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1. /kmod_constants [Modules]

[[Top](#)] [Modules]

NAME

kmod_constants

SYNOPSIS

Used for reading and navigating McIDAS Area format data

USES

none!

1.1. kmod_constants/ae [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

ae

SYNOPSIS

This is the value of the equatorial radius used by many previous routines developed at NESDIS. It is used here for continuity.

1.2. kmod_constants/be_ [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

be

SYNOPSIS

This is the value of the polar radius used by many previous routines developed at NESDIS. It is used here for continuity.

1.3. kmod_constants/EnchiladaDataDir [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

EnchiladaDataDir

SYNOPSIS

Location of data files used in some of the routines.

1.4. kmod_constants/gme [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

gme

SYNOPSIS

Orbital constant used in deriving position from kepler elements, in units of m^3 / s^2

NOTES

Found in Kidder & Vonder Haar 1995: Introduction to Satellite Meteorology

1.5. kmod_constants/j2 [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

j2

SYNOPSIS

Quadropole gravitational coefficient of Earth

NOTES

Found in Kidder & Vonder Haar 1995: Introduction to Satellite Meteorology

1.6. kmod_constants/ree [Definitions]

[[Top](#)] [[kmod_constants](#)] [Definitions]

NAME

ree

SYNOPSIS

Equatorial radius of the Earth in km.

NOTES

Found in Kidder & Vonder Haar 1995: Introduction to Satellite Meteorology

2. /kmod_geometry [Modules]

[[Top](#)] [Modules]

NAME

kmod_geometry

SYNOPSIS

Useful geometrical routines

USES

- * [kmod_constants](#)
- * [kmod_math](#)
- * [kmod_utilities](#)
- * [kmod_time](#)

2.1. kmod_geometry/azimuth [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

azimuth

SYNOPSIS

```
azimuth_angle = azimuth(lat, lon, slat, slon)
```

FUNCTION

Calculate **azimuth** to a location(s) defined by (lat,lon) on the Earth from one point: slat, slon.

INPUTS

```
lat - r*4 - latitude (scalar or arrays rank 1 or 2)
lon - r*4 - longitude (scalar or arrays rank 1 or 2.)
slat - r*4 - latitude of fixed point - (scalar)
slon - r*4 - longitude of fixed point - (scalar)
```

OUTPUT

```
azimuth_angle - 0-360 degrees (clockwise from North) (scalar or arrays rank 1 or 2)
```

NOTES

All variables are passed in units of degrees.

USES

[within](#)

2.2. kmod_geometry/cart2earth [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

cart2earth

SYNOPSIS

```
call cart2earth(x, y, z, julian, lat, lon, radius)
```

FUNCTION

Converts Cartesian coordinates to Earth-relative coordinates.

INPUTS

```
* x (km)
* y (km)
* z (km)
* r*8 - rank2
* r*8 - rank1
* r*8 - scalar
* same type & rank as ip
* julian - r*8 - Julian Date
```

OUTPUT

```
* lat (degrees)
* lon (degrees)
* radius (km)
* same type and rank as x,y,z
```

USES

[cha](#)

NOTES

2.3. kmod_geometry/conv_geolat_lat [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

conv_geolat_lat

SYNOPSIS

```
lat = conv_geolat_lat(geolat)
```

FUNCTION

Converts geocentric latitude to (i.e., every day, run-of-the-mill)

geodetic latitude

INPUTS

- * geocentric latitude (deg)
- * r*4 - rank2
- * r*4 - rank1
- * r*4 - scalar

RESULT

- * geolat (deg) - same type and rank as lat

2.4. kmod_geometry/conv_lat_geolat [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

conv_lat_geolat

SYNOPSIS

geolat = **conv_lat_geolat**(lat)

FUNCTION

Converts geodetic (i.e., every day, run-of-the-mill) latitude to geocentric latitude

INPUTS

- * latitude (deg)
- * r*4 - rank2
- * r*4 - rank1
- * r*4 - scalar

RESULT

- * geolat (deg) - same type and rank as lat

2.5. kmod_geometry/earth2cart [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

earth2cart

SYNOPSIS

```
call earth2cart(lat,lon,x,y,z)
```

FUNCTION

Computes the Cartesian location (x,y,z) based on lat,lon of a point on the earth

INPUTS

```
* latitude (deg)  
* longitude (deg)  
* r*4 - rank2  
* r*4 - rank1  
* r*4 - scalar
```

RESULT

```
* x, y, z (km)  
* same type and rank as latitude
```

USES

[earth_radius](#), [sincos](#)

2.6. kmod_geometry/earth_radius [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

earth_radius

SYNOPSIS

```
radius = earth_radius(lat,geolat,sglat,cglat)
```

FUNCTION

Computes the radius of the Earth at lat.

INPUTS

```
* latitude (deg)  
* r*4 - rank2  
* r*4 - rank1  
* r*4 - scalar
```

RESULT

```
* radius (km)
```

Optional outputs:

- * geolat - returns geocentric latitude (deg)
- * sglat = sin(geolat) - which keeps from computing it again.
- * cglat = cos(geolat) - ditto

USES

[conv_lat_geolat](#), [sincos](#)

2.7. kmod_geometry/gha [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

gha

SYNOPSIS

angle = **gha**(time)

FUNCTION

Calculates the greenwich hour angle.

INPUTS

- * time - Julian Date (as output from [julday](#))
- * scalar or rank1 r*8

RESULT

- * angle (deg) same rank and type as input time
Returns the Greenwich hour angle for the given time in radians (optionally in degrees).

NOTES

This routine is used to convert the satellite position in inertial coordinates to earth coordinates (e.g., longitude). The initial values are taken from Kidder and Vonder Haar:

Kidder and Vonder Haar value:
100.38641 deg at 0000UTC on 1 Jan 1990

TODO

Should include other points which might be more accurate for times not too close to 1990. .. such as the one from NOAA.
From NOAA

Other values can be added by including them in the DATE array and the corresponding hour angle in the GHA0 array

USES

[julday](#)

2.8. kmod_geometry/kep2cart [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

kep2cart

SYNOPSIS

```
call kep2cart(kepler,time,x,y,z)
```

FUNCTION

Calculates the Cartesian location based on keplerian elements and Julian Date.

INPUTS

```
* kepler - real*8(6)
  * kepler(1) = Semimajor axis (km)
  * kepler(2) = Eccentricity
  * kepler(3) = Inclination (deg)
  * kepler(4) = Right ascension of scending node
  * kepler(5) = Argument of Perigee
  * kepler(6) = Mean Anomaly
* time - r*8(scalar or rank1) - Julian Date (output from julday)
```

RESULT

```
* x,y,z (r*8: same rank as inputs) - Cartesian locations (km)
```

NOTES

To locate a satellite in its orbit around a mass (e.g., Earth, Sun) using the Keplerian elements and the time passed since Epoch. The returned position is in the pseudo-inertial reference frame where x points from center of Earth to the Sun at vernal equinox, the z coordinate points along the Earths spin axis northward and the y coordinate completes the right handed coordinate system.

These calculations are based on equations from Kidder & Vonder Haar, 1995: Introduction to Satellite Meteorology

USES

[sincos](#)

2.9. kmod_geometry/solar_angle [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

solar_angle

SYNOPSIS

```
call solar_angle(lat,lon,day,time,sza,azi)
```

FUNCTION

Calculates solar zenith and [azimuth](#) angles.

INPUTS

```
* lat - real*4 - deg
* lon - real*4 - deg
* day - i*4 - day of year
* time- real*4 - fractional hour of day (e.g., output from ftime) (UTC)
```

OUTPUT

```
* sza - real*4 - deg
* azi - real*4 - deg - optional
```

OPTIONS

There are numerous input options available:

TIME CALCULATED PRIOR TO CALL

* ONE POINT AT ONE TIME

```
* call solar_angle(lat,lon,day,time,sza,azi)
```

```
* lat,lon,day,time,sza,azi are all scalars.
```

* MANY POINTS AT ONE TIME

```
* lat,lon, sza, azi are rank1
```

```
* day, time are scalar
```

* MANY POINTS AT MANY TIMES

```
* lat,lon,day,time,sza,azi are all rank1.
```

TIME CALCULATED FROM LINE HEADER

* MANY POINTS AT MANY TIMES

```
* call solar_angle(lat,lon,iy,blu.img,linhdr,sza,azi)
```

```
* lat, lon, sza, azi are rank2 or rank1 or scalar
```

```
* iy is same rank as lat (from the blu\_ll2ij routine)
```

```
* blu.img - array from the bluread routine
```

```
(This method is useful for getting info on recently navigated points).
```

USES

[ftime](#)

2.10. kmod_geometry/varsol [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

varsol

SYNOPSIS

ddm = **varsol**(jday)

FUNCTION

correction factor for Earth-Sun dist

INPUTS

JDAY : integer - day of year (range i 1 to 366)

OUTPUT

Returns the Dsol value. The Earth-Sun Distance normalized by the average distance.

OPTIONS

NOTES

from **varsol.f** (from 6S model)

2.11. kmod_geometry/view_zenith_correct [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

view_zenith_correct

SYNOPSIS

performs the correction

FUNCTION

INPUTS

INPUT: uncorrected Tb, satellite zenith angle,
 Julian day, latitude

OUTPUT

OUTPUT: Seasonal, Latitudinal, Tb dependent
 Zenith angle IR Tb correction

NOTES

programmer: Bob Joyce
date created: 3/2/2000

USES

[VIEW_ZENITH_READ_MODELS](#)

2.12. kmod_geometry/VIEW_ZENITH_READ_MODELS [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

VIEW_ZENITH_READ_MODELS

SYNOPSIS

```
call VIEW_ZENITH_READ_MODELS(error,errorlat,itype)
```

FUNCTION

Reads in the tables to be used by the correction algorithm.

NOTES

```
INCLUDE FOLLOWING CODE (through END INCLUDE) IN MAIN PROGRAM
integer(kind=4), parameter :: J5MAX = 240
integer(kind=4), parameter :: ZABINMX = 64
integer(kind=4), parameter :: TMPBINMX = 170
integer(kind=4), parameter :: ISEASMX = 8
integer(kind=4) :: itype
real(kind=4),dimension(ZABINMX,TMPBINMX) :: error
real(kind=4),dimension(J5MAX,ISEASMX) :: errorlat

call VIEW_ZENITH_READ_MODELS(error,errorlat,itype)

END INCLUDE
```

```
programmer: Bob Joyce
date created: 3/2/2000
purpose: Subroutine read zenith angle corrections models
For itype enter "0" if using PC or LINUX, "1" if SGI or HP
```

USES

[EnchiladaDataDir](#)

2.13. kmod_geometry/viewzenith [Functions]

[[Top](#)] [[kmod_geometry](#)] [Functions]

NAME

viewzenith

SYNOPSIS

```
vza = viewzenith(lat,lon,glat,glon)
```

FUNCTION

Calculate the view zenith angle (in degrees) from the lat/lon of a location on the Earth and a satellite in geostationary orbit at location glat/glon

INPUTS

Inputs can be of rank1, rank2 or scalar and are real*4's:

- * lat - deg
- * lon - deg
- * glat - deg
- * glon - deg

OUTPUT

vza - deg - Real*4 with same rank as input.

2.14. kmod_geometry/zenazi [Subroutines]

[[Top](#)] [[kmod_geometry](#)] [Subroutines]

NAME

zenazi

SYNOPSIS

```
call zenazi(point,sat,vza,azi)
```

FUNCTION

Calculates zenith (and [azimuth](#)) angles from point and satellite locations.

INPUTS

- * point
Either:
 - * real*4(3) - Cartesian coordinates (km)
 - * real*4(2) - (/lat,lon/) coordinates (deg)
- * sat - real*4(3) - (/lat(deg),lon(deg),radius(deg))
for example, subsat output from [blu_ij211](#)

OUTPUT

* vza - real*4 - zenith angle (deg)
* azi - real*4 - [azimuth](#) angle (deg) - optional

USES

[earth radius](#), [conv_lat_geolat](#), [azimuth](#)

NOTES

3. /kmod_isccp [Modules]

[[Top](#)] [Modules]

NAME

kmod_isccp

SYNOPSIS

Files used in manipulating ISCCP data and files

USES

[kmod_mcidas](#), [kmod_utilities](#), [kmod_math](#), [kmod_geometry](#)

3.1. kmod_isccp/b1getfile [Functions]

[[Top](#)] [[kmod_isccp](#)] [Functions]

NAME

b1getfile

SYNOPSIS

file1 = **b1getfile**(b1file,dtime)

FUNCTION

Find the B1U file based on the time of the file B1FILE and a change in time DTIME. This is useful for comparing observations at the same time on different days.

INPUTS

b1file - char(len=*) - full path to the B1U FILE
dtime - real*4 - difference in time in days

OUTPUT

file1 - char(len=120) - Name of the B1U file dttime days
away from B1FILE, or 'MISSING' if none found.

USES

[caldat](#), [julday](#)

3.2. kmod_isccp/b1u_calinfo [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

blu_calinfo

SYNOPSIS

Store calibration information for B1U data.

3.3. kmod_isccp/b1u_channel_index [Functions]

[[Top](#)] [[kmod_isccp](#)] [Functions]

NAME

blu_channel_index

SYNOPSIS

```
index = blu_channel_index(blu.sat.chname, channel)
```

FUNCTION

Returns the index of the location where CHNAME equals
the requested channel.

INPUTS

- * blu.sat.chname - list of channel names provided by [bluread](#)
- * char(len=6), dimension (:)
- * see [blu_data](#), [blu_satinfo](#)
- * channel - char(len=*)

OUTPUT

- * index - integer*4 - range: [1,nchan]

NOTES

* returns -1 if channel non-existent in the blu information provided.

3.4. kmod_isccp/b1u_data [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

blu_data

SYNOPSIS

Data structure for ISCCP B1U data.

3.5. kmod_isccp/b1u_dn2cal [Subroutines]

[[Top](#)] [[kmod_isccp](#)] [Subroutines]

NAME

blu_dn2cal

SYNOPSIS

call **blu_dn2cal**(channels, blu, temp, order)

FUNCTION

Applies the calibration tables stored in the blu structure

INPUTS

channels - char(len=*)(:) - Channel names (IRWIN, IRWVP, ...) to be calibrated
blu - [blu_data](#) - blu data from the [bluread](#) algorithm

OUTPUT

NOTES

Incomplete documentation.

USES

3.6. kmod_isccp/b1u_get_angles [Subroutines]

[[Top](#)] [[kmod_isccp](#)] [Subroutines]

NAME

blu_get_angles

SYNOPSIS

```
call blu_get_angles( blu, lat, lon, vza, azi, sza, azn, subsat )
```

FUNCTION

This routine calculates viewing an illumination angles based on the blu structure and lat/lon's provided.

INPUTS

blu - type([blu_data](#)) - blu information provided by [bluread](#)
 lat - r*4 - rank2 - latitude
 lon - r*4 - rank2 - longitude

OUTPUT

subsat(3) - sub-satellite [lat(deg),lon(deg),radius(km)]
 - The remaining outputs are optional, real*4 rank2 allocatable arrays
 vza - view zenith angle (deg)
 azi - view [azimuth](#) angle (deg) (0 to 360, clockwise from North)
 sza - solar zenith angle at time of observation (deg)
 azn - solar [azimuth](#) angle (deg) (0 to 360, clockwise from North)

NOTES

See Enchilada for units of lat/lon

USES

[blu_ij2ll](#)
[solar_angle](#)

3.7. kmod_isccp/b1u_get_center [Subroutines]

[[Top](#)] [[kmod_isccp](#)] [Subroutines]

NAME

blu_get_center

SYNOPSIS

```
call blu_get_center(file,center)
```

FUNCTION

To read in the derived B1U image center information (derived by `idl.blu_finalcenter`).

INPUTS

* `file` - B1U filename (character(len=*))

OUTPUT

* `center` : real(kind=4), dimension(13)
`center(1:4)` = binomial fit information
`center(5:6)` = range of the derived center pixel values
`center(7)` = correction for the center scan angle
`center(8:11)` = moments of the on-earth IR distribution:
 mean, std. dev., skew, kurtosis
`center(12)` = [median](#) of the on-earth IR distribution
`center(13)` = average space count

NOTES

3.8. `kmod_iscpp/b1u_get_qc` [Functions]

[[Top](#)] [[kmod_iscpp](#)] [Functions]

NAME

`blu_get_qc`

SYNOPSIS

call `blu_get_qc`(file, blu, qc, overwrite, readit)

FUNCTION

This routine returns the quality information on a line-by-line basis for the scans in a B1U file. The data is read from the QCQA file (if it's missing, then the QCQA info is calculated)

INPUTS

See source below for type information:
 * `file` - filename of the B1U file
 * `blu` - blu data structure

OUTPUT

* `qc` - QC info for each band/channel and scan line

OPTIONS

```

* overwrite - flag to overwrite QCQA file if it exists
* readit   - flag to read the blu data (i.e., blu data not
              provided by parent routine)
* debug    - Print debugging output

```

USES

[bluread](#), [smooth](#)

3.9. kmod_isccp/b1u_gvar [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

blu_gvar

SYNOPSIS

Store gvar information in the blu header.

3.10. kmod_isccp/b1u_ll2ij [Subroutines]

[[Top](#)] [[kmod_isccp](#)] [Subroutines]

NAME

blu_ll2ij

SYNOPSIS

```

call blu_ll2ij( lat, lon, ip, jp, blugvar, vza, subsat, debug, scanangle)
      or
call blu_ll2ij( lat, lon, ip, jp, nav, vza, subsat, debug, scanangle)

```

FUNCTION

To convert latitude/longitude point(s) of a satellite image to line/pixel coordinates.

INPUTS

```

* lat (degrees)
* lon (degrees)
  * r*4 - rank2
  * r*4 - rank1
  * r*4 - scalar
  * same type & rank as ip
* Navigation is taken from either:
  * NAV - B1U Navigation array (LONARR(200)) from bluread
  * blugvar, which is type(blu\_gvar)

```

OUTPUT

```
* ip - Pixel locations (default is in image coordinates):
* jp - Line locations (default is in image coordinates):
* Optional outputs:
  * vza - optional:
    * same type and rank as ip
  * subsat - optional - r*4(3) - [lat(deg),lon(deg),radius(km)]
```

OPTIONS

```
Optional arguments:
* debug - i*4 - set debug=1 for optional debugging output
* scanangle - i*4 - set to return scan and elevation angles (deg)
  instead of lat/lon values.
```

USES

[nav2rec](#), [bcd_time](#), [imcnv_rl](#), [julday](#), [kep2cart](#), [cart2earth](#), [sincos](#)

NOTES

```
* The GVAR Navigation calls imc_nav
* The Kepler navigation (all non-GVAR satellites) is based on
  Kidder and Vonder Haar, 1995: Introduction to Satellite Meteorology
* While this routine could use Chebyshev polynomials, it is not yet set up
  to do it.
```

3.11. kmod_isccp/b1u_satinfo [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

b1u_satinfo

SYNOPSIS

Store satellite and sensor information for B1U data.

3.12. kmod_isccp/b1u_scanline [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

b1u_scanline

SYNOPSIS

Store information on the scan line and scan header.

3.13. kmod_isccp/b1u_tgrinfo [Structures]

[[Top](#)] [[kmod_isccp](#)] [Structures]

NAME

blu_tgrinfo

SYNOPSIS

Store test grid information for B1U data.

NOTES

JMA, CMA and early GOES files provided test grids which provide lat/lon pairings for a fixed grid on the earth. In particular, the JMA and CMA files were used to calculate orbit and attitude information for the Kepler navigation.

3.14. kmod_isccp/b1uread [Functions]

[[Top](#)] [[kmod_isccp](#)] [Functions]

NAME

bluread

SYNOPSIS

istatus = **bluread**(file, blu)

FUNCTION

This reads in the blu file and returns the data in the blu structure.

INPUTS

file - char(len=*) - full path to the B1U file

OUTPUT

B1U - type([blu_data](#)) - the B1U data returned in a structure
istatus - i*4 - successful=1, failed=0

NOTES

Some of the parameters in [blu_data](#) are allocatable. Here is how they are

```

declared:
*   allocate (blu%sat%chname(nchan))
*   allocate (blu%sat%chinfo(nchan))
*   allocate (blu%fhdr(len_ob1))
*   allocate (blu%image%prefix(0:19,nchan,nscan))
*   allocate (blu%image%scan(nchan,nelem,nscan))
*   allocate (blu%cal%ctable(2,nchan,nbin))

```

USES

[swap_endian](#)

3.15. kmod_iscpp/view_zenith_correct_iscpp [Functions]

[[Top](#)] [[kmod_iscpp](#)] [Functions]

NAME

view_zenith_correct_iscpp

SYNOPSIS

```
temp_correct = view_zenith_correct_iscpp(BTemp,VZA)
```

FUNCTION

Corrects the brightness temperature of the IR Window channel based on theory.

INPUTS

```

* BTemp - real*4(rank2, rank1, scalar) - Brightness Temperature in Kelvin
* VZA   - real*4(same rank) - view zenith in degrees

```

OUTPUT

```
temp_correct - Corrected brightness temperature in Kelvin
```

4. /kmod_math [Modules]

[[Top](#)] [Modules]

NAME

kmod_math

SYNOPSIS

Useful mathematical routines

USES

[kmod_utilities](#)

4.1. kmod_math/avevar [Subroutines]

[[Top](#)] [[kmod_math](#)] [Subroutines]

NAME

avevar

SYNOPSIS

```
call avevar(data, n, ave, var, skew)
```

FUNCTION

Calculate moments of a data set.

INPUTS

data - real*4(n) - Data from which to determine statistical moments
n - int*4 - Number of points

OUTPUT

ave - real*4 - average of data
var - real*4 - variance of data
skew- real*4 - skewness of data (optional)

NOTES

4.2. kmod_math/idl_moment [Subroutines]

[[Top](#)] [[kmod_math](#)] [Subroutines]

NAME

idl_moment

SYNOPSIS

```
result = moment(values,mask)
```

FUNCTION

Mimics the IDL routine moment.

INPUTS

* values - i*2(:,:), i*4(:,:), r*4(:,:), r*4(:,:) - input values
 * mask - logical - same dimension as value (optional)

RESULT

* r*4(4)
 * Result(1) = mean
 * Result(2) = standard deviation (n-1)
 * Result(3) = skewness
 * Result(4) = kurtosis

4.3. kmod_math/median [Subroutines]

[[Top](#)] [[kmod_math](#)] [Subroutines]

NAME

median

SYNOPSIS

result = **median**(values,mask)

FUNCTION

Calculates the **median**

INPUTS

* values - r*4(:,:) - input alies
 * mask - logical - same dimension as value (optional)

RESULT

* [idl_where](#)
 * qsort

4.4. kmod_math/sincos [Subroutines]

[[Top](#)] [[kmod_math](#)] [Subroutines]

NAME

sincos

SYNOPSIS

```
call sincos(angle,sina,cosa)
```

FUNCTION

Calculates sine and cosine of angle faster than doing it separately.

INPUTS

```
* angle - degrees
* real*4: scalar, rank1, rank2
* real*8: rank1, rank2
```

OUTPUT

```
Same rank and type as angle:
* sina - sine(angle)
* cosa - cosine(angle)
```

NOTES

This routine was created to speed up routines which use both sine and cosine of a set of angles. It is faster than performing the calculations separately since the cosine is used, then the sine is calculated from the result of the cosine. However, it may not be faster when using the scalar, it is much faster when the array is large.

4.5. kmod_math/smooth [Functions]

[[Top](#)] [[kmod_math](#)] [Functions]

NAME

smooth

SYNOPSIS

```
sd = smooth( input, width, flag, boxcar, binomial )
```

FUNCTION

This function smooths input data using either boxcar or binomial smoothing.

INPUTS

```
input - real*4 - rank1 - The input data to be smoothed.
width - integer*4 - Width of the boxcar/polynomial smoothing operators
Optional Inputs:
* flag - logical - rank1 - Ignore input values where flag is false
* For boxcar smoothing, set BOXCAR=1
* For binomial smoothing, set BINOMIAL=1
```

OUTPUT

The returned array is the smoothed array.

USED BY

[blu_get_gc](#)

4.6. kmod_math/spatstdev [Functions]

[[Top](#)] [[kmod_math](#)] [Functions]

NAME

spatstdev

SYNOPSIS

```
sd = spatstdev(image,nin)
```

FUNCTION

Returns the spatial standard deviation at each location in image. The size of the box is defined by +/- nin/2 (so nin=5 is +/- 2)

INPUTS

```
image = real*4(rank2)
nin   = int*4
mask (OPTIONAL) - logical (same size) - only use points which are true
```

OUTPUT

```
sd = real*4(rank2)
```

HISTORY

2007Oct18 - Modifying to accept REAL and INT arrays as well as a QC mask

4.7. kmod_math/stdev [Functions]

[[Top](#)] [[kmod_math](#)] [Functions]

NAME

stdev

SYNOPSIS

```
s = stdev(data)
```

INPUTS

```
data = real*4(rank1) or int*4(rank1) or int*2(rank1,rank2 or rank3)
```

OUTPUT

```
s = real*4 = standard deviation of data
```

4.8. kmod_math/unit [Functions]

[[Top](#)] [[kmod_math](#)] [Functions]

NAME

unit

SYNOPSIS

```
out = unit(array)
```

FUNCTION

Creates a **unit** vector from an array.

INPUTS

```
* array - real*4(:), real*8(:), real*8(:,:)
```

OUTPUT

```
* out - same type and rank as array
```

5. /kmod_mcidas [Modules]

[[Top](#)] [Modules]

NAME

kmod_mcidas

SYNOPSIS

Used for reading and navigating McIDAS Area format data

USES

[kmod_constants](#)
[kmod_math](#)

5.1. kmod_mcidas/bcd_time [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [Subroutines]

NAME

bcd_time

SYNOPSIS

```
call bcd_time (time,year,jday,hour,minute,second,msec)
```

FUNCTION

Converts Byte-encoded time (BCD=Binary Coded Decimal) to "normal" values.

INPUTS

time - i*1(0:7) - byte-encoded time

OUTPUT

```
year
jday  - i*4 - day of year
hour  - i*4 - hour of day
minute - i*4 - minute of hour
second - i*4 - second of minute
msec  - i*4 - # of milliseconds
```

5.2. kmod_mcidas/gvar_angle_information [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

gvar_angle_information

SYNOPSIS

Format and content for angular information [within](#) the McIDAS GVAR Navigation Header. It combines the monomial and sinusoidal components.

5.3. kmod_mcidas/gvar_area [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

gvar_area

SYNOPSIS

Format and content for the McIDAS AREA file format file header.

5.4. kmod_mcidas/gvar_ij2ll [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [Subroutines]

NAME

gvar_ij2ll

SYNOPSIS

```
call gvar_ij2ll( i, j, lat, lon, area, nav)
```

FUNCTION

This function navigates satellite image coordinates to Earth points (defined as lat/lon locations) using the area and navigation headers from the McIDAS area file.

INPUTS

```
i - real*4 - Image element number
j - real*4 - Image line number
* i & j can be of rank1, rank2 or scalar
```

OUTPUT

```
lat - real*4 - latitude
lon - real*4 - longitude
* lat and lon are the same rank as the input lat/lon
```

USES

[bcd_time](#), [nav2rec](#), [imcnay](#)

5.5. kmod_mcidas/gvar_ll2ij [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [Subroutines]

NAME

gvar_112ij

SYNOPSIS

```
call gvar_112ij( lat, lon, i, j, area, nav)
```

FUNCTION

This function navigates Earth points (defined as lat/lon locations) to satellite image coordinates using the area and navigation headers from the McIDAS area file.

INPUTS

```
lat - real*4 - latitude
lon - real*4 - longitude
* lat,lon can be of rank1, rank2 or scalar
```

OUTPUT

```
i - real*4 - Image element number
j - real*4 - Image line number
* i & j are the same rank as the input lat/lon
```

USES

[bcd time](#), [nav2rec](#), [imcnav](#)

5.6. kmod_mcidas/gvar_monomial [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

gvar_monomial

SYNOPSIS

Format and content for monomial portion of the McIDAS GVAR Navigation Header.

5.7. kmod_mcidas/gvar_nav [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

gvar_nav

SYNOPSIS

Format and content for the McIDAS AREA file format file header. navigation header for GVAR data.

NOTES

5.8. kmod_mcidas/gvar_sinusoid [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

gvar_sinusoid

SYNOPSIS

Format and content for sinusoid portion of the McIDAS GVAR Navigation Header.

5.9. kmod_mcidas/imcnav [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [Subroutines]

NAME

imcnav

SYNOPSIS

```
call imcnav(dlat,dlon,line,pixel,key,imc,instr,
  nye,nde,nhe,nme,se, &
  ny,nd,nh,nm,s, &
  ew_nad_cy, ew_nad_inc, ns_nad_cy, ns_nad_inc, &
  REC, glat, glon, grad, vza,scanangle)
```

FUNCTION

Performs conversion between lat/lon and i/j (the direction of the transform depends on key).

INPUTS

OUTPUT

NOTES

- * This code is the code delivered by contractors as part of the Earth Location User's Guide (ELUG) It was converted to Fortran90 code by to_f90.
- * Code converted using TO_F90 by Alan Miller Date: 2004-12-03 Time: 08:31:57
- * This is the basis of the [imcnav_r1](#) routine, which performs the same operation except on rank 1 array.

MODIFICATION HISTORY

- * Conversion to Fortran90
- * Knapp adjusted it to optional return scan/elevation angles instead of lat/lons.

5.10. kmod_mcidas/imcnav_r1 [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [Subroutines]

NAME

imcnav_r1

SYNOPSIS

```
call imcnav_r1(dlat,dlon,line,pixel,key,imc,instr,  
  nye,nde,nhe,nme,se, &  
  ny,nd,nh,nm,s, &  
  ew_nad_cy, ew_nad_inc, ns_nad_cy, ns_nad_inc, &  
  REC, glat, glon, grad, vza,scanangle)
```

FUNCTION

Performs conversion between lat/lon and i/j (the direction of the transform depends on key).

INPUTS

OUTPUT

NOTES

- * This code is the code delivered by contractors as part of the Earth Location User's Guide (ELUG) It was converted to Fortran90 code by to_f90.
- * Code converted using TO_F90 by Alan Miller Date: 2004-12-03 Time: 08:31:57
- * This code is based on the [imcnav](#) routine.

MODIFICATION HISTORY

- * Conversion to Fortran90
- * Knapp adjusted this to use rank1 location parameters
- * Knapp adjusted it to optional return scan/elevation angles instead of lat/lons.

5.11. kmod_mcidas/mcidas_read [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [[Subroutines](#)]

NAME

mcidas_read

SYNOPSIS

```
call mcidas_read (filename, AREA, GVAR, VISR, image, LINhdr, cmb, info)
```

FUNCTION

Reads McIDAS Area format files.

INPUTS

filename - char(len=*) - filename of the Area file

OUTPUT

AREA - [gvar_area](#) - area header
 GVAR - [gvar_nav](#) - GVAR navigation header (optional)
 VISR - [visr_nav](#) - VISR navigation header (optional)
 image- int(nx,ny,nch)- multi-bandedsatellite image (optional)
 cmd - char(len=120) (:) - MCIDAS command line (optional)
 info - int(4) - information?? (optional)

NOTES

Uses a LSTAT: a lahey/fortran 95 specific routine which may or may not be available with other compilers. This is used to retrieve the file size.

5.12. kmod_mcidas/nav2rec [Subroutines]

[[Top](#)] [[kmod_mcidas](#)] [[Subroutines](#)]

NAME

nav2rec

SYNOPSIS

```
call nav2rec(nav,rec)
```

FUNCTION

This routine converts the navigation structure to the REC array.

INPUTS

* nav - type([gvar_nav](#)) - Navigation info produced from [bluread](#)

OUTPUT

rec - r*8(:)

USED BY

[blu_ij2ll](#), [blu_ll2ij](#) (rec is used by [imcnav_r1](#))

5.13. kmod_mcidas/visr_nav [Structures]

[[Top](#)] [[kmod_mcidas](#)] [Structures]

NAME

[gvar_area](#)

SYNOPSIS

Format and content for the McIDAS AREA file format navigation header for VISR data.

6. /kmod_time [Modules]

[[Top](#)] [Modules]

NAME

kmod_time

SYNOPSIS

Used for modifying time values

USES

none!

6.1. kmod_time/caldat [Subroutines]

[[Top](#)] [[kmod_time](#)] [Subroutines]

NAME

caldat

SYNOPSIS

call **caldat**(julian, mm, id, iyyy, hour, min, sec)

FUNCTION

Inverse of the function [julday](#). Here JULIAN is input as a Julian Day Number and the routine outputs mm, id and iyyy as the month, day and year on which the specified Julian Day started at noon

INPUTS

* Julian - real*8(scalar, rank1) - Julian Date (e.g., output from [julday](#))

OUTPUT

Outputs are same rank as julian:
 * mm = int*4 = Month of year (1-12)
 * id = int*4 = Day of Month
 * iyyyy = int*4 = Year
 * hour = int*4 = hour of day (optional)
 * min = int*4 = minute of hour (optional)
 * sec = real*4= second of minute (optional)

NOTES

This routine was typed in by Ken Knapp and is based on the work presented in:
 Numerical Recipes in Fortran 77
 Second Edition
 Vol. 1
 by Press et al.

6.2. kmod_time/ftime [Functions]

[[Top](#)] [[kmod_time](#)] [Functions]

NAME

ftime

SYNOPSIS

result = **ftime**(hour,min,sec)

FUNCTION

Computes the fractional time of day based on HH:MM:SS

INPUTS

```
* HOUR = HHMMSS
      or
* hour
* minute
* second
```

The inputs are either scalar or rank1 int*4.

RESULT

```
* result - same rank as input hour, but type is real*4
```

6.3. kmod_time/julday [Functions]

[[Top](#)] [[kmod_time](#)] [Functions]

NAME

julday

SYNOPSIS

```
time = julday(mon,dom,year,hour,min,sec)
```

FUNCTION

Calculates the Julian Date based on conventional time.

INPUTS

```
* mon - i*4 - month of year (1-12)
* dom - i*4 - day of month (1-31)
* if mon = 1 then this is the daoy (Day of year: 1-366)
* year- i*4
* hour- i*4 - hour of day (optional)
* min - i*4 - minute of hour (optional)
* sec - r*4 - second of minute (optional)

* If any of the optional parameters are left out, they are set to zero.
* Time can be input as scalar or rank1.
```

RESULT

```
* time (r*8: same rank as inputs) - Julian Date
```

NOTES

This routine was typed in by Ken Knapp and is based on the work presented in:
 Numerical Recipes in Fortran 77
 Second Edition
 Vol. 1
 by Press et al.

In this routine, **julday** returns the Julian Day Number that begins at noon of the calendar date specified by month mon, day dom, and year. Positive year signifies A.D and negative year B.C. Remeber, 1 BC is followed by 1 AD (there is no zero year)

6.4. kmod_time/yymmdd_2_yyjjj [Functions]

[[Top](#)] [[kmod_time](#)] [Functions]

NAME

`yymmdd_2_yyjjj`

SYNOPSIS

```
time = yymmdd(input)
```

FUNCTION

Calculates the Julian Date based on conventional time.

INPUTS

input - date in format YYYYMMDD

* If optional arguments are specified, then input is merely the dom

RESULT

*

NOTES

* Although the title has YY, year can either be 2 or 4 digits

7. /kmod_utilities [Modules]

[[Top](#)] [Modules]

NAME

`kmod_utilities`

SYNOPSIS

This is the generic module which holds all generic utilities for general distribution to the public.

NOTES

7.1. kmod_utilities/dot [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

dot

SYNOPSIS

```
dot = dot(a, b)
```

FUNCTION

Computes the **dot** product of two arrays

INPUTS

```
* a
* b
* r*4 - rank1
* r*8 - rank1
* i*4 - rank1
* r*8 - rank2
```

RESULT

```
* dot_product - The dot product of a and b
```

NOTES

```
* If a,b are rank2, then it computes the dot product by
  output = sum(a * b,dim=1)
```

7.2. kmod_utilities/eval [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

eval

SYNOPSIS

```
mask = eval(logical1)
```

FUNCTION

Returns an int*4 evaluated to 1 or 0 based on logical1

INPUTS

```
logical1 - logical (scalar, rank1, rank2)
```

OUTPUT

```
mask - int*4(same rank as logical1)
```

NOTES

```
* set to 1 if logical2 is true
* set to 0 if logical1 is false
* This is based on the IDL usage:
IDL> print,indgen(6) gt 2
  0 0 0 1 1 1
```

EXAMPLE

```
mask = eval((/4, 5, 6, 7/) == 6 )
returns:
  mask = (/ 0, 0, 1, 0 /)
```

7.3. kmod_utilities/idl_where [Subroutines]

[[Top](#)] [[kmod_utilities](#)] [Subroutines]

NAME

idl_where

SYNOPSIS

```
call idl_where(test,index,num)
```

FUNCTION

This function mimics the IDL function where. It returns an array with values assigned where the array test is .true.

INPUTS

OUTPUT

EXAMPLES

```
The foollowing source:
call idl_where( (/ 1,2,3,4/) >= 3,index,number)
print*,number
print*,index
Produces:
  2
  3 4
```

USED BY

clavr_ir_tests.f90, clavr_comp6.f90, [median](#)

7.4. kmod_utilities/is_zipped [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

is_zipped

SYNOPSIS

```
if (is_zipped(filename)) then ...
```

FUNCTION

This function determines whether a file is compressed.

INPUTS

* Char(len=*) - filename - Filename of the file to be tested

RESULT

true - if the file ends with 'gz'
false - otherwise

USES

[strsplit](#)

7.5. kmod_utilities/point_lun [Subroutines]

[[Top](#)] [[kmod_utilities](#)] [Subroutines]

NAME

point_lun

SYNOPSIS

```
call point_lun(unit,position)
```

FUNCTION

To place the current location of logical [unit](#) [unit](#) at POSITION bytes into the file.

INPUTS

- * [unit](#) - an open logical [unit](#) number
- * position - position in bytes

NOTES

This mimics IDL `point_lun` routine, but it is very slow, since it rewinds the file and reads in POSITION bytes. There is a faster routine in Lahey Fortran, but that would make this not very portable.

USED BY

[bluread](#)

7.6. kmod_utilities/random_string [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

`random_string`

SYNOPSIS

```
temp_file=random_string(N)
```

FUNCTION

Creates a random string of length N.

INPUTS

N - i*4 - length of the string to be generated

RESULT

* char(len=120) - random string

NOTES

7.7. kmod_utilities/remove_gz [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

remove_gz

SYNOPSIS

```
temp_file=remove_gz(filename)
```

FUNCTION

Returns a character string with the extension '.gz' removed (if present)

INPUTS

* filename - char(len=*) - Filename

RESULT

* char(len=120) - string with extension '.gz' removed (if present)

USES

[strjoin](#), [strsplit](#)

7.8. kmod_utilities/stripname [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

stripname

SYNOPSIS

```
file = stripname(full_filename)
```

FUNCTION

This strips the path from the filename

INPUTS

full_filename - char(len=*) - filename which may include a path

OUTPUT

file - filename with path removed

USES

[strsplit](#)

7.9. kmod_utilities/strjoin [Subroutines]

[[Top](#)] [[kmod_utilities](#)] [Subroutines]

NAME

strjoin

SYNOPSIS

```
call strjoin(string,sep,output)
```

FUNCTION

Joins an array of characters using SEP

INPUTS

```
* string - char(len=*), rank1
* sep    - char(len=1)
```

OUTPUT

```
* output - char(len=*) - resulting joined string
```

NOTES

This is meant to mimic the IDL function **strjoin** (the inverse of [strsplit](#))

7.10. kmod_utilities/strpos [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

strpos

SYNOPSIS

```
loc = strpos(string,part)
```

FUNCTION

Find the location of part in string

INPUTS

```
* string - char(len=*)  
* part   - char(len=*)
```

OUTPUT

```
* loc - int*4 - location of the first character where part = string
```

NOTES

This is meant to mimic the IDL function **strpos**

7.11. kmod_utilities/strsplit [Subroutines]

[[Top](#)] [[kmod_utilities](#)] [Subroutines]

NAME

strsplit

SYNOPSIS

```
call strsplit(string,sep,output,nn)
```

FUNCTION

Separate the character STRING based on SEP into the OUTPUT variable.

INPUTS

```
* string - char(len=*)  
* sep    - char(len=1) - separator - e.g., '.', '-', ',', etc.
```

OUTPUT

```
* output - char(len=120), allocatable  
* nn     - number of elements in output
```

NOTES

This is meant to mimic the IDL function **strsplit**

7.12. kmod_utilities/swap_endian [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

swap_endian

SYNOPSIS

```
out = swap_endian(in)
```

FUNCTION

Swaps the Endian-ness of a variable

INPUTS

```
in - a variable which could be:
* int*2:  scalar, rank1, rank2, rank3
* int*4:  scalar, rank1
* real*4: scalar, rank1, rank2
```

OUTPUT

The byte-swapped output of same type and rank as IN

7.13. kmod_utilities/within [Functions]

[[Top](#)] [[kmod_utilities](#)] [Functions]

NAME

within

SYNOPSIS

```
out = within(array,min,max)
```

FUNCTION

Forces variable array to have values **within** min and max.

INPUTS

```
* array - type can be any of:
* int*4:  scalar, rank1, rank2
* int*2:  rank2
* real*4: scalar, rank1, rank2
* real*8: scalar, rank1, rank2
* min - scalar with same type as array - optional
* max - scalar with same type as array - optional
```

OUTPUT

out - same rank and type as input, but now is **within** the range [min,max]

NOTES

* This routine mimics the following IDL function:
 IDL> print,indgen(6)>1<4
 1 1 2 3 4 4

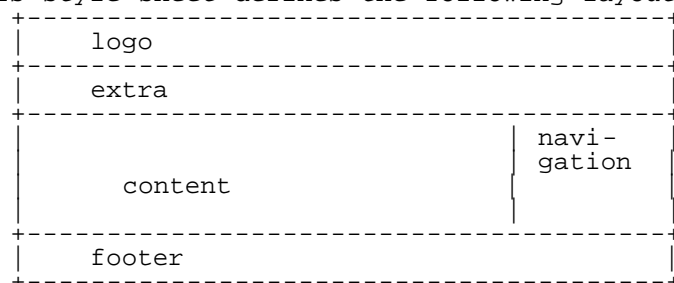
8. ROBODoc/ROBODoc Cascading Style Sheet [Modules]

[[Top](#)] [Modules]

FUNCTION

This is the default cascading style sheet for documentation generated with ROBODoc. You can edit this file to your own liking and then use it with the option
 --css <filename>

This style-sheet defines the following layout



This style-sheet is based on a style-sheet that was automatically generated with the Strange Banana stylesheet generator. See <http://www.strangebanana.com/generator.aspx>

9. /match_hirs_b1u [Programs]

[[Top](#)] [Programs]

NAME

match_hirs_b1u

SYNOPSIS

Performs colocations of HIRS with ISCCP B1U data. Colocations are limited in space and time.

INPUTS

Command line:

```
$ match_hirs_b1u <match_file>
```

where:

- <match_file> is a matchup file containing ISCCP B1U files and corresponding POES files, including: ISCCP B2, HIRS AS, and HIRS L1C data.

OUTPUT

A binary file is created for each matchup, reporting on the HIRS and B1U statistics associated with the matchup.

USES

Enchilada, Enchilada_Internal

AUTHOR

Ken Knapp - NCDC/RSAD - October 2005

NOTES

- * New compilation does not use compile but the kmod Makefile.
- * Compilation: make.match
- * \$ compile -mei -p blu_HIRS-path-AS_matchup.f90 -o **match_hirs_blu**
- * Hardcoded options include:
 - * dblpix - search +/-DB1PIX B1U pixels from HIRS center for colocation with HIRS. This allows a 25x25 box to be used to find B1U pixels which fall within the HIRS footprint
 - * dtimes - difference in time allowed for matchups expressed in days currently=2/24 (2 hours). While, 2 hours allows a previous orbit, the change in time generally is overcome by errors in surface heating and cloud motion.
 - * dmulimit-The difference in mu between HIRS and B1U. The limit in VZA varies nonlinearly with VZA, so dMU is better. Sensitivity studies showed dMU~0.1 was reasonable, so here, will only keep obs within 0.2
 - * fov_frac-The B1U stats are collected for 3 levels. Currently, for B1U pixels falling exactly within the footprint, then expanding the footprint by one half and 1 full B1U pixel ... this allows for B1U pixels whose pixel center is outside the HIRS footprint, but a portion of which may be within the HIRS footprint.
 - * alphag - This represents the scan angle (in radians) of an 8km footprint GEO satellite (e.g., it is twice the GOES-8 IR scan angle).

TODO

- * GEO-GEO calibrations should be included in the future.

10. b1ucal/b1u_calibration_procedure [Generics]

[[Top](#)] [Generics]

NAME

blu_calibration_procedure

PURPOSE

To use HIRS as a basis for ISCCP B1U calibration.

NOTES

The following is the general flow of calibrating ISCCP B1U data using HIRS Pathfinder All Sky data.

1. Contact Lei Shi and have her update the HIRS Pathfinder All Sky files through 2008.
2. Ensure the files are visible in the \$DATA/hirs/ subdirectories. This is done through symbolic links to her files on crystal.
3. Update ISCCP B1U files. See [isccp blu production](#) for more information on this process.
4. Run match_blu_poes.pro through the latest year to ensure that ISCCP B1U files and HIRS clear sky files can be matched up.
5. Run the Fortran matchup routine:
6. ...

USES

- * match_poes.pro

USED BY

- The following routines use the calibration results of this process:
- * [idl.blu_2_grisat](#)

TODO

- * Change calibration from linear regression of T vs T to (T-T) vs. T. T vs T leads to biases when correlation decreases because linear regression tends toward a zero slope. Using the anomaly would remove this bias.

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Fri Oct 5 10:36:07 EDT 2007

HISTORY

- * 2007Oct05 - Modifying to report values instead of NaN (particularly useful for SMS)
- * 2009Apr07 - Adding more documentation

11. b1ucal/idl.cal_b1u_correct [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

cal_blu_correct

PURPOSE

To analyze the collected monthly matchups between HIRS and ISCCP B1 and provide a monthly calibration correction for use in calibrating ISCCP B1 observations for climate purposes.

USAGE

INPUT

OUTPUT

RESULT

The output is the calibration file to the directory:
/home/kknapp/idl/isccp/calib/

EXAMPLE

USES

- * blank.pro
- * circle.pro [idl/lib]
- * cl.pro
- * cleanplot.pro [idl/dl]
- * correlation.pro
- * flines.pro
- * legend.pro [idl/dl]
- * mean.pro
- * multiplot.pro
- * [percentiles](#).pro
- * png.pro
- * reset.pro
- * [stdev](#).pro

USED BY

- * [blu_calibration_procedure](#)

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Fri Oct 5 10:36:07 EDT 2007

HISTORY

- * 2007Oct05 - Modifying to report values instead of NaN (particularly useful for SMS)

12. grisat-b1/grisat-b1 [Generics]

[[Top](#)] [[Generics](#)]

NAME

grisat-b1

PURPOSE

Gridded Satellite data - B1

The data are brightness temperatures at channels available from ISCCP B1 data. The global channels are:

- visible (0.6 um)
- infrared window (11 um)
- infrared water vapor (6.7 um)

The data are provided in netCDF and CF compliant conventions to simplify access by automated tools.

NOTES

The processing of **grisat-b1** data is based on this IDL routine. However, many things need to be in place prior to this last step. The following is a summary of the Processing steps required to create **grisat-b1** data:

1. Convert ISCCP B1 files to B1U files.

Data from the archive are in numerous formats, so processing is simplified by unifying the format. The file `bl_2_blu.pro` does the bulk of the work in reformatting and creating the B1U files.

2. Create Match files

The Match files are lists of temporally co-located satellite files. The files are created by `match_blu_poes.pro`. In general, this lists coincident B1U files along with SSMI, HIRS and ISCCP B2 AVHRR files. This simplifies looking for matching pixels by providing the list of temporally located files. Match files are produced at 3-hr resolution and point to files located across NCDC servers (in current configuration, using the `nfs` connections).

3. Co-locate ISCCP B1U with HIRS all sky radiances

This step is performed by a Fortran routine:

`blu_HIRS-path-AS_matchup.f90`

This process matches B1U observations with HIRS when both have nearly the same viewing geometry. The output of this routine is then used to create a calibration correction that normalizes B1U calibration to HIRS data. It currently matches data for the IRWIN, IRWVP and IRSPL channels. The output of these steps are called the calibration match files.

4. Create monthly calibration coefficients

Process the instantaneous calibration match files (output from step 3) to monthly corrections. This is presently performed via a complicated process of automated and manual steps. The final output of this step is the calibration tables, which are then used by `blu_2_grisat.pro` to create **grisat-b1** files. The calibration coefficient table is created by

5. Create **grisat-b1** data.

Run this algorithm to create **grisat-b1** data. This is generally run from a script and trolled (`troll.batch_runner`)

USES

[idl.blu_2_grisat](#) (`blu_2_grisat.pro`)

TODO

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

2009-2010

HISTORY

13. grisat/grisat [Generics]

[[Top](#)] [Generics]

NAME

grisat

PURPOSE

Gridded Satellite data

The concept is to provide satellite data in a gridded file to simplify access to satellite data for non-satellite experts. Users should still learn about the proper use of satellite data, however, data access is no longer a hindrance with **grisat**. As initially implemented, the **grisat** data consist of ISCCP B1 data. However, a similar gridding of AVHRR and SSMI data at different resolutions would likely be beneficial to the community.

The data are provided in netCDF and CF compliant conventions to simplify access by automated tools.

NOTES

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

2009-2010

HISTORY

14. idl/check_kep [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

check_kep

PURPOSE

To determine if two sets of Kepler elements are similar. Many parameters can be used to describe the identical orbit, thus it is important to determine if two sets of Kepler elements describe a similar orbit.

This performs a very simple comparison, basically, the test fails if:

- the relative difference in Semi-major axis or eccentricity is $> 1.5\%$
- or
- the angular differences in angular parameters is > 1 degree

USAGE

INPUT

kep1 - First set of kepler elements
epoch1 - Epoch data of first Kepler set
kep2 - Second set of kepler elements
epoch2 - Epoch data of second Kepler set
kep3 - Third set of kepler elements
epoch3 - Epoch data of third Kepler set

OUTPUT

1 - Elements are similar
0 - Elements are not similar

EXAMPLE

USES

* [gha.pro](#)
* [mean.pro](#)

USED BY

* [navcheck.pro](#)

15. idl/idl.angles [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

angles

PURPOSE

Calculate view zenith and [azimuth](#) angles for solar and satellite views for certain locations on the Earth.

USAGE

See procedure definition below.

INPUT

lat - latitude (deg)
lon - longitude (deg) (same dimension as lat)
time - time of day (result from [ftime](#) ... decimal hour)
jday - day of year

OUTPUT

sza - Solar zenith angle (deg)
az_not - Solar [azimuth](#) angle (deg_east_of_north)
vza - satellite view zenith angle (deg)
[azimuth](#) - Satellite view [azimuth](#) angle (deg_east_of_north)

KEYWORDS

GOESE - GOES-East position (default) (-75 deg East)
GOESW - GOES-West position (-135 deg East)
INGLON - input Geo longitude (deg) (degree_east)
SUNONLY - only perform the solar angle calculations
SATONLY - only perform the satellite angle calculations

EXAMPLE

USES

Nothing

USED BY

- * blu_2_grisat.pro
- * blu_coastline_navigation.pro
- * blu_imc.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Tue Jun 26 09:51:47 EDT 2007

HISTORY

Jun2010 - Verified header info.

[[Top](#)] [[IDL_Routines](#)]

NAME

asctab

PURPOSE

To convert binary data to text using the ASCII alternate from the early 1980s (used by the Japanese in early GMS files).

This byte to text mapping was an alternate to ASCII, but less widely used.

USAGE

See routines that call this procedure.

INPUT

OUTPUT

Text/string based on the byte input.

RESULT

EXAMPLE

USES

USED BY

- * b3_channel_order.pro
- * blread_jma_gms.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

Jun2010 - Added header

[[Top](#)] [IDL_Routines]

NAME

atan2

PURPOSE

Simulate the Fortran ATAN2 function where the returned result ranges from -180 to 180 instead of the default range of ATAN (-90,90) HOWEVER, RETURNED ANGLES ARE IN RADIANS ... JUST LIKE ATAN.

USAGE

```
angle = atan2(y,x)
```

INPUT

y,x - these numbers would normally y/x for the atan function, but remain separate to retain the information lost when dividing.

OUTPUT

angle (RADIANS) ranging from (-PI,PI)

RESULT

EXAMPLE

```
IDL> print,atan(-1./(-1.))/!dior
45.0000
IDL> print,atan2(-1.,(-1.))/!dior
-135.00001
```

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

* 27Jun07 - Documentation added.

18. idl/idl.b1qc [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

blqc

PURPOSE:

Provide QC analysis of ISCCP B1 file. If QC file exists, the QC information is read from the QC file and returned. Otherwise, QC information is collected, written to file, then returned to the main program.

CATEGORY:

ISCCP

INPUTS:

KEYWORD PARAMETERS:

OVERWRITE - When set, do not look for existing QC file, but create a new one.
UPDATE - When set, checks version of the QC file found and compares to current version. If QC file is older version of this routine, then it reruns the QC.
QUIET - When set, suppresses test output
VERSION - Return the version string

OUTPUTS:

qc_line- line-by-line QC flags

OPTIONAL OUTPUTS:

qc_pix - When implemented, this routine will provide information on a pixel-by-pixel basis.

USES

- * [idl.ksmooth](#) (internal ... above)
- * [b1read.pro](#)
- * [bluread.pro](#)
- * [stripname.pro](#)

USED BY

- * [idl.b1_2_blu](#)

MODIFICATION HISTORY:

\$Id: blqc.pro,v 1.6 2005/02/11 20:07:00 kknapp Exp \$

19. idl/idl.b1read [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

blead

PURPOSE

To read all B1 files as provided by the SPCs

CATEGORY
ISCCP

SYNOPSIS:

```
blead, file=file,images=images,  
AREAst=AREAst,NAVstr=NAVstr,RECstr=RECstr,GEOstr=GEOstr,$  
ORBstr=ORBstr,IMGstr=IMGstr,ATTstr=ATTstr,TIMstr=TIMstr,$  
CHNstr=CHNstr,TGRstr=TGRstr,TEST=TEST
```

INPUTS

file = filename of B1 data [if not provided, then the
dialog_pickfile will prompt user to select a file]

KEYWORDS

TEST=TEST: Sets ioutput=1 [print debug info where available]

OUTPUTS:

AREAst: Return area information [varies by blead_*]
NAVstr: Return nav. information [varies by blead_*]
RECstr: Return rec info [varies by blead_*]
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers of the data
CALstr: Calibration structure
LAT: The pixel Latitude (deg) values if LL=1
LON: The pixel Longitude(deg) values if LL=1
B1LAND: # of pixels in a 5x5 of IGBP that are land [0-25]
B1TYPE: IGBP Landcover type [17=water]
B1RVER: Returns version information on the blead routines
FHDR: Return a byte array of the entire B1 file header

USES

External Routine:

```
geo_struct.pro ... sets up the structures  
... these external routines read the various B1 formats ...  
blead_aes_g7.pro  
blead_aes_g8.pro  
blead_cma_fy2.pro  
blead_csu_g6.pro  
blead_csu_g7.pro  
blead_csu_g8.pro  
blead_csu_g91012.pro  
blead_csu_met3.pro  
blead_eum_met.pro  
blead_eum_msg.pro  
blead_jma_gms.pro  
blead_jma_mts.pro  
blead_noa_goe.pro
```

```
blread_uws_g56.pro
stripname.pro
reset.pro
blread_calv2.pro
blu_ij2ll.pro
bluread.pro
mcidas_calibrate.pro
```

EXAMPLE

```
blread,file='ISCCP.B1.0.MET-3.1993.10.07.1800.CSU',IMAGE=IMG
  Read a MET-3 file and return the images in the IMG
  variable.
```

MODIFICATION HISTORY

```
$Id: blread.pro 5325 2007-10-29 19:31:45Z kknapp $
Created      12/2003 - Ken Knapp  NCDC
Modified 01/08/2004 - Ken Knapp  NCDC
                To include Meteosat B1 files
Modified 03/01/2004 - Ken Knapp  NCDC
                To include structures [to support
                navigation using GEO_LL2IJ and GEO_IJ2LL]
03/11/2004     Imported to CVS
03/15/2004     Adding the option to output the line headers
03/17/2004     Adding the option to receive Calibration
03/19/2004     Added LL,LAT,LON keywords
                Added LC, B1LAND,B1TYPE
03/30/2004     Added B1RVER
                Removed LL, LC
28Jun07 - Changes since last commit include: file compression,
          nominal calibration (noacal, mtscal, msgcal,...),
          msg read, early GOES files (oldNOA),
01Jun09 - Now reads CSU-style files created at NCDC
```

20. idl/idl.b1read_aes_g7 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

blread_aes_g7

PURPOSE:

To read ISCCP-B1 data created by the AES SPC for GOES-7 data.

CATEGORY:

ISCCP

SYNOPSIS:

This routine is called from blread. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the

dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

AREAstr: File header and header record info
NAVstr: Data from the OA file provided by AES
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data
BLVER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

These common blocks were used initially, but were replaced by the structures above.

KEPLER - keplarian orbit elements
ATT - Satellite attitude parameters
IMAGE - Image coordinate constants
GREEN - greenwich right ascensions/times

USES

- * blread_oa.pro
- * [blu_ij2ll.pro](#)
- * [cart2earth.pro](#)
- * geo_struct.pro
- * get_file_size.pro
- * get_histroy.pro
- * itime.pro
- * [kep2cart.pro](#)
- * navcheck.pro
- * plot_tle.pro
- * reset.pro
- * [stripname.pro](#)
- * [yymmdd_2_yyjjj.pro](#)

USED BY

- * blread.pro

RESTRICTIONS:

External routines:

reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
blread_oa.pro ... reads the OA files and returns navigation info

MODIFICATION HISTORY:

\$Id: blread_aes_g7.pro 4238 2007-06-28 14:00:33Z kknapp \$
Created 11/17/2003 - Ken Knapp NCDC

Modified01/06/2004 - Ken Knapp, NCDC
 Inserted common blocks for use with
 navigation routines
Modified03/02/2004 - Ken Knapp, NCDC
 Added structures which will replace
 common blocks.
 03/11/2004 Imported to CVS
 03/15/2004 Added the option to return line headers
 03/30/2004 Added B1VER
 Removed common blocks
 06/03/2004 Added B1U functionality
* 28Jun07 - Changes since last commit: documentation, uses
 get_file_size.pro, compression,

21. idl/idl.b1read_aes_g8 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_aes_g8

PURPOSE:

An input which reads ISSCP B1 data provided by AES for GOES-8

CATEGORY:

ISSCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

REC: Navigation header in a FLTARR
NAVstr: Navigation data from the OA file
AREastr: The file header
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

USES

```
* b1read_oa.pro
* bcd\_time.pro
* get\_file\_size.pro
* mcidas\_calibrate.pro
* reset.pro
* stripname.pro
* tempfile.pro
```

USED BY

```
* b1read.pro
```

RESTRICTIONS:

External routines:

```
reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
imcnav ... calculates the effective spnax parameters
b1read_oa ... reads the OA files and returns navigation info
```

MODIFICATION HISTORY:

```
$Id: b1read_aes_g8.pro 4238 2007-06-28 14:00:33Z kknapp $
Modified03/01/2004 - Ken Knapp, NCDC
                    Added structures which will replace
                    common blocks.
03/11/2004          Imported to CVS
03/15/2004          Added the option to return line headers
03/30/2004          Added B1VER
04/27/2004          Added B1U functionality
05/25/2004          fixed blu.img(1) calculation
* 28Jun07 - Changes since last commit: noacal keyword, uses
  get_file_size.pro, compression, modify sat_id_num
  in AREAAstr to allow calibration with
  mcidas_calibrate.pro
```

22. idl/idl.b1read_calv2 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

```
b1read_calv2
```

PURPOSE

Provide ISCCP calibration for ISCCP B1 files. This routine gathers the ISCCP calibration from either BT or B3 files.

USAGE

See code for b1read.pro

USES

- * [stripname.pro](#)
- * [b3_channel_order.pro](#)
- * [btread.pro](#)

USED BY

- * [blread.pro](#)

NOTES

Version 2 of [blread_cal.pro](#)

this update

- ... uses the raw BT/B3 files (instead of KT files)
- ... searches B3 in addition to BT files
- ... properly searches for nearby files (staying [within](#) the month 1st)
- ... returns new variable with better description of version and where it came from

- * Some channel orders are hardcoded because the B3 file corresponding to the BT file is missing. (e.g., GOE-6 1986)

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

- * 28Jun07 - Added this documentation.
- * 2010-08- KRK - Added more documentation.

23. [idl/idl.b1read_cma_fy2](#) [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[blread_cma_fy2](#)

PURPOSE

To read B1 files from CMA. The user should use [blread](#) instead of using this routine directly.

USES

- * [blu_ij211.pro](#)
- * [bittest.pro](#)
- * [blank.pro](#)
- * [cma_bestfit.pro](#)
- * [geo_struct.pro](#)
- * [reset.pro](#)

* [stripname.pro](#)
* [yymmdd_2_yyjjj.pro](#)

USED BY

* b1read.pro

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

* Dec. 05

HISTORY

* Jun07 - Changes since last commit: compression, cmacal,
* 28Jun07 - Added documentation

24. idl/idl.b1read_csu_g6 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_csu_g6

PURPOSE:

To read ISCCP-B1 data created by the CSU SPC for GOES-6 data.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

NAVstr: The navigation header
 IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
 ORBstr: Keplarian orbital information
 IMGstr: Image information [size, resolution, ...]
 ATTstr: Attitude info [roll, pitch, yaw, ...]
 TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
 CHNstr: Channel information [names, number, ...]
 TGRstr: Test grid data [used to test navigation in old data]
 LINhdr: The line headers in the data
 B1VER : Return version information
 FHDR: Return a byte array of the entire B1 file header

USES

- * [blu_ij2ll.pro](#)
- * [geo_struct.pro](#)
- * [get_file_size.pro](#)
- * [itime.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)
- * [yymmdd_2_yyjjj.pro](#)

USED BY

- * [blread.pro](#)

MODIFICATION HISTORY:

```
$Id: blread_csu_g6.pro 4238 2007-06-28 14:00:33Z kknapp $
Created 11/14/2003 - Ken Knapp NCDC
Modified01/02/2004 - Ken Knapp, NCDC
    Inserted common blocks for use with
    navigation routines
Modified03/01/2004 - Ken Knapp, NCDC
    Added structures which will replace
    common blocks.
    03/11/2004 Imported to CVS
    03/16/2004 Added the option to return line headers
    03/30/2004 Added B1VER
    05/03/2004 Added B1U functionality
*28Jun07 - Added robodoc documentation
```

25. idl/idl.b1read_csu_g7 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

blread_csu_g7

PURPOSE:

To read ISCCP-B1 data created by the CSU SPC for GOES-7 data.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from blread. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

NAVstr: Navigation header from B1 file
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

These common blocks were used initially, but were replaced by the structures above.

KEPLER - keplarian orbit elements
ATT - Satellite attitude parameters
IMAGE - Image coordinate constants
GREEN - greenwich right ascensions/times

RESTRICTIONS:

External routines:

reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
latlon2ij ... sets up the navigation information

ERROR:

There still seems to be an error in the navigation by ~1-3 pixels.

USES

* [blu_ij2ll.pro](#)
* [blu_ll2ij.pro](#)
* [geo_struct.pro](#)
* [get_file_size.pro](#)
* [itime.pro](#)
* [reset.pro](#)
* [stripname.pro](#)
* [yymmdd_2_yyjjj.pro](#)

USED BY

* blread.pro

MODIFICATION HISTORY:

```
$Id: b1read_csu_g7.pro 4238 2007-06-28 14:00:33Z kknapp $
Created 11/19/2003 - Ken Knapp NCDC
Modified 01/02/2004 - Ken Knapp, NCDC
    Inserted common blocks for use with
    navigation routines
Modified 03/01/2004 - Ken Knapp, NCDC
    Added structures which will replace
    common blocks.
    03/11/2004 Imported to CVS
    03/16/2004 Added the option to return line headers
    Commented out the common blocks
    03/30/2004 Added B1VER
    Removed common blocks
    04/22/2004 Added B1U functionality
* 28Jun07 - Added robodoc header
```

26. idl/idl.b1read_csu_g8 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_csu_g8

PURPOSE:

To read ISCCP-B1 data created by the CSU ISCCP SPC for GOES-8 data. The data is in a format similar to the McIDAS format, except for the inclusion of a record header which was used in writing data to tape.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

AREAstr: McIDAS area header
NAVstr: McIDAS navigation header
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:
GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll

ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

None.

RESTRICTIONS:

External routines:
reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
[imcnav](#) ... sets up the navigation structures [not NAVstr]

USES

- * [bcd_time.pro](#)
- * [bitprint.pro](#)
- * [bittest.pro](#)
- * [geo_struct.pro](#)
- * [get_file_size.pro](#)
- * [mcidas_calibrate.pro](#)
- * [navtorec.pro](#)
- * [range.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)

USED BY

- * [blread.pro](#)

MODIFICATION HISTORY:

\$Id: blread_csu_g8.pro 4238 2007-06-28 14:00:33Z kknapp \$
Created 11/16/2003 - Ken Knapp NCDC
Modified 03/01/2004 - Ken Knapp, NCDC
Added structures which will replace
common blocks.
03/11/2004 Imported to CVS
03/16/2004 Added the option to return line headers
03/30/2004 Added B1VER
04/26/2004 Added B1U
* 28Jun07 - Added robodoc header.

27. idl/idl.b1read_csu_g91012 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

blread_csu_g91012

PURPOSE:

To read ISCCP-B1 data created by the CSU ISCCP SPC for GOES-8 data. The data is in a format similar to the McIDAS format, except for the inclusion of a record header which was used in writing data to tape.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

AREAstr: McIDAS area header
NAVstr: McIDAS Navigation header
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplerian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

None.

RESTRICTIONS:

External routines:

reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
[imcnav](#) ... sets up the navigation structures [not NAVstr]

USES

- * [bcd_time](#).pro
- * [bittest](#).pro
- * [geo_struct](#).pro
- * [get_file_size](#).pro
- * [mcidas_calibrate](#).pro
- * [navtorec](#).pro
- * [range](#).pro
- * [reset](#).pro
- * [stripname](#).pro

USED BY

* b1read.pro

MODIFICATION HISTORY:

\$Id: b1read_csu_g91012.pro 10777 2008-12-22 15:10:54Z kknapp \$

Created 11/16/2003 - Ken Knapp NCDC

Modified 03/01/2004 - Ken Knapp, NCDC

Added structures which will replace
common blocks.

03/11/2004 Imported to CVS

03/15/2004 Added the option to return line headers

03/30/2004 Added B1VER

04/26/2004 Added B1U

05/25/2004 Adjusting the Imgtime (blu.img(1)) calc ???

* 28Jun07 - Added robodoc header

28. idl/idl.b1read_csu_met3 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_csu_met3

PURPOSE:

To read ISCCP-B1 data created by CSU for Meteosat data
This Meteosat data covered the GEO gap for the Americas
prior to GOES-8.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read
routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the
dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

NAVstr: Navigation info

IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll

ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

None.

RESTRICTIONS:

External routines:
reset.pro ... performs housekeeping tasks
geo_struct ... defines structures

USES

- * [ftime.pro](#)
- * [geo_struct.pro](#)
- * [get_file_size.pro](#)
- * [gha.pro](#)
- * [itime.pro](#)
- * [plot_tle.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)
- * [vymdd_2_yyjjj.pro](#)

USED BY

- * [b1read.pro](#)

MODIFICATION HISTORY:

\$Id: b1read_csu_met3.pro 4238 2007-06-28 14:00:33Z kknapp \$
Created 01/15/2004 - Ken Knapp NCDC
Modified 03/04/2004 - Ken Knapp, NCDC
Added structures which will replace
common blocks.
03/11/2004 Imported to CVS
03/30/2004 Added B1VER

29. idl/idl.b1read_eum_met [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_eum_met

PURPOSE:

To read ISCCP-B1 data created by EUM for Meteosat data

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from bload. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll

ORBstr: Keplarian orbital information

IMGstr: Image information [size, resolution, ...]

ATTstr: Attitude info [roll, pitch, yaw, ...]

TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]

CHNstr: Channel information [names, number, ...]

TGRstr: Test grid data [used to test navigation in old data]

LINhdr: The line headers in the data

B1VER : Return version information

FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

None.

RESTRICTIONS:

External routines:

reset.pro ... performs housekeeping tasks

geo_struct ... defines structures

USES

- * [ftime.pro](#)
- * [geo_struct.pro](#)
- * [get_file_size.pro](#)
- * [gha.pro](#)
- * [itime.pro](#)
- * [plot_tle.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)
- * [yyymmdd_2_yyjjj.pro](#)

USED BY

- * bload.pro

MODIFICATION HISTORY:

```
$Id: b1read_eum_met.pro 5326 2007-10-29 19:33:01Z kknapp $  
Created 01/08/2004 - Ken Knapp NCDC  
Modified 03/04/2004 - Ken Knapp, NCDC  
    Added structures which will replace  
    common blocks.  
03/11/2004 Imported to CVS  
03/16/2004 Added the option to return line headers  
03/30/2004 Added B1VER  
04/23/2004 Added B1U functionality  
05/25/2004 Corrected blu.img(1) ???
```

30. idl/idl.b1read_eum_msg [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_eum_msg

PURPOSE:

To read ISCCP-B1 data created by EUM for Meteosat Second Generation (MET-8/MET-9)

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll

ORBstr: Keplarian orbital information

IMGstr: Image information [size, resolution, ...]

ATTstr: Attitude info [roll, pitch, yaw, ...]

TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]

CHNstr: Channel information [names, number, ...]

TGRstr: Test grid data [used to test navigation in old data]

LINhdr: The line headers in the data

B1VER : Return version information

FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

None.

RESTRICTIONS:

External routines:
reset.pro ... performs housekeeping tasks
geo_struct ... defines structures

USES

- * [ftime.pro](#)
- * [geo_struct.pro](#)
- * [get_file_size.pro](#)
- * [gha.pro](#)
- * [itime.pro](#)
- * [plot_tle.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)
- * [yymmdd_2_yyjjj.pro](#)

USED BY

- * [b1read.pro](#)

MODIFICATION HISTORY:

- * 2010-08 - krk - Added robodoc header

31. [idl/idl.b1read_jma_gms](#) [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_jma_gms

PURPOSE:

To read ISCCP-B1 files created at JMA

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from [b1read](#). The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the [dialog_pickfile](#) will prompt user to select a file]

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

NAVstr: Navigation info
lnhdr: Line headers
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplarian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
LINhdr: Line header information
TGRstr: Test grid data [used to test navigation in old data]
B1VER : Return version information
FHDR: Return a byte array of the entire B1 file header

COMMON BLOCKS:

These common blocks were used initially, but were replaced by the structures above.

KEPLER - keplarian orbit elements
ATT - Satellite attitude parameters
IMAGE - Image coordinate constants
GREEN - greenwich right ascensions/times

RESTRICTIONS:

External Routine:
reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
plot_tle ... get TLE nav info
latlon2ij ... perform navigation calculations

USES

- * asctab.pro
- * [blu_ij2ll](#).pro
- * [ftime](#).pro
- * geo_struct.pro
- * get_file_size.pro
- * [gha](#).pro
- * itime.pro
- * jma_bestfit.pro
- * plot_tle.pro
- * reset.pro
- * str2num.pro
- * [stripname](#).pro
- * [yyymmdd_2_vyjjj](#).pro

USED BY

- * b1read.pro

MODIFICATION HISTORY:

\$Id: b1read_jma_gms.pro 4238 2007-06-28 14:00:33Z kknapp \$
Created 01/08/2004 - Ken Knapp NOAA/NCDC
Modified 03/02/2004 - Ken Knapp, NCDC
Added structures which will replace

	common blocks.
03/11/2004	Imported to CVS
03/15/2004	Attempting to return LINhdr info in new keyword
03/30/2004	Added B1VER
	Removed common blocks
04/23/2004	Adding B1U functionality

32. idl/idl.b1read_jma_mts [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

b1read_jma_mts

PURPOSE

Read ISCCP B1 files from JMA for the MTSAT-1R and MTSAT-2 satellites.

USAGE

This routine should not be called directly (unless tsting). The b1read.pro should be used by the user.

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

USES

- * [ftime.pro](#)
- * [geo_struct.pro](#)
- * [gha.pro](#)
- * [plot_tle.pro](#)
- * [reset.pro](#)
- * [stripname.pro](#)
- * [vymdd_2_vyjjj.pro](#)

USED BY

- * b1read.pro

CREATION DATE

~2006

HISTORY

- * 2007 - Changes since last commit: compression and calibration header (mtcal)
- * 28Jun07 - Added robodoc header.

33. idl/idl.b1read_noa_goe [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

blread_noa_goe

PURPOSE

Read B1 files created by NOAA/NCDC. The files are in McIDAS format, and thus use the [idl.mcidas_read](#) algorithm.

USAGE

This routine should not be used except for testing. The user should read B1 files using blread.pro instead.

USES

- * [mcidas_read](#).pro
- * [bittest](#).pro
- * [ftime](#).pro
- * [itime](#).pro
- * [stripname](#).pro
- * [yymmdd_2_yyjjj](#).pro
- * [geo_struct](#).pro
- * [bcd_time](#).pro
- * [navcheck](#).pro
- * [blu_ij211](#).pro
- * [blu_112ij](#).pro

USED BY

- * [blread](#).pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Tue Jun 26 09:51:47 EDT 2007

HISTORY

34. idl/idl.b1read_oa [IDL_Routines]

[[Top](#)] [[IDL_Routines](#)]

NAME:

blread_oa

PURPOSE:

To read ISCCP-B1 OA files from AES

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from blread_aes_g7/8

INPUTS:

file = filename of B1 data

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

oa: the orbit/attitude data in a structure
rec: the orbit/attitude data in a FLTARR

COMMON BLOCKS:

None.

RESTRICTIONS:

External Routine:

def_oapre96 ... defines the OA structure for dates before 1996
def_oapost96 ... defines the OA structure for dates after 1996
def_oagoes7 ... defines the OA structure for GOES-7
reset ... perform basic housekeeping

USES

- * def_oagoes7.pro
- * def_oapost96.pro
- * def_oapre96.pro
- * get_file_size.pro
- * [remove_gz](#).pro
- * reset.pro

USED BY

- * blread_aes_g7.pro
- * blread_aes_g8.pro

MODIFICATION HISTORY:

```
$Id: b1read_oa.pro 4237 2007-06-28 12:33:31Z kknapp $  
Created 01/08/2004 - Ken Knapp NOAA/NCDC  
Modified 03/02/2004 - Ken Knapp, NCDC  
                        Added structures which will replace  
                        common blocks.  
03/11/2004 Imported to CVS
```

35. idl/idl.b1read_uws_g56 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

b1read_uws_g56

PURPOSE:

To read ISCCP-B1 data created by the UWS_SPC for GOES-5 and 6 data. Data is in the AES format as described in the SSEC documentation folder.

CATEGORY:

ISCCP

CALLING SEQUENCE:

This routine is called from b1read. The user should use that read routine to read any and all B1 data.

INPUTS:

file = filename of B1 data [if not provided, then the dialog_pickfile will prompt user to select a file]

OPTIONAL INPUTS:

IOUTPUT: Print debug info

KEYWORD PARAMETERS:

All keywords are outputs

OUTPUTS:

AREAstr: Old McIDAS area header
NAVstr: Old McIDAS navigation header
IMAGES: The image file. The return is BYTARR[NCHAN,NX,NY]

Structures common to all B1 read routines:

GEOstr: Used to navigate the data using geo_ll2ij/geo_ij2ll
ORBstr: Keplerian orbital information
IMGstr: Image information [size, resolution, ...]
ATTstr: Attitude info [roll, pitch, yaw, ...]
TIMstr: Timing data [greenwich right asc, chebyshev polynomials, ...]
CHNstr: Channel information [names, number, ...]
TGRstr: Test grid data [used to test navigation in old data]
LINhdr: The line headers in the data

FHDR: Return a byte array of the entire B1 file header
BLU: Structure with B1-Uniform data info [to write BLU files]

common BLOCKS:

These common blocks were used initially, but were replaced by the structures above.

KEPLER - keplarian orbit elements
ATT - Satellite attitude parameters
IMAGE - Image coordinate constants
GREEN - greenwich right ascensions/times

USES

- * asctab.pro
- * [blu_ij2ll.pro](#)
- * equiv_ken.pro
- * [ftime.pro](#)
- * get_file_size.pro
- * geo_struct.pro
- * itime.pro
- * [kep2cart.pro](#)
- * navcheck.pro
- * plot_tle.pro
- * reset.pro
- * [stdev.pro](#)
- * [stripname.pro](#)
- * yyjjj_2_julday.pro
- * [yymmdd_2_yyjjj.pro](#)

USED BY

- * b1read.pro

RESTRICTIONS:

External routines:

reset.pro ... performs housekeeping tasks
geo_struct ... defines structures
latlon2ij ... perform navigation calculations

MODIFICATION HISTORY:

\$Id: b1read_uws_g56.pro 4238 2007-06-28 14:00:33Z kknapp \$
Created 11/14/2003 - Ken Knapp NCDC
Modified 01/02/2004 - Ken Knapp, NCDC
 Inserted common blocks for use with
 navigation routines
Modified 03/04/2004 - Ken Knapp, NCDC
 Added structures which will replace
 common blocks.
 03/11/2004 Imported to CVS
 03/16/2004 Added the option to return line headers
 03/30/2004 Added B1VER
 Removed common blocks

36. idl/idl.b1u_2_grisat [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

b1u_2_grisat

PURPOSE

To reformat, remap and calibrate ISCCP B1U files as netCDF data.

USAGE

```
IDL> blu_2_grisat, '/home/kknapp/DATA/isccp/match-poes/1984/B1U-POES.1984.11.26.12.match'
```

INPUT

year - year for which to process gridded data
istart(optional) - index at which to restart gridding
debug(optional) - debug flag
parallax(optional) - perform the parallax correction on IRWIN (NOT IMPLEMENTED YET)
mfilein(optional) - specify one match-poes file to process (useful when running with troll.batch_runner)
allonly(optional) - Only process the ALL files, not individual basins.
VZAcorr(obsolete) - Limb-correct IRWIN temps. However, this is now the default, so the option is obsolete.

OUTPUT

Files are output to:
'~/datasan/[grisat](#)/' + cyear

USES

- * Files from the [isccp blu production](#)
- * Results of [blu calibration procedure](#)
- *
- * [idl.angles](#)
- * [idl.blu ij211](#)
- * [idl.blu ll2ij](#)
- * [idl.blu dn2cal](#)
- * [idl.bluread](#)
- * [idl.date jul2iso](#)
- * [idl.date mmm 2 mm](#)
- * [idl.flines](#)
- * [idl.geo hirs limb corr](#)
- * [idl.i2xy](#)
- * [idl.parallax correct swath](#)
- * [idl.read match poes](#)
- * [idl.remove gz](#)
- * [idl.satellite_temp2image.pro](#)
- * [idl.stripname](#)
- * [idl.systime iso](#)
- * [idl.szacorr](#)

USED BY

NOTES

TODD

BUGS

* The szacorr seems to still leave seams. An new correction should be derived from the HIRS/B1U matchups

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

* ~Jan. 2007

HISTORY

* 25Jun07 - Modifying for output to work with NCO
* 01Feb09 - Modifying to output [grisat](#) files ... instead of HURSAT
* 01Mar09 - Added second layer of observations to keep all VZAs

37. idl/idl.b1u_coastline_navigation [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

blu_coastline_navigation

PURPOSE

To adjust the navigation by fitting to a coastline

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

```
(internal)
* idl.get_five_z
* idl.get_z_score
* idl.maximize_z_score
(external)
* angles.pro
* blu\_112ij.pro
* mean.pro
* stdev.pro
```

USED BY

* b1_2_blu.pro

NOTES

Uses the coastal file:
getenv('DATDIR')+'/igbp/gigbp2_011.img.remap.10km.coast'

TODO
BUGS
AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE
HISTORY

38. idl/idl.b1u_dn2cal [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[blu_dn2cal](#)

PURPOSE

Provide calibrated imagery of B1U files.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * lr.pro
- * mean.pro
- * [stdev](#).pro

USED BY

- * blu_2_grisat.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Tue Jun 26 09:51:47 EDT 2007

HISTORY

39. idl/idl.b1u_get_center [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[blu_get_center](#)

PURPOSE

This routine is used by `idl.blu_finalcenter` to determine the correct center of the image, which is used to make navigation more accurate.

AUTHOR

Ken Knapp - Feb. 2006

NOTES

- The routine has been tested and the latest version in CVS (1.3) finds the center of the image and has been tested on all B1U files. The next step is to develop the navigation algorithm.
- This updated version is different from previous in that
 - a) binom is a cubic equation
 - b) it uses [idl.blu_ll2ij](#) and [idl.blu_ij2ll](#) to get a correction for the central scan number

USES

- * [blu_ij2ll.pro](#)
- * [blu_ll2ij.pro](#)
- * [ftime.pro](#)
- * [mean.pro](#)
- * [stdev.pro](#)

USED BY

- * `b1_2_blu.pro`

40. idl/idl.b1u_ij2ll [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[blu_ij2ll](#)

PURPOSE:

To convert line/pixel coordinate point(s) of a satellite image to latitude/longitude.

CATEGORY:

B1U Navigation

INPUTS:

ipoints - Pixel locations (default is in image coordinates)
jpoints - Line locations (default is in image coordinates)
NAV - B1U Navigation array (LONARR(200)) from [bluread](#)

KEYWORD PARAMETERS:

SATCOOR - Optionally input line/pixels in original satellite coordinates.
IOUTPUT - Optionally output debugging information
RADIANS - Optionally output lat/lon as radians (instead of the default units)

OUTPUTS:

latitude (degrees)
longitude (degrees)

Optional outputs:

glat,glon - Subsatellite latitude/longitude (degrees)
grad - Satellite distance from center of Earth (km)

USES

- * atan2.pro
- * blu_imc.pro
- * [cart2earth](#).pro
- * cheb2cart.pro
- * const.pro
- * [ftime](#).pro
- * [gha](#).pro
- * [kep2cart](#).pro

USED BY

- * blread_aes_g7.pro
- * blread_cma_fy2.pro
- * blread_csu_g6.pro
- * blread_csu_g7.pro
- * blread_jma_gms.pro
- * blread_noa_goe.pro
- * blread_ows_g56.pro
- * blread.pro
- * [blu_get_center](#).pro

MODIFICATION HISTORY:

\$Id: [blu_ij211](#).pro 15234 2009-09-02 17:33:31Z kknapp \$

41. idl/idl.b1u_imc [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[imcnav](#)

PURPOSE:

```
Navigate GVAR imagery. It converts either:
  line/pixel --> lat/lon
  or
  lat/lon --> line/pixel
```

CATEGORY:

ISCCP Navigation

INPUTS:

```
dlat = latitude (in degrees, North is positive)
dlon = longitude(in degrees, East is positive)
line = scan line number (in full resolution ... visible elements)
pixel= pixel number (in full resolution ... visible elements)
key = direction of transformation
      key=0 means line/pixel --> lat/lon
      key=1 means lat/lon --> line/pixel
imc = IMC status
instr = GVAR instrument
       Imager: Instr = 1
       Sounder:Instr = 2 [NOT TESTED!!!]
```

OPTIONAL INPUTS:

```
file = filename of file being navigated ... necessary for
      AES navigation
rec = rec array containing Navigation information
AREAstr = McIDAS area structure
NAVstr = McIDAS Navigation structure
```

OUTPUTS:

Either dlat/dlon or line/pixel depending on KEY=1 or 2

OPTIONAL OUTPUTS:

```
glon = satellite subpoint longitude
glat = satellite subpoint latitude
```

USES

```
* atan2.pro
* bcd\_time.pro
* elcomm.pro
* elcons.pro
* evln.pro
* evsc2l.pro
* gatt.pro
* gpoint.pro
* inst2er.pro
* instco.pro
* lmodel.pro
* lpoint.pro
* navtorec.pro
* setcon.pro
* sndelo.pro
```

* tempfile.pro
* time50.pro

USED BY

* [blu_ij211.pro](#)
* [blu_112ij.pro](#)

MODIFICATION HISTORY:

```
$Id: blu_imc.pro 5355 2007-10-31 17:15:58Z kknapp $  
Created 1/23/2004 Ken Knapp NOAA/NCDC  
                based on code developed in FORTRAN  
                for GVAR navigation  
3/11/2004 Imported to CVS
```

42. idl/idl.b1u_112ij [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME:

[blu_112ij](#)

PURPOSE:

To convert latitude/longitude to image (or satellite) coordinates.

INPUTS:

inlat - latitude (scalar or array) in degrees
inlon - longitude (scalar or array) in degrees
NAV - B1U Navigation array

KEYWORD PARAMETERS:

RADIANS - Optionally, the input lat/lon values are provided in radians
IOUTPUT - Optionally output debugging information
SATCOOR - Optionally output line/pixels in original satellite coordinates.

OUTPUTS:

ipoints - Pixel location of lat/lon coordinates in image coordinates.
jpoints - Line location of lat/lon coordinates in image coordinates
Optional
glat - Subsatellite latitude locations (deg)
glon - Subsatellite longitude locations (deg)
grad - Satellite distance to center of Earth (km)

USES

- [const.pro](#) - provides an interconsistent set of constants across many IDL routines
- [blu_imc.pro](#) - processes navigation of the GVAR files
- [cart2earth.pro](#) - Convert Cartesian coordinates to Earth coordinates.
- [cheb2cart.pro](#) - Calculate Cartesian coordinates from Chbyshev polynomials
- [ftime.pro](#)
- [gha.pro](#)
- [kep2cart.pro](#) - Convert keplerian parameters to a Cartesian position using a time since epoch
- [unit.pro](#) - only in debug mode (when iloop = 1)

USED BY

This common utility is used by nearly any routine that processes ISCCP B1 data.

Examples include:

- * [blread_cma_fy2.pro](#)
- * [blread_csu_g7.pro](#)
- * [blu_2_grisat.pro](#)
- * [blread_noa_goe.pro](#)
- * [blread.pro](#)
- * [blu_get_center.pro](#)
- * [jma_bestfit.pro](#)
- * [cma_bestfit.pro](#)
- * [blu_coastline_navigation.pro](#)
- *

NOTES

This routine is meant to be identical to the Fortran routine of the same name ([blu_ll2ij](#)).

MODIFICATION HISTORY:

\$Id: [blu_ll2ij.pro](#) 15234 2009-09-02 17:33:31Z kknapp \$

43. idl/idl.b1uread [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[bluread](#)

PURPOSE:

To read the B1U file format and return all data in the blu structure (where each block is a separate part of the structure).

KEYWORD PARAMETERS:

file: The blu filename, if non is provided, then one is selected using [dialog_pickfile](#)
 blu: The contents of the blu file in a structure
 headers: only read the headers (saves I/O when entire file is not needed) - it returns after CALIBRATION header

EXAMPLE:

USES

- * no other IDL scripts

USED BY

- * blu_2_grisat.pro
- * blqc.pro
- * blread.pro

MODIFICATION HISTORY:

\$Id: [bluread](#).pro 15235 2009-09-02 17:34:38Z kknapp \$

44. idl/idl.b3_channel_order [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

b3_channel_order

PURPOSE

To determine the instrument channel order based on B3 data files and assign B1U channel names.

USAGE

See blread_calv2.pro

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * asctab.pro
- * b3file_from_blfile.pro
- * b3read.pro

USED BY

- * blread_calv2.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

Jun2010 - Added Header

45. idl/idl.b3file_from_b1file [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

b3file_from_b1file

PURPOSE

Determine the name of the B3 file based on a b1 file

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* [ftime](#).pro

USED BY

* b3_channel_order.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

2010-08 - krk - Added robodoc header

46. idl/idl.bcd_time [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[bcd_time](#)

PURPOSE:

Convert time in BCD format (encoded in binary data) to a more conventional format.

CATEGORY:

GOES

INPUTS:

8 bytes of data (can be 8 BYTES, 4 INTs, 2 LONGs or 2 FLOATs)

OUTPUTS:

YEAR (YYYY)
JDAY (day of year)
Hour (HH)
Minute (MM)
Seconds
of milliseconds (the fraction of a second *1000)

USES

* Nothing.

USED BY

* b1read_aes_g8.pro
* b1read_csu_g8.pro
* b1read_csu_g91012.pro
* b1read_noa_goe.pro
* blu_imc.pro

MODIFICATION HISTORY:

47. idl/idl.bitprint [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

bitprint

PURPOSE

To print out the bit values for a given integer

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* bittest.pro

USED BY

* blread_csu_g8.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

48. idl/idl.bittest [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

bittest

PURPOSE

To test whether a specific bit is set in an integer.

USAGE

```
result = bittest(value,bit_number)
```

where

```
value = integer (byte, short or long)
bit_number = integer [0-7 for byte]
               [0-15 for short]
               [0-31 for long]
result = integer: 0 if set
                  1 if not set
```

INPUT

OUTPUT

RESULT

EXAMPLE

```
IDL> print,bittest(3,0)
1
IDL> print,bittest(3,1)
1
IDL> print,bittest(3,2)
0
```

USES

Nothing

USED BY

```
* bitprint.pro
* blread_cma_fy2.pro
* blread_csu_g8.pro
* blread_csu_g91012.pro
* blread_noa_goe.pro
```

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown.

HISTORY

* Jun2010 - added headers

49. idl/idl.blank [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

blank

PURPOSE

To wipe a device clean by "tv"ing a constant field.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blread_cma_fy2.pro
* cal_blu_correct.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

50. idl/idl.btread [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

btread

PURPOSE

To read ISCCP BT (calibration) files

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* reset.pro

USED BY

* blread_calv2.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

51. idl/idl.cal_b1u_monthly [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

cal_blu_monthly

PURPOSE

To compile matchups of HIRS/ISCCP B1U over many files.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * flines.pro
- * hirs_blu_month.pro
- * hirs_irwvp_correction.pro
- * itime.pro
- * kploterror.pro
- * lr.pro

USED BY

- * cal_blu_correct.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

52. idl/idl.cart2earth [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

idl.cart2earth

PURPOSE:

Convert cartesian coordinates at a specific time to Earth-centered coordinates of latitude, longitude and distance from center.

CATEGORY:

Navigation

INPUTS:

X, Y, Z - Cartesian coordinates X, Y, Z in km
[julday](#) - Julian date from IDL [julday](#) algorithm

KEYWORD PARAMETERS:

RADIANS - Optionally output lat/lon in radians
TWOPI - Optionally output longitude in range [0, 360.]

OUTPUTS:

lat,lon - Sub-satellite latitude and longitude (degrees)
lat = [-90,90]
lon = [-180,180]
radius - distance from center of Earth (km)

USES

- * [gha.pro](#)
- * [const.pro](#)

USED BY

- * [blread_aes_g7.pro](#)
- * [navcheck.pro](#)
- * [blu_ij2ll.pro](#)
- * [blu_ll2ij.pro](#)

MODIFICATION HISTORY:

\$Id: [cart2earth.pro](#) 15231 2009-09-02 17:19:05Z kknapp \$

53. idl/idl.cart2kep [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

idl.cart2kep

PURPOSE:

Convert a position vector with corresponding velocity to keplerian elements.

CATEGORY:

Navigation

INPUTS:

Input position is distance from center of Earth in km
Input velocity is km/hour

KEYWORD PARAMETERS:

None

OUTPUTS:

Output Keplerian elements is an array: DBLARR(6)
kep(0) = semi-major axis (km)
kep(1) = orbit eccentricity
kep(2) = Orbital inclination (degrees)
kep(3) = right ascension of the ascending node (degrees)
kep(4) = argument of perigee (degrees)
kep(5) = mean anomaly (degrees)

PROCEDURE:

This routine is based on the equations found in the Earth Location User's Guide (Revision 1, March 1998) NOAA/NESDIS document DRL 504-11. It has been tested in conjunction with [kep2cart.pro](#).

MODIFICATION HISTORY:

\$Id: cart2kep.pro,v 1.1 2004/08/02 18:26:14 kknapp Exp \$

USES

* atan2.pro

USED BY

* navcheck.pro

54. idl/idl.circle [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

circle

PURPOSE

To define a user symbol as a circle.

USAGE
INPUT
OUTPUT
RESULT
EXAMPLE
USES

* nothing.

USED BY

* cal_blu_correct.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

55. idl/idl.cl [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

cl

PURPOSE

This is shorthand for closing all open logical units.

USAGE

Usually placed at the start of a routine to ensure all units are closed.

INPUT

OUTPUT

RESULT EXAMPLE USES

Nothing.

USED BY

Many IDL procedures that include:
* cal_blu_correct.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

Jun2010 - Added header

56. idl/idl.cma_besfit [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

cma_bestfit

PURPOSE

To help navigate CMA files which have (to put it mildly) strange navigation constants. This algorithm minimizes the navigation error by adjusting the roll/pitch/yaw as well as other parameters.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * [blu_ll2ij.pro](#)
- * [itime.pro](#)
- * [mean.pro](#)
- * [mpfit.pro](#)
- * [mpfitfun.pro](#)
- * [remove_gz.pro](#)
- * [sign.pro](#)
- * [stdev.pro](#)
- * [stripname.pro](#)
- * [yymmdd_2_yyjj.pro](#)

USED BY

- * [blread_cma_fy2.pro](#)

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

?????

HISTORY

57. [idl/idl.cmproduct](#) [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

CMPRODUCT

AUTHOR:

Craig B. Markwardt, NASA/GSFC Code 662, Greenbelt, MD 20770
craigm@lheamail.gsfc.nasa.gov

PURPOSE:

CMPRODUCT() is the multiplicative equivalent of TOTAL().

CALLING SEQUENCE:

Result = CMPRODUCT(ARRAY)

DESCRIPTION:

Calculates the product of all the elements of an array. Vector multiplication in groups of powers of two make this operation faster than a simple FOR loop. The number of actual multiplications is still N_ELEMENTS(ARRAY). Double precision should be used for the highest accuracy when multiplying many numbers.

INPUTS:

ARRAY - Array of elements to multiply together. For instance, ARRAY could contain the dimensions of another array--then CMPRODUCT(ARRAY) would be the total number of elements of that other array.

RETURNS:

The result of the function is the total product of all the elements of ARRAY.

EXAMPLE:

SEE ALSO:

TOTAL, PRODUCT (from Astronomy User's Library)

USES

* Nothing.

USED BY

* i2xy.pro

MODIFICATION HISTORY:

Written, CM, 28 Mar 2000
(based on outline of PRODUCT by William Thompson)

\$Id: cmproduct.pro,v 1.1.1.1 2004/03/10 20:06:17 kknapp Exp \$

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58. idl/idl.const.pro [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

idl.const.pro

PURPOSE

To initialize geophysical variables.

USAGE

Usually included in routines as:
@const.pro

INPUT

OUTPUT
RESULT
EXAMPLE
USES

* Nothing

USED BY

* [cart2earth.pro](#)
* [plot_tle.pro](#)
* [blu_ij211.pro](#)
* [blu_112ij.pro](#)
* [kep2cart.pro](#)

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

??

HISTORY

2010-08 - KRK - Added robodoc header.

59. [idl/idl.correlation](#) [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

correlation

PURPOSE

To calculate the linear correlation coefficient.

USAGE

INPUT

OUTPUT

RESULT EXAMPLE USES

* Nothing.

USED BY

* cal_blu_correct.pro

NOTES

Returns zero correlation if x or y do not vary enough.

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

60. idl/idl.date_arr2iso [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

date_arr2iso

PURPOSE

To convert date in a set of arrays to ISO formatted date.

The ISO format of date is:

YYYY-MM-DD HH:MM:SS.SSSS

or

YYYY-MM-DDTHH:MM:SS.SSSS

where the space between date and time can be replaced by "T".

USAGE

* See [idl.date_jul2iso](#)

INPUT

```
A 1-D or 2-D array :: time
time(0,*) :: time(0) = year
time(1,*) :: time(1) = month (1-12)
time(2,*) :: time(2) = day of month (1-31)
time(3,*) :: time(3) = hour of day (00-23)
time(4,*) :: time(4) = minute (0-59)
time(5,*) :: time(5) = second (0-59)
```

KEYWORDS

withT - (optional) if present, the ISO date will use a "T" instead of a space

OUTPUT

* string (scalar or array) of a ISO formatted date

EXAMPLE

USES

* IDL internal function [caldat](#)

USED BY

* date_jul2iso.pro

NOTES

* While ranges above are stated, no tests are made here to ensure that values are [within](#) the stated range

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

HISTORY

Jun 2010 - Added headers

61. idl/idl.date_jul2iso [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

date_jul2iso

PURPOSE

To convert Julian date to ISO formatted date.

The ISO format of date is:
YYYY-MM-DD HH:MM:SS.SSSS

or

YYYY-MM-DDTHH:MM:SS.SSSS

where the space between date and time can be replaced by "T".

USAGE

```
IDL> isotime = date_jul2iso(julday(1,1,1980,12,45,35))
```

INPUT

jdate - (scalar or array)

KEYWORDS

withT - (optional) if present, the ISO date will use a "T" instead of a space

OUTPUT

* string (scalar or array) of a ISO formatted date

EXAMPLE

USES

* [idl.date_arr2iso](#)
* IDL internal function [caldat](#)

USED BY

* [bluread.pro](#)
* [blu_2_grisat.pro](#)

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

HISTORY

Jun 2010 - Added headers

[[Top](#)] [[IDL_Routines](#)]

NAME

date_mmm_2_mm

PURPOSE

To convert 3 letter month to a value from 1 to 12

USAGE

```
IDL> print,date_mmm_2_mm('January')
01
```

INPUT

* Months - string (scalar or array)
this can be either 3-letter month names or the complete
month name (because the input is trimmed to the 1st three
letters.

OUTPUT

* array or scalar - zero-filled strings with range '01' to '12'

EXAMPLE

* See [bluread.pro](#)

USES

Only internal IDL routines

USED BY

* blu_2_grisat.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

HISTORY

2010 Jun - Added headers & strmid call to allow entire months as
input

63. idl/idl.def_oagoes7 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

def_oagoes7

PURPOSE

To define a structure used in reading orbit and attitude data from older GOES data

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blread_oa.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

64. idl/idl.def_oapost96 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

def_oapost96

PURPOSE

To define a structure used in reading orbit and attitude data from older GOES data

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blread_oa.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

65. idl/idl.def_oapre96 [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

def_oapre96

PURPOSE

To define a structure used in reading orbit and attitude data from older GOES data

USAGE
INPUT
OUTPUT
RESULT
EXAMPLE
USES

* Nothing.

USED BY

* blread_oa.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

66. idl/idl.define_mcidas_area_gvar [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

define_mcidas_area_gvar

PURPOSE

Set up the McIDAS AREA structure for the GVAR files.

USAGE

```
from mcidas\_read.pro  
define_mcidas_area_gvar, AREAstr
```

NOTES

Derived from McIDAS documentation:
http://www.ssec.wisc.edu/mcidas/doc/misc_doc/area2.html

USED BY

* [mcidas_read.pro](#)

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

* 27 Jun07 - Added documentation

67. idl/idl.define_mcidas_lineprefix_class [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

define_mcidas_lineprefix_class

PURPOSE

Set up the structure for the line prefixes produced by NOAA/CLASS.

USAGE

```
from mcidas\_read.pro
define_mcidas_lineprefix_class,class_pre
```

NOTES

Derived from McIDAS documentation:
http://www.ssec.wisc.edu/mcidas/doc/misc_doc/area2.html

USED BY

* [mcidas_read.pro](#)

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

* 27 Jun07 - Added documentation

68. idl/idl.define_mcidas_nav_goes [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

define_mcidas_nav_goes

PURPOSE

Set up the McIDAS navigation structure for the older GOES files. (pre-GVAR)

USAGE

```
from mcidas\_read.pro
define_mcidas_nav_goes,VISRstr
```

NOTES

Derived from McIDAS documentation:
http://www.ssec.wisc.edu/mcidas/doc/misc_doc/area.txt

USED BY

* [mcidas_read.pro](#)

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

* 27 Jun07 - Added documentation

69. idl/idl.define_mcidas_nav_gvar [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

define_mcidas_nav_gvar

PURPOSE

Set up the McIDAS navigation structure for the GVAR files.

USAGE

```
from mcidas\_read.pro  
define_mcidas_nav_gvar,NAVstr
```

NOTES

Derived from McIDAS documentation:
http://www.ssec.wisc.edu/mcidas/doc/misc_doc/area2.html

USED BY

* [mcidas_read](#).pro

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

* 27 Jun07 - Added documentation

70. idl/idl.elcomm [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

elcomm

PURPOSE

To allow common blocks for navigation routines

USAGE

```
@elcomm.pro
```

This inserts the statements herein into the files.

INPUT

OUTPUT

RESULT

EXAMPLE

See files in "USED BY"

USES

Nothing

USED BY

- * blu_imc.pro
- * gpoint.pro
- * lmodel.pro
- * lpoint.pro
- * setcon.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

- * Jun2010 - Added header

71. idl/idl.elcons [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

elcons

PURPOSE

To allow set constants for GVAR/IMC navigation routines

USAGE

@elcomm.pro

This inserts the statements herein into the files.

INPUT

OUTPUT

RESULT

EXAMPLE

See files in "USED BY"

USES

Nothing

USED BY

- * blu_imc.pro
- * gpoint.pro
- * lmodel.pro
- * lpoint.pro
- * setcon.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

* Jun2010 - Added header

72. idl/idl.equiv_ken [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

equiv_ken

PURPOSE

To perform the same operation as the old EQUIVALENCE Fortran function. In essence, it can convert between dta types using the low level byte values.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blread_uws_g56.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

73. idl/idl.evln [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

evln

PURPOSE

THIS FUNCTION CONVERTS FRACTIONAL LINE NUMBER TO ELEVATION ANGLE IN RADIANS.

USAGE
INPUT
OUTPUT
RESULT
EXAMPLE

See files in "USED BY"

USES

* instco.pro

USED BY

* blu_imc.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

* Jun2010 - Added header

74. idl/idl.evsc2l [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

evsc2l

PURPOSE

THIS SUBROUTINE CONVERTS ELEVATION AND SCAN ANGLES
TO THE FRACTIONAL LINE AND PIXEL NUMBERS.

USAGE

INPUT
OUTPUT
RESULT
EXAMPLE

See files in "USED BY"

USES

* instco.pro

USED BY

* blu_imc.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

* Jun2010 - Added header

75. idl/idl.flines [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

flines

PURPOSE

To count the number of lines in an ASCII text file.

USAGE

```
IDL> print,flines('startup.pro')
```

34

INPUT

filename - string (scalar) - filename

KEYWORDS

compress - OPTIONAL - if set, use IDL compressed open (to read gzipped files)

OUTPUT

* Returns long integer of number lines in the ASCII file

EXAMPLE

* see [bluread.pro](#)

USES

Only uses internal IDL routines

USED BY

* [bluread.pro](#)

NOTES

TODD

* Remove failure if file doesn't exist

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

HISTORY

2010 Jun - Added robodoc header

76. idl/idl.ftime [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[ftime](#)

PURPOSE

To convert hhhmss to decimal (fractional) time

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

- * yyjjj_2_julday.pro
- * b3file_from_blfile.pro
- * blread_csu_met3.pro
- * blread_eum_met.pro
- * blread_eum_msg.pro
- * blread_jma_gms.pro
- * blread_jma_mts.pro
- * blread_noa_goe.pro
- * blread_uws_g56.pro
- * [blu_get_center.pro](#)
- * hirs_blu_month.pro
- * [blu_ij211.pro](#)
- * [blu_ll2ij.pro](#)

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

77. idl/idl.gatt [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

idl.gatt

PURPOSE

Calculations for GVAR/IMC navigation

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blu_imc.pro

NOTES

TODD

BUGS

AUTHOR

CREATION DATE

HISTORY

78. idl/idl.geo_hirs_limb_corr [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

geo_hirs_limb_corr

PURPOSE

To perform limb correction for HIRS data.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

```
* Only IDL internal routines
* External data file:
  '/net/glaze/home/raid/kknapp/data/geo-vza-tables/'+sat+'.WV.VZA-corr.dat'
```

USED BY

```
* blu_2_grisat.pro
```

NOTES

```
* Requires the presence of the correction table
  '/net/glaze/home/raid/kknapp/data/geo-vza-tables/'+sat+'.WV.VZA-corr.dat'
```

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

79. idl/idl.geo_struct [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

geo_struct

PURPOSE

This "include" file defines the structures used in the bload algorithms. It includes structures used by other routines as well as informational structures. It does NOT include format specific structures (for example, the numerous types of NAV or AREA headers. The GEO_NAV structure are the minimum requirements to navigate geostationary data using the GEO_IJ2LL and GEO_LL2IJ unified routines (that is, all satellites can use this routine once the structure variables are in place).

NOTE: The spin axis variables (rgtasc and decl) are primarily for spin-stabilised satellites. The parameters are used to convert between instrument and Earth-centered coordinates. For this reason, these parameters are defined for 3-axis stabilized, where the values represent an equivalent spin axis declination and right ascension.

 ALERT: The GEO_NAV is no longer used. It is obsolete since the geo_ij2ll and geo_ll2ij routines are also obsolete.

```

lat:0.d0,$           ;Sub-Sat. latitude (deg)
lon:0.d0,$           ;Sub-Sat. longitude (deg)
radius:0.d0,$        ;Distance satellite-Earth-center (km)
rgtasc:0.d0,$        ;Spin axis right ascension (deg)
decl:0.d0,$          ;Spin Axis declination
GOESNEXT:0,$         ;GOES-Next flag 1=GOES-8,9,10,...
rma:0.d0,$           ;Roll misalignment (GOES-Next only)
pma:0.d0}            ;Pitch misalignment (GOES-Next only)

```

USES

Nothing.

USED BY

```

blread.pro
  blread_aes_g7.pro
  blread_aes_g8.pro
  blread_cma_fy2.pro
  blread_csu_g6.pro
  blread_csu_g7.pro
  blread_csu_g8.pro
  blread_csu_g91012.pro
  blread_csu_met3.pro
  blread_eum_met.pro
  blread_eum_msg.pro
  blread_jma_gms.pro
  blread_jma_mts.pro
  blread_noa_goe.pro
  blread_uws_g56.pro

```

80. idl/idl.get_file_size [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

get_file_size

PURPOSE

To determine the file size (by decompressing as necessary)

USAGE

INPUT

file - filename

OUTPUT

* File size in bytes

KEYWORDS

compress - the file was compressed so used gzip to output the uncompressed file size

RESULT EXAMPLE USES

* external call to GNU gzip

USED BY

* bload_oa.pro
* bload_aes_g7.pro
* bload_aes_g8.pro
* bload_csu_g6.pro
* bload_csu_g7.pro
* bload_csu_g8.pro
* bload_csu_g91012.pro
* bload_csu_met3.pro
* bload_eum_met.pro
* bload_eum_msg.pro
* bload_jma_gms.pro
* bload_uws_g56.pro

NOTES

Some file calculations need the uncompressed file size, and this seems to be the only way to get it.

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

81. idl/idl.get_histroy [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

get_histroy

PURPOSE

USAGE

INPUT

OUTPUT

RESULT EXAMPLE USES

- * reset.pro
- * geo_struct.pro
- * b3read.pro

USED BY

- * blread_aes_g7.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

82. idl/idl.gha [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

idl.gha

PURPOSE:

To calculate the greenwich hour angle.

CATEGORY:

Navigation

INPUTS:

Julian - The julian date (as returned by the [julday](#) IDL routine)

KEYWORD PARAMETERS:

DEGREES - Returns angle in degrees (instead of radians).

OUTPUTS:

Returns the Greenwich hour angle for the given time in radians (optionally in degrees).

PROCEDURE:

This routine is used to convert the satellite position in inertial coordinates to earth coordinates (e.g., longitude). The initial values are taken from Kidder and Vonder Haar and from some old NOAA GOES navigation code:

Kidder and Vonder Haar values:
100.38641 deg at 0000UTC on 1 Jan 1990
From NOAA

Other values can be added by including them in the DATE array and the corresponding hour angle in the GHA0 array

MODIFICATION HISTORY:

\$Id: [gha.pro](#),v 1.3 2004/10/13 15:42:06 kknapp Exp \$

USES

Nothing (outside IDL internal routine)

USED BY

- * [cart2earth.pro](#)
- * [kep2cart.pro](#)
- * [navcheck.pro](#)
- * [bload_csu_met3.pro](#)
- * [bload_eum_met.pro](#)
- * [bload_eum_msg.pro](#)
- * [bload_jma_gms.pro](#)
- * [bload_jma_mts.pro](#)
- * [blu_ij2ll.pro](#)
- * [blu_ll2ij.pro](#)

83. idl/idl.gpoint [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

gpoint

PURPOSE

this subroutine converts eographic lat/lon to the related elevation and scan angles.

USAGE

INPUT

OUTPUT
RESULT
EXAMPLE
USES

* elcons.pro
* elcomm.pro

USED BY

* blu_imc.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

84. idl/idl.hirs_b1u_month [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

hirs_blu_month

PURPOSE

To read matchup data from a HIRS/BLU matchup file and filter the output based on input limits on time, view and spatial noise.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* [ftime.pro](#)

USED BY

* [cal_blu_monthly.pro](#)

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

85. [idl/idl.hirs_irwvp_correction](#) [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

`hirs_irwvp_correction`

PURPOSE

To normalize all HIRS observations to the HIRS instrument on NOAA-14.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Output from [hirs_intercal_setup.pro](#)

USED BY

* [cal_blu_monthly.pro](#)

NOTES

TODDO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

86. idl/idl.i2xy [IDL_Routines]

[[Top](#)][[IDL_Routines](#)]

NAME:

i2xy

PURPOSE:

Convert an array index to an N dimensional array index.

CALLING SEQUENCE:

```
INDEX = i2xy(I,size(ARRAY))
```

INPUTS:

INDEX0 : Long/Int/Byte
 SIZEOFARRAY - The result of the call SIZE(ARRAY) where the array. This passes just the information on the array size, which reduces unnecessary I/O if the entire array were passed.

EXAMPLE:

```
IDL> f = randomu(1,10,10)
IDL> help,f
F                FLOAT          = Array[10, 10]
IDL> i = where(f gt 0.9)
IDL> print,i
   4           19           31           37           38           39
  45           51           62           68
IDL> i2 = i2xy(i,size(f))
IDL> help,i2
I2                LONG          = Array[2, 10]
IDL> print,i2
   4           0
   9           1
   1           3
... (and so on)
IDL> print,f(i2(0,0),i2(1,0))
   0.930436
IDL> print,f(i2(0,1),i2(1,1))
   0.909208
```

USES

* cmproduct.pro

USED BY

* blu_2_grisat.pro

*Many others

(a very useful and widely used tool in the Knapp library)

MODIFICATION HISTORY

Written by Kenneth Knapp - CIRA
visiting NOAA/NESDIS/ORA
now at NOAA/NESDIS/NCDC
08-12-2003 - Documentation header added
06-16-2010 - Chenged Docs to Robodoc header

87. idl/idl.inst2er [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

inst2er

PURPOSE

INST2ER ACCEPTS THE SINGLE PRECISION ROLL, PITCH AND YAW ANGLES OF AN INSTRUMENT AND RETURNS THE DOUBLE PRECISION INSTRUMENT TO EARTH COORDINATES TRANSFORMATION MATRIX.

WE COMPUTE INSTRUMENT TO BODY COORDINATES TRANSFORMATION MATRIX BY USING A SMALL ANGLE APPROXIMATION OF TRIGONOMETRIC FUNCTIONS OF THE ROLL, PITCH AND YAW.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blu_imc.pro
* lmodel.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

88. idl/idl.instco [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

instco

PURPOSE

Define a common block for GVAR navigation
(this routine is used as an include file)

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing

USED BY

* evln.pro
* evsc2l.pro
* blu_imc.pro
* setcon.pro
* sndelo.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

89. idl/idl.itime [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

itime

PURPOSE

FLOATING POINT TIME TO PACKED INTEGER (SIGN HH MM SS)
INPUT PARAMETERS:

USAGE

INPUT

X=FLOATING POINT TIME (fractional hours of the day)

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

- * blread_aes_g7.pro
- * cheb2cart.pro
- * navcheck.pro
- * yyjjj_2_julday.pro
- * [ftime](#).pro
- * plot_tle.pro
- * cma_bestfit.pro
- * blread_csu_g6.pro
- * blread_csu_g7.pro
- * blread_csu_met3.pro
- * blread_eum_met.pro
- * blread_eum_msg.pro
- * blread_jma_gms.pro
- * jma_bestfit.pro
- * blread_noa_goe.pro
- * blread_uws_g56.pro
- * cal_blu_monthly.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

90. idl/idl.jma_besfit [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

jma_besfit

PURPOSE

To help navigate JMA files which have (to put it mildly) strange navigation constants. This algorithm minimizes the navigation error by adjusting the roll/pitch/yaw as well as other parameters.

Does not apply to MTS files ... that satellite is navigated in a different way.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * [blu_112ij.pro](#)
- * [brent.pro](#)
- * [itime.pro](#)
- * [mean.pro](#)
- * [mpfit.pro](#)
- * [mpfitfun.pro](#)
- * [remove_gz.pro](#)
- * [sign.pro](#)
- * [stdev.pro](#)

USED BY

- * [blread_cma_fy2.pro](#)

NOTES
TODO
BUGS
AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

?????

HISTORY

91. idl/idl.kep2cart [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[kep2cart](#)

PURPOSE:

To locate a satellite in its orbit around a mass (e.g., Earth, Sun) using the Keplerian elements and the time passed since Epoch. The returned position is in the pseudo-inertial reference frame where x points from center of Earth to the Sun at vernal equinox, the z coordinate points along the Earth's spin axis northward and the y coordinate completes the right handed coordinate system.

CATEGORY:

Navigation

INPUTS:

kep: The keplerian element array
kep(0) = semi-major axis (km)
kep(1) = orbit eccentricity
kep(2) = Orbital inclination (degrees)
kep(3) = right ascension of the ascending node (degrees)
kep(4) = argument of perigee (degrees)
kep(5) = mean anomaly (degrees)
intime: The time elapsed since epoch (sec) (can be an array)

OPTIONAL INPUTS:

sattim: The time in Julian of the position (used to calculate sub-satellite positions.

KEYWORD PARAMETERS:

NOPERTURB - Set this flag to optionally not calculate the orbital perturbations due to an oblate Earth (useful when not

calculating position of point orbitting Earth).

OUTPUTS:

x,y,z - [same dimensions of intime] Array or scalar values of the satellite position.

OPTIONAL OUTPUTS:

glon - [same dimensions of intime] Array or scalar values of sub-satellite longitude [only calculated if SATTIM is set]
glat - [same dimensions of intime] Array or scalar values of sub-satellite latitude [only calculated if SATTIM is set]

USES

- * atan2.pro
- * const.pro
- * [gha](#).pro

USED BY

- * navcheck.pro
- * plot_tle.pro
- * blread_uws_g56.pro
- * blu_2_ij211.pro
- * blu_2_112ij.pro

MODIFICATION HISTORY:

\$Id: [kep2cart](#).pro 15231 2009-09-02 17:19:05Z kknapp \$

92. idl/idl.kploterror [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

kploterror

PURPOSE

To plot error bars on values.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * mean.pro
- * [stdev](#).pro

USED BY

* cal_blu_monthly.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

93. idl/idl.ksmooth [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

ksmooth

PURPOSE

To simulate the ISL [smooth](#) function, but allow missing data as well as use a binomial filter (optional).

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blqc.pro

NOTES

TODO
BUGS
AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE
HISTORY

94. idl/idl.ksmooth_internal [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

ksmooth

PURPOSE

To perform some simple weighted averaging using a mask to ignore certain points. Binomial filter?

USAGE

See [idl.blqc](#)

INPUT

data - array
flag - array with same dimensions as data
w - number of times to apply the filter

OUTPUT

Smoothed array.

RESULT

EXAMPLE

USES

* Nothing

USED BY

* blqc.pro

NOTES

TODO
BUGS
AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE
HISTORY

95. idl/idl.lmodel [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

lmodel

PURPOSE

THIS SUBROUTINE COMPUTES THE POSITION OF THE SATELLITE AND THE ATTITUDE OF THE IMAGER OR SOUNDER. THE CALCULATIONS ARE BASED ON THE OATS ORBIT AND ATTITUDE MODEL REPRESENTED BY THE O&A PARAMETER SET IN GVAR BLOCK 0.

USAGE

INPUT

TIME, EPOCH TIME, O&A PARAMETER SET, IMC STATUS.

OUTPUT

THE SPACECRAFT POSITION VECTOR IN EARTH FIXED COORDINATES
THE GEOMETRIC ROLL, PITCH, YAW ANGLES AND THE ROLL,
PITCH MISALIGNMENTS FOR EITHER THE IMAGER OR THE SOUNDER
THE EARTH FIXED TO INSTRUMENT FRAME TRANSFORMATION MATRIX
GEOGRAPHIC LATITUDE AND LONGITUDE AT SUBSATELLITE POINT.

RESULT

EXAMPLE

USES

* elcons.pro
* elcomm.pro
* atan2.pro
* gatt.pro
* inst2er.pro

USED BY

* blu_imc.pro

NOTES

LMODEL ACCEPTS AN INPUT DOUBLE PRECISION TIME IN MINUTES FROM 1950, JAN.1.0 AND AN INPUT SET OF O&A PARAMETERS AND COMPUTES POSITION OF THE SATELLITE, THE ATTITUDE ANGLES AND ATTITUDE MISALIGNMENTS AND THE INSTRUMENT TO EARTH FIXED COORDINATES TRANSFORMATION MATRIX.

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

HISTORY

96. idl/idl.lpoint [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

lpoint

PURPOSE

THIS SUBROUTINE CONVERTS THE INSTRUMENT ELEVATION AND SCAN ANGLES TO THE RELATED GEOGRAPHIC LATITUDE AND LONGITUDE.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * atan2.pro
- * elcons.pro
- * elcomm.pro

USED BY

- * sndelo.pro
- * blu_imc.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

97. idl/idl.lr [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

lr

PURPOSE

To produce linear regression statistics on a paired set as input.

USAGE

INPUT

x (array) - dependent set of input data
y (Array) - independent set of input data

KEYWORDS

Keyword inputs:
* FILTER - binary array: 0 = do not use, 1 = use
* error - input - estimate of error for each point
* confidence - (0-1) confidence limit (DEFAULT=0.99)

OUTPUT

Keyword outputs:
* newx - output - which values were used
* newy - output - which values were used
* slopesd - std. deviation of slope

RESULT

- float array having 11 elements e.g., output: array = lr(x,y)
All values are based on simple linear least square regression (using the IDL routine regress)

array(0) = # of points
array(1) = correlation coefficient

```
array(2) = slope of linear regression  
array(3) = offset (intercept) of linear regression  
array(4) = Goodness of fit [stdev(yfit-y)]  
array(5) = root mean square (rms) difference  
array(6) = bias difference [mean(x-y)]  
array(7) = Chi squared parameter  
array(8) = sigma (?)  
array(9) = Slope Error (confidence interval at DEFAULT=99%)  
array(10) = Intercept error (confidence interval at DEFAULT=99%)
```

EXAMPLE

```
IDL> st = lr(x,y)
```

USES

```
* stdev.pro  
* mean.pro
```

USED BY

```
* blu\_dn2cal.pro  
* cal_blu_monthly.pro
```

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

~2000

HISTORY

2010-08 KRK - Added robodoc header

98. idl/idl.match_b1u_poes [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

match_blu_poes

PURPOSE

Set up files which provide a mapping between ISCCP B1U files and other non-geostationary data.

USAGE

INPUT

Nothing.

RESULT

Creates files in `getenv('ISCCPDIR')+'match-poes/'`

USES

USED BY

Numerous algorithms which require colocating ISCCP B1U files in time with other satellites (either GEO or polar).
* `isscp_blu_production`

NOTES

Currently includes the following satellites:

1. ISCCP B1U from `getenv('ISCCPDIR')+'blu'`
2. HIRS Level 1C from `getenv('DATDIR')+'/hirs/l1c/'`
3. ISCCP B2 from `getenv('ISCCPDIR')+'b2/'`
4. HIRS Pathfinder All Sky from `getenv('DATDIR')+'/hirs/path/as/'`
5. SSM/I netCDF from `/net/mirage/raidla/data/ssmi_netcdf/
/net/mirage/raidlb/data/ssmi_netcdf/`
6. SSM/IS netCDF from `/net/mirage/raidla/data/ssmi_netcdf/
/net/mirage/raidlb/data/ssmi_netcdf/`

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

* Unknown

HISTORY

* 26 Jun07 - Added this documentation

99. idl/idl.mean [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

mean

PURPOSE

To calculate the arithmetic mean of a set of numbers.

USAGE

INPUT

an array of values (any type)

OUTPUT

The mean of the array
If nothing is passed, then -1 is returned.

RESULT

EXAMPLE

USES

- * nothing

USED BY

Many routines use this short function, including:

- * navcheck.pro
- * cma_bestfit.pro
- * jma_bestfit.pro
- * blu_coastline_navigation.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

??

HISTORY

Jul 2010 - KRK - Added robodoc header.

100. idl/idl.navcheck [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

NAVCHECK

PURPOSE:

To check the navigation parameters provided in file headers for errors or invalid values

CATEGORY:

ISCCP
Navigation

INPUTS:

pdate = [date1,time1]
date1 - Epoch date for Chebyshev parameters (YYJJJ)
time1 - Epoch time for Chebyshev parameters (sec * 100)
pos1 = [X1,Y1,Z1] Satellite position at time1 (km)
vel1 = [VX1,VY1,VZ1] Satellite velocity at time1 (km/hour)
pos2 = [X2,Y2,Z2] Satellite position at time1+13 hours (km)
vel2 = [VX2,VY2,VZ2] Satellite velocity at time1+13 hours (km/hour)
CX - Chebyshev polynomials for X
CY - Chebyshev polynomials for Y
CZ - Chebyshev polynomials for Z
kdate = [epy,eph]
EPY - Epoch date for Keplerian elements (YYMMDD)
EPH - Epoch time for Keplerian elements (HHMMSS)
kep = [SMA,ECC,INC,RAN,AP,MA]
SMA - semi-major axis (km)
ECC - Eccentricity
INC - Inclination (deg)
RAN - Right ascension of ascending node (deg)
AP - Argument of perigee (deg)
MA - Mean Anomaly (deg)

KEYWORD PARAMETERS:

keput - The "best" kepler output of the input data
kepdate - The "best" epoch date of the input data

OUTPUTS:

RESULT - This is the result of the testing

USES

- * [cart2earth.pro](#)
- * [cart2kep.pro](#)
- * [cheb2cart.pro](#)
- * [gha.pro](#)
- * [itime.pro](#)
- * [kep2cart.pro](#)
- * [mean.pro](#)
- * [yyjjj_2_julday.pro](#)
- * [yyymmdd_2_yyjjj.pro](#)

USED BY

- * [bload_aes_g7.pro](#)
- * [bload_noa_goe.pro](#)
- * [bload_aws_g56.pro](#)

MODIFICATION HISTORY:

\$Id: navcheck.pro,v 1.4 2006/01/03 16:01:31 kknapp Exp \$

101. idl/idl.navtorec [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

navtorec

PURPOSE

To convert NAV AREA header to a rec array (a double array)

USAGE

INPUT

MCIDAS Navigation array structure.

OUTPUT

rec = dblarr(337)

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blread_csu_g91012.pro
* blu_imc.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

Jul2010 - KRK - Added robodoc headers.

102. idl/idl.parallax_correct_swath [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

parallax_correct_swath

PURPOSE

To correct satellite data for parallax. In particular, GEO data.

USAGE

INPUT

btemp - input brightness temperature. (Kelvin)
gvza - input view zenith angle (degrees)
gazi - input [azimuth](#) angle (degrees)
glat - input latitude (degrees North)
btemp_corr - Parallax corrected temperatures (Kelvin)
remap - Indices used in remapping data.

KEYWORDS

This needs some work.

OUTPUT

RESULT

EXAMPLE

USES

* timer.pro (these calls are primarily for development, so they could
be removed)
* mean.pro

USED BY

* blu_2_grisat.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

2008

HISTORY

103. idl/idl.plot_tle [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

plot_tle

PURPOSE

To obtain the nearest TLE (Two Line Elements) Kepler elements.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * const.pro
- * geo_struct.pro
- * itime.pro
- * [kep2cart](#).pro
- * read_tle.pro

USED BY

- * bload_aes_g7.pro
- * bload_csu_met3.pro
- * bload_eum_met.pro
- * bload_eum_msg.pro
- * bload_jma_gms.pro
- * bload_jma_mts.pro
- * bload_uws_g56.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

Jul2010 - KRK - Added robodoc headers

104. idl/idl.png [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

png

PURPOSE

To save images as PNG files.

105. idl/idl.qrfac [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

QRFAC

AUTHOR:

Craig B. Markwardt, NASA/GSFC Code 662, Greenbelt, MD 20770
craigm@lheamail.gsfc.nasa.gov

PURPOSE:

Perform QR decomposition of a rectangular matrix

MAJOR TOPICS:

Linear Systems

CALLING SEQUENCE:

QRFAC, A, R, [IPVT, /PIVOT]

DESCRIPTION:

Given an MxN matrix A (M>N), the procedure QRFAC computes the QR decomposition (factorization) of A. This factorization is useful in least squares applications solving the equation, A ## x = B. Together with the procedure QRSOLV, this equation can be solved in a least squares sense.

The QR factorization produces two matrices, Q and R, such that

```
A = Q ## R
```

where Q is orthogonal such that $\text{TRANSPPOSE}(Q)##Q$ equals the identity matrix, and R is upper triangular. This procedure does not compute Q directly, but returns the more-compact Householder reflectors, which QRSOLV applies in constructing the solution.

Pivoting can be performed by setting the PIVOT keyword. Rows with the largest L2-norm are pivoted into the top positions of the matrix. The permutation matrix is returned in the IPVT parameter.

PARAMETERS:

A - upon input, an MxN matrix (=XARRAY(M,N)) to be factored, where M is greater than N.

Upon output, the upper triangular MxN matrix of Householder reflectors used in reconstructing Q. Obviously the original matrix A is destroyed upon output.

Note that the dimensions of A in this routine are the *TRANSPPOSE* of the conventional appearance in the least squares matrix equation.

R - upon output, an upper triangular NxN matrix

IPVT - upon output, the permutation indices used in partial pivoting. If pivoting is used, this array should be passed to the PIVOTS keyword of QRSOLV. If the PIVOT keyword is not set, then IPVT returns an unpermuted array of indices.

KEYWORD PARAMETERS:

PIVOT - if set, then partial pivoting is performed, to bring the rows with the largest norm to the top of the matrix.

QMATRIX - upon return, the fully explicit "Q" matrix is returned. This square matrix can be used to perform explicit matrix multiplication (although not super efficiently). The values returned modified in A are the Householder vectors, which are then used to compute QMAT.

IMPLEMENTATION NOTE:

Upon return, A is in standard parameter order; A(*,IPVT) is in permuted order. RDIAG and QMATRIX are in permuted order upon return. QRSOLV accounts for these facts at the solution stage.

EXAMPLE:

```
Decompose the 3x2 matrix [[9.,2.,6.],[4.,8.,7.]]
aa = [[9.,2.,6.],[4.,8.,7.]]
qrfac, aa, r, ipvt
```

```
IDL> print, aa
      1.81818      0.181818      0.545455
      XXXXXXXXXX      1.90160      0.432573
(position marked with Xs is undefined)
```

Construct the matrix Q by expanding the Householder reflectors returned in AA. (M = 3, N = 2) This same procedure is accomplished by using the QMATRIX keyword.

```
ident = fltarr(m,m) ;; Construct an identity matrix
ident(lindgen(m),lindgen(m)) = 1

q = ident
for i = 0, n-1 do begin
  v = aa(*,i) & if i GT 0 then v(0:i-1) = 0 ;; extract reflector
  q = q ## (ident - 2*(v # v)/total(v * v)) ;; generate matrix
endfor
```

Verify that Q ## R returns to the original AA

```
print, q(0:1,*) ## r
      9.00000      4.00000
```



```
      2.00000      8.00000
      6.00000      7.00000
(transposed)
```

See example in QRSOLV to solve a least squares problem.

REFERENCES:

More', Jorge J., "The Levenberg-Marquardt Algorithm: Implementation and Theory," in *Numerical Analysis*, ed. Watson, G. A., Lecture Notes in Mathematics 630, Springer-Verlag, 1977.

MODIFICATION HISTORY:

Written (taken from MPFIT), CM, Feb 2002
Added usage message, error checking, CM 15 Mar 2002
Corrected error in EXAMPLE, CM, 10 May 2002
Now returns Q matrix explicitly if requested, CM, 14 Jul 2002
Documented QMATRIX keyword, CM, 22 Jul 2002
Corrected errors in computations of R and Q matrices when pivoting, CM, 21 May 2004

\$Id: qrfac.pro,v 1.7 2006/02/12 20:55:56 craigm Exp \$

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106. idl/idl.range [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

range

PURPOSE

To return a 2-element vector containing the minimum and maximum of the input array/matrix

USAGE

```
minmax = range(array)
```

INPUT

array = scalar or multi-dimension vector of same type as input

OUTPUT

2-element array:

```
range(0) = minimum of input
range(1) = maximum of input
```

RESULT

EXAMPLE

```
IDL> print,range(1)
      1      1
IDL> print,range(findgen(10))
      0.00000      9.00000
```

USES

Nothing.

USED BY

```
* parallax_correct_swath.pro
* blread_csu_g91012.pro
* mcidas\_read.pro
```

NOTES

In the event that a null variable is passed, then range returns -1

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

unknown

HISTORY

107. idl/idl.read_match_poes [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

read_match_poes

PURPOSE

To read the matchup files created by match_blu_poes.pro

USAGE

INPUT

None

KEYWORDS

```
file = filename to be read (input)
blu   = list of blu files in this file (output)
b2    = list of ISCCP B2 files in this file (output)
L1C   = list of HIRS Level 1C files in this file (output)
PathAS= list of HIRS Pathfinder All Sky files in this file (output)
SSMI  = list of SSMI files in this file (output)
```

OUTPUT

None.

RESULT

None.

EXAMPLE

USES

* Only IDL internal procedures.

USED BY

* blu_2_grisat.pro (among many other routines)

NOTES

* Should be updated if match_blu_poes.pro is ever changed.

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

HISTORY

108. idl/idl.read_tle [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

read_tle

PURPOSE

Read TLE (two line elements) from a file

USAGE

INPUT

[unit](#) = logical [unit](#) that was opened

OUTPUT

tle = structure containing the tle data
See below for structure definition.

RESULT

EXAMPLE

USES

* Nothing

USED BY

* plot_tle.pro

NOTES

TODDO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

109. idl/idl.remove_gz [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

[remove_gz](#)

PURPOSE

To remove trailing ".gz" from input filenames

USAGE

INPUT

input - string (generally a filename)

OUTPUT

Returns the filename with the gz suffix (if present) removed.

RESULT

EXAMPLE

USES

* Nothing.

USED BY

- * blread_oa.pro
- * cma_bestfit.pro
- * jma_bestfit.pro
- * bl_2_blu.pro
- * blu_2_grisat.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

??

HISTORY

110. idl/idl.reset [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

reset

PURPOSE

To reset some IDL parameters. It used to do more, now it just runs the equivalent of cl.pro.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

- * blread.pro
- * blread_oa.pro
- * get_histroy.pro
- * blread_aes_g7.pro
- * blread_aes_g8.pro
- * b3read.pro
- * btread.pro
- * blread_cma_fy2.pro
- * blread_csu_g6.pro
- * blread_csu_g7.pro
- * blread_csu_g91012.pro
- * blread_csu_met3.pro
- * blread_eum_met.pro
- * blread_eum_msg.pro
- * blread_jma_gms.pro
- * blread_jma_mts.pro
- * blread_uws_g56.pro
- * cal_blu_correct.pro

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

111. idl/idl.satellite_temp2image [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

satellite_temp2image

PURPOSE

To convert temperatuer data (K) to indices for mapping satellite imagery. In particuler, this uses tables provided CIRA (John Knaff) and NRL (Jeff Hawkins).

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* Nothing.

USED BY

* blu_2_grisat.pro

NOTES

Requires color table informaiton in:
getenv('DATDIR')+'/hurricanes/colormaps/'
- IR4.cmap
- BD_IR.cmap
- ssmi_vapor.rgb
- 37h.rgb
- 85h.rgb

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

112. idl/idl.setcon [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

setcon

PURPOSE

To set constants used in GVAR navigation

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * elcons.pro
- * elcomm.pro
- * instco.pro

USED BY

- * blu_imc.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

Jun2010 - Added header info (KRK)

113. idl/idl.sign [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

SIGN

PURPOSE:

Mimics the intrinsic FORTRAN function, SIGN.

CATEGORY:

Math.

CALLING SEQUENCE:

```
Result = SIGN( A [, B ] )
```

OUTPUTS:

If ONE parameter is specified then

returns -1 if $A < 0$, +1 if $A > 0$.

If TWO parameters are specified then

returns A if $B \geq 0$ or $-A$ if $B < 0$

USES

* Nothing.

USED BY

* cma_bestfit.pro
* jma_bestfit.pro

MODIFICATION HISTORY:

Written by: Han Wen, August 1994.
8-DEC-1994: Accepts A, B as vectors.
16-JUN-1995: Bugfix: if A is a scalar, return a scalar
instead of a 1-element vector.

114. idl/idl.sndelo [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

sndelo

PURPOSE

??

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * instco.pro
- * lpoint.pro

USED BY

- * blu_imc.pro

NOTES

TODDO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

115. idl/idl.stdev [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[stdev](#)

PURPOSE

To calculate the standard deviation of a set of numbers

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

- * Nothing outside of IDL's internal routine.

USED BY

Just about everything.
* [bload_uws_g56.pro](#)
* [blu_coastline_navigation.pro](#)
* [blu_get_center.pro](#)

NOTES

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown.

HISTORY

116. idl/idl.str2num [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

str2num

PURPOSE

To convert a scalar or array of strings to numbers (integer, etc.)

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

```
IDL> print, str2num('4flag')
0
IDL> print, str2num('4')
4
IDL> print, str2num('4.d4')
40000.000
IDL> print, str2num('4.e4')
40000.0
```

USES

- Nothing outside of what IDL has as internal routines.

USED BY

* blread_jma_gms.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

117. idl/idl.stripname [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

[stripname](#)

PURPOSE:

Strips path information from a file name (and possibly the file extensions) and returns the string

INPUTS:

FILENAME : String - The filename

KEYWORD PARAMETERS:

DIR - Returns the directory structure to the DIR keyword
NODOT - Removes the file extension (everything after the first [dot](#))

EXAMPLE:

```
IDL> print, stripname('/home/kknapp/work/lib/idl/goes/surface_sens.pro')
      surface_sens.pro
IDL> print, stripname('/home/kknapp/work/lib/idl/goes/surface_sens.pro', /nodot)
      surface_sens
```

MODIFICATION HISTORY:

Written by Kenneth Knapp - CIRA
visiting scientist @ NESDIS/ORA
now @ NESDIS/NCDC

118. idl/idl.systime_iso [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

systime_iso

PURPOSE

To return the current sytem time in ISO format.

USAGE

INPUT

nothing

OUTPUT

Returns the scalar string of current ISO time.

RESULT

EXAMPLE

USES

Only internal IDL routines

USED BY

* [idl.blu_2_grisat](#)

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

HISTORY

119. idl/idl.szacorr [IDL_Routines]

[[Top](#)] [[IDL_Routines](#)]

NAME:

szacorr

PURPOSE:

This routine corrects geostationary brightness temperatures for view zenith angle. The correction depends on time of year, latitude and brightness temperature.

The routine is based on the fortran routine developed by Bob Joyce (NOAA/NCEP). The IDL routine has been tested, and returns the exact same corrections that the fortran routine returns.

The code was converted directly from FORTRAN code.

INPUTS:

tb	-	Brightness temperature (K)	[array]
xlat	-	Latitude (degrees)	[array]
sza	-	VIEW zenith angle (degrees)	[array]
xjday	-	Day of year (1-366)	[scalar]

KEYWORD PARAMETERS:

None as of yet.

OUTPUTS:

Returns Corrected Brightness Temp (K) [array]

EXAMPLE:

```
Btempc = szacorr(Btemp,lat,vza,jday)
This returns the corrected values for all Btemp values
```

USES

The correction information is located in two data files currently stored in `getenv('DATDIR')+'/szacorr/'`

USED BY

* blu_2_grisat.pro

MODIFICATION HISTORY:

```
$Id: szacorr.pro 16648 2009-12-03 18:17:49Z kknapp $
Created 3/18/2004 Ken Knapp
```

120. idl/idl.tempfile [[IDL_Routines](#)]

[[Top](#)] [[IDL_Routines](#)]

NAME

tempfile

PURPOSE

To create a randomly generated filename that will not likely already exist in the directory.

USAGE

INPUT

OUTPUT

RESULT

EXAMPLE

USES

* No other routines

USED BY

* blread_aes_g8.pro

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Thu Dec 3 16:17:05 EST 2009

HISTORY

121. idl/idl.time50 [IDL_Routines]

[[Top](#)][IDL_Routines]

NAME

time50

PURPOSE

Function Time50 will take the epoch time from the GVAR NAVstr and convert it to minutes from January 1, 1950.

USAGE

INPUT

Epoch_time : the (modified) binary coded data time from GVAR

OUTPUT

TU : Minutes from January 1, 1950

RESULT

EXAMPLE

```
TU = Time50(NAVstr.epoch_time)
```

USES

* No non-IDL routines

USED BY

* [blu_ij211.pro](#)

NOTES

TODD

BUGS

AUTHOR

Written by: Kelly Dean, September 1994
Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

HISTORY

Jul2010 - KRK - Adjusted header info for robodoc

122. idl/idl.timer [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME:

TIMER

PURPOSE:

Measure elapsed time between calls.

CATEGORY:

CALLING SEQUENCE:
timer, [dt]

INPUTS:

KEYWORD PARAMETERS:

Keywords:
/START starts timer.
/STOP stops timer (actually updates elapsed time).
/PRINT prints timer report.
NUMBER = n. Select timer number to use (default = 0).
Timer numbers 0 through 9 may be used.
COMMENT = cmt_text. Causes /PRINT to print:
cmt_text elapsed time: hh:mm:ss (nnn sec)

OUTPUTS:

dt = optionally returned elapsed time in seconds. out

COMMON BLOCKS:

timer_com

USES

USED BY

* parallax_correct_swath.pro

NOTES

Notes:
Examples:
timer, /start use this call to start timer.
timer, /stop, /print, dt use this call to stop timer
and print start, stop, elapsed time. This example also
returns elapsed time in seconds.
Timer must be started before any elapsed time is available.
Timer may be stopped any number of times after starting once, and
the elapsed time is the time since the last timer start.
timer, /start, number=5 starts timer number 5.
timer, /stop, /print, number=5 stops timer number 5
and prints result.

MODIFICATION HISTORY:

R. Sterner, 17 Nov, 1989
R. Sterner, 28 Sep, 1993 --- Used dt_tm_tojs to handle long intervals.
R. Sterner, 2 Dec, 1993 --- Now uses systime(1) for high precision.

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123. idl/idl.yyjjj_2_julday [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

yyjjj_2_julday

PURPOSE

To convert year/julian day information to Julian Date.

USAGE

INPUT

yyjjj = Current date in YYJJJ format
Can be: Year*1000 + DOY [day of year]
 or
 (Year-100)*1000 + DOY

KEYWORDS

All keywords are optional
time = Time of day in one of the following 3 formats:
fltime = time of day provided in fractional hours since midnight
itime = time of day provided in HHMMSS
seconds = time of day provided in seconds since midnight
debug = provide status output

OUTPUT

Julian date as determined by IDL's [julday](#) routine.

RESULT

EXAMPLE

USES

USED BY

NOTES

TODD

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

???

HISTORY

Jul2010 - KRK - Added Robodoc information

124. idl/idl.yymmdd_2_yyjjj [IDL_Routines]

[[Top](#)][[IDL_Routines](#)]

NAME

[yymmdd_2_yyjjj](#)

PURPOSE

To convert date from style YYYYMMDD to YYJJJ

USAGE

result = [yymmdd_2_yyjjj](#)(date)

where

```
date = integer = of format:
                YYYYMMDD where
                YY = 2 or 4 digit year
                MM = month of year [1-12]
                DD = Day of month [1-31]
```

INPUT

OUTPUT

RESULT

The returned result is an integer of the form:

```
YYJJJ
where:
YY=2 or 3 digit year (Year - 1900)
JJJ = day of calendar [001-366]
```

EXAMPLE

```
IDL> print, yymmdd\_2\_yyjjj(981231)
      98365
IDL> print, yymmdd\_2\_yyjjj(011231)
      101365
```

USES

IDL internal routine: [julday](#)

USED BY

- * navcheck.pro
- * blread_aes_g8.pro
- * blread_cma_fy2.pro

and more ...

NOTES

* Assumes all years < 50 are in the 21st millenium, so 100 is also added to the year (in addition to the 1900 which is also added).

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Unknown

HISTORY

Jul2010 - Added header (KRK)

125. idl/is_geostationary [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

is_geostationary

PURPOSE

To determine if a set of kepler parameters describe a geostationary orbit. An orbit is declared geostationary if its range in longitude is less than 3 degrees.

USAGE

INPUT

kep - kepler parameter array

OUTPUT

0 - not a geostationary orbit
1 - is a geostionary orbit

EXAMPLE

USES

- * [kep2cart.pro](#)
- * [cart2earth.pro](#)

USED BY

- * [navcheck.pro](#)

126. idl/is_perpendicular [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

is_perpendicular

PURPOSE

To determine if two vectors are perpendicular. In this case, two vectors are declared perpendicular if and only if:

- angle between the vectors is [within](#) LIMIT degrees of 90 degrees.

By default, LIMIT=1 degree

USAGE

INPUT

array1 - Vector 1
array2 - Vector 2
anglelimit - optional - threshold to declare two angles as perpendicular (in degrees)

OUTPUT

1 - Vectors are perpendicular
0 - Vectors are not perpendicular

EXAMPLE

USES

- * Nothing

USED BY

- * [navcheck.pro](#)

127. idl/is_similar [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

is_similar

PURPOSE

To determine if two vectors are similar. In this case the tests pass if and only if:
- angle between the vectors < 1 degree
- difference in magnitude between the vectors is less than 1%

USAGE

INPUT

array1 - Vector 1
array2 - Vector 2

OUTPUT

1 - Vectors are similar
0 - Vectors are not similar

EXAMPLE

USES

* Nothing

USED BY

* navcheck.pro

128. idl/percentiles [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

percentiles

PURPOSE

compute **percentiles** of a data array

CATEGORY

statistical function

USAGE

Y = **percentiles**(DATA [,VALUE=value-array])

INPUTS

DATA --> the vector containing the data

KEYWORDS

VALUE --> compute specified **percentiles**
default is a standard set of min, 25%, [median](#) (=50%), 75%, and max
which can be used for box- and whisker plots.
The values in the VALUE array must lie between 0. and 1. !

OUTPUTS

The function returns an array with the percentile values or
-1 if no data was passed or value contains invalid numbers.

REQUIREMENTS

NOTES

EXAMPLE

```
x = (findgen(31)-15.)*0.2      ; create sample data
y = exp(-x^2)/3.14159        ; compute some Gauss distribution
p = percentiles(y,value=[0.05,0.1,0.9,0.95])
print,p

IDL prints :  3.92826e-05  0.000125309      0.305829      0.318310
```

MODIFICATION HISTORY:

```
mgs, 03 Aug 1997: VERSION 1.00
mgs, 20 Feb 1998: - improved speed and memory usage
                  (after tip from Stein Vidar on newsgroup)
mgs, 26 Aug 2000: - changed copyright to open source
                  - median now correctly returned as average
                    of two central values for data sets with
                    even number of elements
                  - modernized look and [] array notation
mgs, 09 Nov 2000: - bug fix: median didn't use sorted index!
                  (thanks Andrew Slater)
```

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129. isccpb1u/idl.b1_2_b1u [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

b1_2_b1u

PURPOSE

This routine converts the ISCCP B1 files to the B1U format - which is a unified data format that makes it possible to have one read and one navigation routine.

USAGE

INPUT

OUTPUT

RESULT

The ISCCP B1U file is created

EXAMPLE

USES

- * [blqc.pro](#)
- * [blread.pro](#)
- * [bluread.pro](#)
- * [blu_coastline_navigation.pro](#)
- * [blu_get_center.pro](#)

USED BY

- * [isccp_blu_production](#)

NOTES

The B1U file is described by the B1U documentation. This routine reads the B1 file using blread, then modifies the structures returned and outputs the data in a uniform format (which is nearly the same for all B1 files). The data is read using bluread.pro and navigated using blu_nav.pro

Test on MET - Processed all MET files in ISCCP-test. Files created were similar in size (B1(size) = 299MB whereas B1U(size) = 301MB).

Test on GMS - Processed all GMS files in ISCCP-test. File sizes were slightly smaller.

Test on GOES9 - Processed all GOES9 files in ISCCP-test. File sizes were slightly smaller.

Test on GOES7 - Tested GOES-7 CSU
I/O is fine, but navigation is off a bit.

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

HISTORY

```
$Id: b1_2_blu.pro 5323 2007-10-29 19:28:44Z kknapp $
03/30/2004 Created by Ken Knapp NCDC/RSAD
04/22/2004 Tested successfully on UWS data.
04/23/2004 Tested successfully on MET data.
04/26/2004 Tested successfully on GMS/GOES9 data.
04/27/2004 Tested successfully on CSU/GOES-8/9/10/12 data.
04/27/2004 Tested successfully on AES/GOES-8 data.
05/03/2004 Tested successfully on CSU/GOES-7 data.
05/03/2004 Tested successfully on CSU/GOES-6 data.
```

130. isccpb1u/isccp_b1u_production [Generics]

[[Top](#)] [Generics]

NAME

isccp_blu_production

PURPOSE

To document the production of ISCCP B1U files.

NOTES

The following are the steps used in producing ISCCP B1U files.

USES

* [idl.b1_2_blu](#)

USED BY

ISCCP B1U files are used by many of the processes I run. These include:
* [idl.blu_2_grisat](#)

INPUT

OUTPUT

RESULT

EXAMPLE

TODO

BUGS

AUTHOR

Ken Knapp, NOAA/NCDC/RSAD

CREATION DATE

Tue Apr 7 11:03:54 EDT 2009

HISTORY

07April2009 - Added this summary documentation header.

131. kmod_utilities/qsortd [Subroutines]

[[Top](#)] [Subroutines]

NAME

qsortd

SYNOPSIS

call **qsortd**(x,ind,n)

FUNCTION

Sorts the data in parameter x returning the sorted indices in IND

INPUTS

x - rank1 - real*4 or 8 or integer *1, 2 or 4 - input data to be sorted
n - # of elements in x

OUTPUT

ind - indices of the sorted parameters

NOTES

ROBERT RENKA
OAK RIDGE NATL. LAB.
THIS SUBROUTINE USES AN ORDER $N \cdot \log(N)$ QUICK SORT TO SORT A REAL (dp) ARRAY X INTO INCREASING ORDER. THE ALGORITHM IS AS FOLLOWS. IND IS INITIALIZED TO THE ORDERED SEQUENCE OF INDICES 1,...,N, AND ALL INTERCHANGES ARE APPLIED TO IND. X IS DIVIDED INTO TWO PORTIONS BY PICKING A CENTRAL ELEMENT T. THE FIRST AND LAST ELEMENTS ARE COMPARED WITH T, AND INTERCHANGES ARE APPLIED AS NECESSARY SO THAT THE THREE VALUES ARE IN ASCENDING ORDER. INTERCHANGES ARE THEN APPLIED SO THAT ALL ELEMENTS GREATER THAN T ARE IN THE UPPER PORTION OF THE ARRAY AND ALL ELEMENTS LESS THAN T ARE IN THE LOWER PORTION. THE UPPER AND LOWER INDICES OF ONE OF THE PORTIONS ARE SAVED IN LOCAL ARRAYS, AND THE PROCESS IS REPEATED ITERATIVELY ON THE OTHER PORTION. WHEN A PORTION IS COMPLETELY SORTED,

```

THE PROCESS BEGINS AGAIN BY RETRIEVING THE INDICES BOUNDING ANOTHER
UNSORTED PORTION.
INPUT PARAMETERS -   N - LENGTH OF THE ARRAY X.
                   X - VECTOR OF LENGTH N TO BE SORTED.
                   IND - VECTOR OF LENGTH >= N.
N AND X ARE NOT ALTERED BY THIS ROUTINE.
OUTPUT PARAMETER - IND - SEQUENCE OF INDICES 1,...,N PERMUTED IN THE SAME
                      FASHION AS X WOULD BE.  THUS, THE ORDERING ON
                      X IS DEFINED BY Y(I) = X(IND(I)).

-- IU AND IL MUST BE DIMENSIONED >= LOG(N) WHERE LOG HAS BASE 2.
-- Knapp modified it to allow different types of real and integers

```

132. kmos_iscsp/b1u_ij2ll [Subroutines]

[[Top](#)] [Subroutines]

NAME

b1u_ij2ll

SYNOPSIS

```

call b1u_ij2ll( ip, jp, lat, lon, blugvar, vza, subsat, debug, scanangle)
      or
call b1u_ij2ll( ip, jp, lat, lon, nav, vza, subsat, debug, scanangle)

```

FUNCTION

To convert line/pixel coordinate point(s) of a satellite image to latitude/longitude.

INPUTS

```

* ip - Pixel locations (default is in image coordinates):
    * r*4 - rank2
    * r*4 - rank1
    * r*4 - scalar
* jp - Line locations (default is in image coordinates):
    * same type & rank as ip
* Navigation is taken from either:
    * NAV - B1U Navigation array (LONARR(200)) from bluread
    * blugvar, which is type(blu\_gvar)

```

OUTPUT

```

* lat (degrees)
* lon (degrees)
* Optional outputs:
    * vza - optional:
      * same type and rank as ip
    * subsat - optional - r*4(3) - [lat(deg),lon(deg),radius(km)]

```

OPTIONS

```

Optional arguments:
* debug - i*4 - set debug=1 for optional debugging output
* scanangle - i*4 - set to return scan and elevation angles (deg)
  instead of lat/lon values.

```

USES

[nav2rec](#), [bcd_time](#), [imcnav_r1](#), [julday](#), [kep2cart](#), [cart2earth](#), [sincos](#)

NOTES

- * The GVAR Navigation calls `imc_nav`
- * The Kepler navigation (all non-GVAR satellites) is based on Kidder and Vonder Haar, 1995: Introduction to Satellite Meteorology
- * See Enchilada for units of lat/lon

133. mcidas/idl.mcidas_calibrate [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

`mcidas_calibrate`

PURPOSE

Calibrate McIDAS imagery read by [mcidas_read.pro](#)

INPUTS

All variables are input and output through keywords:
AREAstr - McIDAS AREA file directory header
images - Image (as provided from [mcidas_read.pro](#))
LINhdr - Scan line prefix header

OUTPUT

radiance- Radiances determined from the IMAGES input
temperature- Temperature determined from the IMAGES input.

OPTIONS

The radiance output is optional.

NOTES

This routine was coded up from information freely available on the world wide web. References to web sites are provided in the code documentation.

This code will need an update to work with satellites other than those listed below:

- * GOES Imagers (GOES-8,9,10,11,12,13)

Last Updated June 23, 2006

USED BY

- * `blread_aes_g8.pro`

- * blread_csu_g91012.pro
- * blread.pro

USES

- * Nothing

TO DO

- * Sounder calibration routines
- * Mode-A calibration
- * Multi-channel imagery (i.e., images=intarr(nchan,nx,ny))

134. mcidas/idl.mcidas_read [IDL_Routines]

[[Top](#)] [IDL_Routines]

NAME

[mcidas_read](#)

WARNING

THIS ROUTINE HAS NOT BEEN FULLY TESTED. THE PARAMETERS RETURNED SHOULD BE CHECKED FOR ACCURACY AND CONSISTANCY. IT HAS BEEN TESTED AGAINST A SMALL SAMPLE OF FILES OBTAINED FROM CLASS (<http://www.class.noaa.gov> or <http://www.class.ncdc.noaa.gov>)

PURPOSE

To read in the mcidas GOES area data. This routine is based on the ISCCP B1 access to CSU GOES-9/10/12 data. The routine ONLY reads the mcidas data. Calibration and navigation are entirely different algorithms. Navigation requires converting lat/lon values to line/pixels (or vice versa). Information to do this is stored in the AREAstr and NAVstr structures. Calibration involves converting images counts [from the IMAGES variable] to radiance units. Information to do this is available online.

INPUTS

All input/output are keyword parameters.

- * file = filename of mcidas area file [if not provided, then the
- * dialog_pickfile will prompt user to select a file]

OUTPUT

- * AREAstr: Mcidas area header
- * NAVstr: Mcidas Navigation header
- * IMAGES: The image data. The return is ARRAY[NCHAN,NX,NY]
- * LINhdr: McIDAS scan line prefix
- * cmd : McIDAS command line (if stored)

OPTIONS

- * NOREAD - This reads only the AREAstr and NAVstr header and skips

reading the IMAGES array (useful for checking out the header without the I/O of reading the entire file).

USES

- * define_mcidas_area_gvar.pro
- * define_mcidas_lineprefix_class.pro
- * define_mcidas_nav_goes.pro
- * define_mcidas_nav_gvar.pro

USED BY

- * blread_noa_goe.pro

MODIFICATION HISTORY

```
$Id: mcidas\_read.pro,v 1.10 2007/04/30 13:08:50 kknapp Exp $
Created 11/16/2003 - Ken Knapp NCDC
    03/11/2004   Imported to CVS
    03/15/2004   Added the option to return line headers
    03/19/2004   Converted to read mcidas AREA files
    05/27/2004   Updating for distribution.
```

TO DO

- Add option to output line header time (converted from BCD)
- Read the calibration header if available.