TABLE OF CONTENTS

1. PATMOSX/algorithm_constants.f90 [Programs]

[Top] [Programs]

NAME

algorithm_constants.f90

LOCATION

.../patmosx/src/**algorithm_constants.f90**

PURPOSE

This module serves as a common block for passing the
non-cloud algorithm coefficients

DESCRIPTION

This module serves as a common block for passing the
non-cloud algorithm coefficients

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

None

2. PATMOSX/algorithm_module_usage.f90 [Programs]

[Top] [Programs]

NAME

algorithm_module_usage.f90

LOCATION

.../patmosx/src/**algorithm_module_usage.f90**

PURPOSE

Lists modules necessary for cloud_tau_re_solar.f90

DESCRIPTION

Lists modules necessary for cloud_tau_re_solar.f90

AUTHOR

Andi Walther

CREATION DATE

unk

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NOTES

None

HISTORY

Version	Date	Comment
v1	06/04/2009	AW

ATTRIBUTES

Language : Fortran 90
Software Standards: NOAA/NESDIS STAR WI-12.1.1

3. PATMOSX/avhrr_calnav_routines.f90 [Programs]

[Top] [Programs]

NAME

avhrr_calnav_routines.f90

LOCATION

.../patmosx/src/**avhrr_calnav_routines.f90**

PURPOSE

AVHRR CALIBRATION AND NAVIGATION ROUTINES

DESCRIPTION

EXPERMINENTAL VERSION = READS LEVEL-1b one segment at a time - not 2 scans

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

Routines in this module and their purpose:

DEFINE_1B_DATA - based on level 1b data type, define some parameters
needed to read and unpack the avhrr data
DETERMINE_FILE_TYPE - interrogate header and determine the file type
UNPACK_AVHRR_HEADER_RECORD - unpack level 1b header for pre-klm data
UNPACK_AVHRR_DATA_RECORD - unpack level 1b data for pre-klm data
LAGRANGIAN_ANCHOR_INTERP - perform Lagrangian interpolatation of anchors
LINEAR_ANCHOR_INTERP - perform linear interpolation of anchors
COMPUTE_ANGLE_ANCHORS - compute satzen and relaz anchors for pre-klm data
UNPACK_AVHRR_HEADER_RECORD_KLM - unpack level 1b header for klm+ data
UNPACK_AVHRR_DATA_RECORD_KLM - unpack level 1b data for klm+ data
i4word_to_string - convert a 4 byte integer to a string
READ_AVHRR_INSTR_CONSTANTS - read avhrr instrument constant files
READ_CLAVRXORB_DEFAULT_OPTIONS - Opens default file if necessary
QC_CLAVRXORB_OPTIONS - quality control options
REF_CAL - perform the reflectance calibration
REF_CAL_COEFFS - compute the reflectance calibration coefficients

```
THERM_CAL - perform the thermal calibration
COMPUTE_NEW_THERM_CAL_COEF - compute thermal calibration coefficients
WRITE_HEADER_1BX - write a header to the level 1bx files
READ_AVHRR_LEVEL1B_DATA - read level 1b data records
READ_AVHRR_LEVEL1B_HEADER - read level 1b header records
COMPUTE_GLINTZEN_SCATANGLE - compute the glint and scattering angles
READ_CLAVRXORB_COMMANDLINE_OPTIONS - gathers command line options
                                     and checks the options for errors
HELPER - Displays what each command line option is
CALCULATE_ASC_DES - Calculates ascending/descending flag if error presennt
                    in level1b file
```

4. PATMOSX/avhrr_diag_routines.f90 [Programs]

[Top] [Programs]

NAME

avhrr_diag_routines.f90

LOCATION

/patmosx/src/**avhrr_diag_routines.f90**

PURPOSE

AVHRR DIAGNOSTIC ROUTINES

DESCRIPTION

this module houses the routines for performance diagnostics

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

Routines in this module:

```
OPEN_DIAG_FILES - open the files used for diagnostic output
WRITE_TO_DIAG_FILES - write chosen fields to diagnostic output
```

CLOSE_DIAG_FILES - close the files used for diagnostic output

5. PATMOSX/avhrr_pixel_aerosol.f90 [Programs]

[Top] [Programs]

NAME

avhrr_pixel_aerosol.f90

LOCATION

/patmosx/src/**avhrr_pixel_aerosol.f90**

PURPOSE

a module for pixel level aerosol properties from AVHRR
this is the single channel algorithm used in PATMOS for
aerosol optical in ch1 over the ocean

DESCRIPTION

a module for pixel level aerosol properties from AVHRR
this is the single channel algorithm used in PATMOS for
aerosol optical in ch1 over the ocean

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

Note, aerosol product quality flags are computed elsewhere.

Lookup tables provided by A. Ignatov (02/2005)

Public routines used in this module:
READ_AER_CH123A_REF_LUTS - read the lookup tables (LUTS)
PIXEL_AER_RET_OCEAN - perform the estimation of optical depth

INPUTS_OUTPUTS

```
 Input and output to these routines is through public arrays
 through the AVHRR_PIXEL_COMMON module.

File I/O
 Logical units are opened and closed during LUT read.

public variables used
 alb1 - channel 1 relflectance (%)
 alb2 - channel 2 reflectance (%)
 alb3a - channel 3a reflectance (%)
 satzen - sensor zenith angle (deg)
 solzen - solar zenith angle (deg)
 relaz - relative azimuth angle (deg)

output passed through AVHRR_PIXEL_COMMON
 aot1 - channel 1 aerosol optical depth
 aot2 - channel 2 aerosol optical depth
 aot3a - channel 3a aerosol optical depth

aerosol lookup table variables
 tau_lut - optical depth used in tables - dimension (ntau)
 solzen_lut - solar zenith angles used in tables - dimension(nsolzen)
 zen_lut - sensor zenith angles used in tables -dimension (nzen)
 az_lut - relative azimuth angles used in tables - dimension(naz)
 ref_lut_ch1_aer - ch1 reflectances (0-1) of lookup table -
                   dimension(nsolzen,nzen,ntau,naz)
 ref_lut_ch2_aer - ch2 reflectances (0-1) of lookup table
 ref_lut_ch3a_aer - ch3a reflectances (0-1) of lookup table
```

6. PATMOSX/avhrr_pixel_common.f90 [Programs]

[Top] [Programs]

NAME

avhrr_pixel_common.f90

LOCATION

/patmosx/src/**avhrr_pixel_common.f90**

PURPOSE

AVHRR PIXEL COMMON

DESCRIPTION

This module houses routines used to handle the pixel level arrays that
are based through this module

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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```
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TO USERS.
```

NOTES

EXTERNALS

```
Public routines in this module:
 CREATE_PIXEL_ARRAYS - allocate memory for pixel level arrays
 DESTROY_PIXEL_ARRAYS - deallocate memory for pixel level arrays
 RESET_PIXEL_ARRAYS_TO_MISSING - set pixel arrays to missing
```

7. PATMOSX/avhrr_pixel_routines.f90 [Programs]

[Top] [Programs]

NAME

avhrr_pixel_routines.f90

LOCATION

/patmosx/src/**avhrr_pixel_routines.f90**

PURPOSE

AVHRR_PIXEL_ROUTINES

DESCRIPTION

this module houses routines for computing some needed pixel-level arrays

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

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```

NOTES

EXTERNALS

```
Public routines used in this module:
READ_AVHRR_ALGO_CONSTANTS - read coefficients from AVHRR algo files
COMPUTE_PIXEL_ARRAYS - compute some commonly used arrays
OPERATIONAL_SST - compute an sst using the NESDIS oper. equations
COMPUTE_TSFC - combine sst, lst and ist into a single surface
                  temperature and derive an estimate of total prec. water
COMPUTE_ERB - compute outgoing longwave radiation (OLR)
ATMOS_CORR - perform atmospheric correction
NORMALIZE_REFLECTANCES - divide reflectances by cosine solar zenith angle
CH3B_ALB - compute the channel 3b reflectance
COMPUTE_SPATIAL_UNIFORMITY - compute metrics of radiance and reflectance
                             spatial uniformity
CONVERT_COUNTS_SINGLE_GAIN - convert dual gain counts to single gain for
                             calibration diagnostics
SPECTRAL_CORRECT_NDVI - apply a spectral correct to ndvi to look like NOAA14
ASSIGN_CLEAR_SKY_QUALITY_FLAGS - assign quality flags to clear-sky products
COMPUTE_DATA_MASK - compute data mask used in cloud mask - holds flags
                    telling processing path (day/land/coast/...)
CONVERT_TIME - compute a time in hours based on millisecond time in level1b
COMPUTE_SNOW_FIELD - based on snow information, make a snow field.
COMPUTE_GLINT - derive a glint mask
COMPUTE_INOUE_CLOUD_TYPE - compute cloud type based on Toshiro Inoue's scheme
---- constants needed in this module
```

8. PATMOSX/awg_cloud_mask_tests.f90 [Programs]

[Top] [Programs]

NAME

awg_cloud_mask_tests.f90

LOCATION

/patmosx/src/**awg_cloud_mask_tests.f90**

PURPOSE

AWG_Cloud_Mask_Tests

DESCRIPTION

module use statements

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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```
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```

NOTES

```
none
```

EXTERNALS

```
PRIVATE ROUTINES:
 SPLIT_WIN_CIRRUS_ROUTINE
 TEMPIR_ROUTINE
 NIRREF_Chn7_ROUTINE
 CIRREF_ROUTINE
 MECIDA_ROUTINE
 ATMOSPHERIC_SCATTERING_CHN2

PUBLIC ROUTINES:
 RUT_ROUTINE
 TUT_ROUTINE
 RTCT_ROUTINE
 ETROP_ROUTINE
 PFMFT_ROUTINE
 NFMFT_ROUTINE
 RFMFT_ROUTINE
 SET_CMASK_THRESHOLDS
 RGCT_ROUTINE
 RVCT_ROUTINE
 NIRREF_Chn5_ROUTINE
 EMISS4_ROUTINE
 ULST_ROUTINE
```

9. PATMOSX/calibration_constants.f90 [Programs]

[Top] [Programs]

NAME

calibration_constants.f90

LOCATION

/patmosx/src/**calibration_constants.f90**

PURPOSE

```
This module serves as a common block for passing the
instrument and calibration coefficients
```

DESCRIPTION

```
This module serves as a common block for passing the
instrument and calibration coefficients
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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```

NOTES

```
none
```

EXTERNALS

```
none
```

INPUTS_OUTPUTS

```
none
```

MODIFICATION HISTORY

10. PATMOSX/cell_hdf_1.f90 [Programs]

[Top] [Programs]

NAME

cell_hdf_1.f90

LOCATION

/patmosx/src/**cell_hdf_1.f90**

PURPOSE

```
CELL_HDF_ROUTINES
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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NOTES

```
none
```

EXTERNALS

```
Public routines used here:
WRITE_GRIDCELL_DATA - routine to write CLAVR-x sds's to
                      orbital grid file
```

INPUTS_OUTPUTS

```
File I/O - data is written to the orbital gridcell file using HDF4
```

11. PATMOSX/cld_hght_11_12_1dvar.f90 [Programs]

[Top] [Programs]

NAME

cld_hght_11_12_1dvar.f90

LOCATION

/patmosx/src/**cld_hght_11_12_1dvar.f90**

PURPOSE

```
This module holds the algorithms to estimate cloud properties
```

DESCRIPTION

```
This module holds the algorithms to estimate cloud properties
accomplished via multiple passes
pass 1 = non-multi-layer ncc pixels
pass 2 = single layer water cloud pixels
  <---- interp water cloud values to all pixels
```

```
pass 3 = lrc multi-layer clouds
pass 4 = all remaining clouds

pass 0 = treat all pixels as single layer ncc pixels (only done if lrc_flag=no)
```

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

```
reference:
 Heidinger, A.K., and M.J. Pavolonis, 2009: Gazing at Cirrus Clouds for 25 Years
 through a Split Window. Part I: Methodology. J. Appl. Meteor. Climatol., 48,
 1100â€“1116.
```

MODIFICATION HISTORY

```
v5 changes:
    1) multi-layer clouds are now processed using a dynamically
       determined lower cloud boundary condition
    2) profiles are now interpolated to each pixel
```

12. PATMOSX/cloud_mask.f90 [Programs]

[Top] [Programs]

NAME

cloud_mask.f90

LOCATION

/patmosx/src/**cloud_mask.f90**

PURPOSE

This module performs a cloud mask

DESCRIPTION

```
This module performs a cloud mask on 2 by 2 pixel arrays
resulting in cloud mask codes. In addition, this module
it applies each test to each pixel and each test has its
own byte which is also an output of this routine.
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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NOTES

```
none
```

EXTERNALS

```
Subroutines included in module:
 CLOUD_MASK_3x3

DEPENDENCIES:
     CONSTANTS
     CLOUD_MASK_THRESHOLDS
     AVHRR_PIXEL_COMMON
     NWP_COMMON
     CLOUD_MASK_ROUTINES
```

13. PATMOSX/cloud_mask_routines.f90 [Programs]

[Top] [Programs]

NAME

cloud_mask_routines.f90

LOCATION

/patmosx/src/**cloud_mask_routines.f90**

PURPOSE

```
Calculation of the reflectance thresholds, dust detection,
fire detection, probably clear pixels, clear restorals, and putting bits into
cloud mask bits
```

DESCRIPTION

```
This module contains several subroutines needed for both cloud mask modules.
They include the calculation of the reflectance thresholds, dust detection,
fire detection, probably clear pixels, clear restorals, and putting bits into
cloud mask bits
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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NOTES

```
none
```

EXTERNALS

```
Subroutines included in module:
     COMPUTE_2BIT_CLOUD_MASK
     COMPUTE_2BIT_CLOUD_MASK_IR
     COMPUTE_PROBABLY_CLOUDY
     DUST_DETECTION_ALGORITHM
     SMOKE_DETECTION_ALGORITHM
     FIRE_DETECTION_ALGORITHM
     COMPUTE_PROBABLY_CLEAR_RESTORAL
     COMPUTE_PROBABLY_CLOUDY_RESTORAL

DEPENDENCIES:
     CONSTANTS
     AVHRR_PIXEL_COMMON
     NWP_COMMON
```

14. PATMOSX/cloud_tau_re_solar.f90 [Programs]

[Top] [Programs]

NAME

cloud_tau_re_solar.f90

LOCATION

/patmosx/src/**cloud_tau_re_solar.f90**

PURPOSE

This module contains the routine to compute daytime microphysical properties (DCOMP)

DESCRIPTION

This function retrieves the cloud microphysical properties optical depth, effective radius and water path (liquid and solid)
This algorithm uses the 0.6 and 3.75 (1.6 for 3a periods) micron channels with optimal estimation inversion to retrieve the cloud microphysics

AUTHOR

Andi Walther

CREATION DATE

unk

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NOTES

Reference: The Cloud Application Team Cloud DAYTIME Microphysical properties ATBD (DCOMP)

Calling Sequence:
USE BASELINE_CLOUD_MICRO_DAY
CALL BASELINE_CLOUD_MICRO_DAY_MAIN(ialgo)
where ialgo is the GEOCAT algorithm index. All other input/output is passed via global module variables.
Called after cloud mask, cloud type and cloud height

EXTERNALS

Dependencies:
ALGORITHM_MODULE_USAGE --> a module that lists all of the modules that need to be included
ABI cloud mask --> the ABI cloud mask must be processed first and available in the sat%cldmask variable
ABI cloud type --> the ABI cloud type must be processed first and available in the sat%cldtype variable
ABI cloud pressure --> the ABI cloud top pressure must be processed first and available in the sat%cldp variable
ABI cloud temperature --> the ABI cloud top temperature must be processed first and available in the sat%cldt variable

HDF_DCOMP ---> a module that contains all HDF routines to enable access to main amd anillary daya LUTs.
This module is stored in DCOMP_LIB library path.

Routines in HDF_DCOMP module those are called in this module:

```
                                - POPULATE_ALL_LUT      --> called once at the first segment to
  populate data structure
                                - GET_LUT_DATA          --> Access routine

          GEOCAT satellite, RTM,  and NWP structures must be
          populated for each segment
```

INPUTS_OUTPUTS

```
    Inputs: All input passed through geocat structures
           (SATELLITE, NWP, RTM and temporal)

    Outputs:
          COD = out2(ialgo)%cod_vis = cloud optical depth
          CPS = out2(ialgo)%cldreff = cloud particle size
          LWP = out2(ialgo)%cldlwp  = liquid water path
          IWP = out2(ialgo)%cldiwp  = ice water path
          QC = out2(ialgo)%qcflg1   = quality flags
```

MODIFICATION HISTORY

```
     Version        Date           Comment
     - - - -      - - - -        - - - - - - -
       v1           2007          initial version Andrew Heidinger
       v3           02/02/2009    transformed code to NOAA standard
                    05/31/2009    bug fix, airmass was twice included in tau
                                  calculations of h2o  (AW)
                    02/18/2010    revised
                    03/26/2010    major revision. outsource hdf routines
                                   and allocatable arrays (AW)!
                    04/23/2010    new get_lut_data subroutine in dcomp_lib library
```

ATTRIBUTES

```
     Language : Fortran 90
     Software Standards: NOAA/NESDIS STAR WI-12.1.1
```

15. PATMOSX/cloud_type.f90 [Programs]

[Top] [Programs]

NAME

cloud_type.f90

LOCATION

/patmosx/src/**cloud_type.f90**

PURPOSE

This module performs a cloud typing decision on pixel by pixel basis

DESCRIPTION

This module performs a cloud typing decision on pixel by pixel basis

AUTHOR

Michael Pavolonis, Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

none

EXTERNALS

Subroutines included in module:
CLOUD_TYPE

DEPENDENCIES:
CONSTANTS
AVHRR_PIXEL_COMMON

MODIFICATION HISTORY

October 2006, Added retype routine - Heidinger
August 2007 - Added IR cloud type/layer - Heidinger
August 2009 - Added preliminary cloud type for AVHRR/1 - Heidinger

16. PATMOSX/comp_asc_des.f90 [Programs]

[Top] [Programs]

NAME

comp_asc_des.f90

LOCATION

/patmosx/src/**comp_asc_des.f90**

PURPOSE

A main code generated one of the executables in the CLAVR-x processing system.

DESCRIPTION

This code takes the level-3 files created for each orbit
for one day from one satellite and writes separate level3
files for the ascending and descending nodes. This code runs
after clavrxorb has processed the level-1b files for one day.
This program reads input (directories and filenames) from a file
called comp_asc_des_input. Currently, there are no
command line arguments.

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

May 2004

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NOTES

Reference: Level3 file contents are given on
http://cimss.ssec.wisc.edu/patmosx

Format of Required Input File:
  line 1: directory of orbital level3 files (input)
  line 2: directory of daily level3 files (output)
  line 3: year
  line 4: julian day
  line 5: satellite number (i.e. 18 = NOAA-18)
  line 6: level-3 grid resolution (input files with different resolution are
                                   skipped in the processing)
  line 7: level-3 grid format. 0 = equal-area, 1 = equal-angle (input files
                           with differnt format are skipped)
  line 8+: orbital level3 file (one file per line)

Reference: Level3 file contents are given on
http://cimss.ssec.wisc.edu/patmosx

Calling Sequence:
  comp_asc_des_level2 node nav_flag geo_flag

EXTERNALS

Dependencies: (The following are names of modules)
  CONSTANTS
  HDF
  HDF_PARAMS
  NUMERICAL_ROUTINES
  SCALING_PARAMETERS

MODIFICATION HISTORY

August 2004 - Added error messaging (D. Donahue - STC)
June 2006 - Rewrote for version 4 CLAVR-x using standardized HDF read/write commands

17. PATMOSX/comp_asc_des_level2b.f90 [Programs]

[Top] [Programs]

NAME

comp_asc_des_level2b.f90

LOCATION

/patmosx/src/**comp_asc_des_level2b.f90**

PURPOSE

This code takes the orbit level2 files for one day from one satellite
and writes separate level2b files for the ascending and descending nodes

DESCRIPTION

This code takes the level2 files created for each orbit
for one day from one satellite and writes separate level2b
files for the ascending and descending nodes. This code runs
after clavrxorb has processed the level-1b files for one day.
This program reads input (directories and filenames) from a file
called comp_asc_des_level2b_input. Currently, there are no
command line arguments.

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

May 2009

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NOTES

Format of Required Input File:
  line 1: directory of level2 files (input)
  line 2: directory of level2b files (output)
  line 3: year
  line 4: julian day
  line 5: satellite number (i.e. 18 = NOAA-18)
  line 6: longitudes (west, east, spacing)
  line 7: latitudes (south, north, spacing)
  line 8+: level2 file name (one per line)

```
   Reference:  Level2 and Level2b file contents are given on
               http://cimss.ssec.wisc.edu/patmosx

   Calling Sequence:
      comp_asc_des_level2 node nav_flag geo_flag

      where:
            node = asc or des
            nav_flag = 0 (compute pixel lat,lon from level2b)
                       1 (read pixel lat, lat from nav file)
            geo_flag = 0 (compute pixel angles from level2b)
                       1 (read pixel angles from nav file)
```

EXTERNALS

```
   Dependencies:  (The following are names of modules)
     CONSTANTS
     HDF
     HDF_PARAMS
     NUMERICAL_ROUTINES
     SCALING_PARAMETERS
     LEVEL2B_ROUTINES
     FILE_UTILITY
```

MODIFICATION HISTORY

```
      June 2010: Added options to use geo and nav files for speed
      August 2010: Added FCDR attributes
      September 2010: Added descriptive global attributes
```

18. PATMOSX/Compare_Float_Numbers.f90 [Programs]

[Top] [Programs]

NAME

Compare_Float_Numbers.f90

LOCATION

/patmosx/src/**Compare_Float_Numbers.f90**

PURPOSE

```
Module containing routines to perform equality and relational
comparisons on floating point numbers
```

DESCRIPTION

```
Module containing routines to perform equality and relational
comparisons on floating point numbers
```

AUTHOR

```
Paul van Delst, CIMSS/SSEC
```

CREATION DATE

Apr 2003

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NOTES

none

19. PATMOSX/constant.f90 [Programs]

[Top] [Programs]

NAME

constant.f90

LOCATION

/patmosx/src/**constant.f90**

PURPOSE

A module with the CLAVR-x processing system

DESCRIPTION

Store and serve various constants for use in the CLAVR-x system

AUTHOR

Paul van Delst, CIMSS/SSEC

CREATION DATE

Apr 2003

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NOTES

```
Calling Sequece:
 use CONSTANTS
```

20. PATMOSX/equal_angle.f90 [Programs]

[Top] [Programs]

NAME

equal_angle.f90

LOCATION

/patmosx/src/**equal_angle.f90**

PURPOSE

This set of routines in this modules is used when the equal angle
options selected for the clavr-x gridcell

DESCRIPTION

This set of routines in this modules is used when the equal angle
options selected for the clavr-x gridcell
This cell-ordering is the same as the PATMOS ordering
first cell is at 0 longitude (the prime meridian) and at
the south pole. Cells go east then north.

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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EXTERNALS

```
Dependencies: (The following are names of modules used in CLAVR-x)
CONSTANTS
```

```
Public Routines within this module:
SETUP_EQUAL_ANGLE
PLACE_EQUAL_ANGLE_CELL
FIND_EQUAL_ANGLE_CELL
DESTROY_EQUAL_ANGLE
```

NOTES

```
Calling Sequence:
use EQUAL_ANGLE_GRID
```

21. PATMOSX/equal_area.f90 [Programs]

[Top] [Programs]

NAME

equal_area.f90

LOCATION

/patmosx/src/**equal_area.f90**

PURPOSE

```
This set of routines in this modules is used when the equal area
options selected for the clavr-x gridcell
```

DESCRIPTION

```
This set of routines in this modules is used when the equal area
options selected for the clavr-x gridcell
This cell-ordering is the same as the PATMOS ordering
first cell is at 0 longitude (the prime meridian) and at
the south pole. Cells go east then north.
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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```
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THE USE OF THE SOFTWARE AND DOCUMENTATION; OR (2) TO PROVIDE TECHNICAL SUPPORT
TO USERS.
```

EXTERNALS

```
Dependencies: (The following are names of modules used in CLAVR-x)
CONSTANTS

Calling Sequence:
use EQUAL_AREA_GRID

Public Routines within this module:
SETUP_EQUAL_AREA
PLACE_EQUAL_AREA_CELL
FIND_EQUAL_AREA_CELL
DESTROY_EQUAL_AREA
```

22. PATMOSX/file_utility.f90 [Programs]

[Top] [Programs]

NAME

file_utility.f90

LOCATION

/patmosx/src/**file_utility.f90**

PURPOSE

Module containing generic file utility routines

DESCRIPTION

```
Module containing generic file utility routines
CATEGORY:
    NCEP RTM
CALLING SEQUENCE:
    USE file_utility
```

AUTHOR

Paul van Delst, CIMSS@NOAA/NCEP

CREATION DATE

12 JUL 2000

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NOTES

```
CONTAINS:
    get_lun:     PUBLIC function to return a free logical unit number for
                 file access.

    file_exists: PUBLIC function to determine if a named file exists.
```

23. PATMOSX/gfs_hdf_module.f90 [Programs]

[Top] [Programs]

NAME

gfs_hdf_module.f90

LOCATION

/patmosx/src/**gfs_hdf_module.f90**

PURPOSE

This module houses all routines related to the GFS data

DESCRIPTION

This module houses all of the routines used to read and process the
GFS NWP data. The data used here are already in hdf format from the
convert_grib_to_hdf utility.

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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EXTERNALS

Dependencies:
CONSTANTS
NUMERICAL_ROUTINES
Sort_Module
NWP_COMMON
HDF

```
Calling Sequence:
use GFS

Public Routines within this module:
READ_GFS_DATA
```

24. PATMOSX/hdf.f90 [Programs]

[Top] [Programs]

NAME

hdf.f90

LOCATION

/patmosx/src/**hdf.f90**

PURPOSE

Fortran header file for HDF routines

DESCRIPTION

This file is a modularized version of the '**hdf.f90**' file from the 'include' directory of the standard HDF library installation. This version of the file is taken from the HDF4.2r0 library distribution.

AUTHOR

Aleksandar Jelenak

CREATION DATE

unk

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NOTES

```
Contents:
    Tag definitions
    Error return codes
    Logical constants
Remarks:
    This file can be included with Fortran user programs.  As a
    general rule, don't use DFNT constants that don't include a
    number in their name.  E.g., don't use DFNT_FLOAT, use
```

```
DFNT_FLOAT32 or DFNT_FLOAT64.  The DFNT constants that don't
include numbers are for backward compatibility only.  Also,
there are no current plans to support 128-bit number types.
For more information about constants in this file, see the
equivalent constant declarations in the C include file 'hdf.h'
```

MODIFICATION HISTORY

```
08 Apr 2004   Aleksandar Jelenak
```

25. PATMOSX/hdf_dcomp.f90 [Programs]

[Top] [Programs]

NAME

hdf_dcomp.f90

LOCATION

/patmosx/src/**hdf_dcomp.f90**

PURPOSE

This module contains routines for hdf read functions for DCOMP algorithm

DESCRIPTION

This module contains routines for hdf read functions for DCOMP algorithm

AUTHOR

A. Walther
andi.walther@ssec.wisc.edu

CREATION DATE

28 Mar 2010

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NOTES

none

26. PATMOSX/hdf_params.f90 [Programs]

[Top] [Programs]

NAME

hdf_params.f90

LOCATION

/patmosx/src/**hdf_params.f90**

PURPOSE

This module contains routines used to read and write to the
hdf output files from CLAVR-x

DESCRIPTION

This module contains routines used to read and write to the
hdf output files from CLAVR-x

AUTHOR

A. Walther
andi.walther@ssec.wisc.edu

CREATION DATE

28 Mar 2010

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EXTERNALS

Dependencies: (The following are names of other CLAVR-x modules)
CONSTANTS
HDF
SCALING_PARAMETERS

Calling Sequence:
use HDF_PARAMS

Public Routines within this module
SCALE_VECTOR_I1_RANK1
SCALE_VECTOR_I1_RANK2
SCALE_VECTOR_I1_RANK3
SCALE_VECTOR_I2_RANK1
SCALE_VECTOR_I2_RANK2
SCALE VECTOR I2 RANK3

```
UNSCALE_VECTOR_I1_RANK1
WRITE_CLAVRX_HDF4_SDS
HDF_TSTAMP
GET_MACHINE_NAME
WRITE_CLAVRX_HDF_GLOBAL_ATTRIBUTES
READ_CLAVRX_HDF_GLOBAL_ATTRIBUTES
READ_CLAVRX_HDF4_SDS_RANK1
```

27. PATMOSX/irtsubn.f [Programs]

[Top] [Programs]

NAME

irtsubn.f

LOCATION

/patmosx/src/**irtsubn.f**

PURPOSE

Subprograms for infrared transmittance at 101-level SPACECRAFT pressure coordinate

DESCRIPTION

Subprograms for infrared transmittance at 101-level SPACECRAFT pressure coordinate

AUTHOR

unk

CREATION DATE

unk
version of 13.08.03

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EXTERNALS

```
  block data reference_atmosphere
  subroutine calpir
  subroutine conpir
  subroutine gphite
  subroutine taudoc
  subroutine tauwtr
  subroutine gphite  - calculates geopotential height given profile data
```

28. PATMOSX/land_sfc_properties.f90 [Programs]

[Top] [Programs]

NAME

land_sfc_properties.f90

LOCATION

/patmosx/src/**land_sfc_properties.f90**

PURPOSE

This module contains contains the subroutines necessary to reading in the global land surface files, determination of the snow mask file name

DESCRIPTION

This module contains contains the subroutines necessary to reading in the global land surface files, determination of the snow mask file name

AUTHOR

unk

CREATION DATE

unk

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NOTES

none

29. PATMOSX/level2.f90 [Programs]

[Top] [Programs]

NAME

level2.f90

LOCATION

/patmosx/src/**level2.f90**

PURPOSE

Routines for creating, writing and closing pixel-level output files

DESCRIPTION

Routines for creating, writing and closing pixel-level output files

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

May 2009

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NOTES

none

EXTERNALS

```
use CONSTANTS
use AVHRR_PIXEL_COMMON
use HDF
use SCALING_PARAMETERS
use HDF_PARAMS
use OISST_ANALYSIS

public:: DEFINE_HDF_FILE_STRUCTURES, &
         WRITE_PIXEL_HDF_RECORDS, &
         CLOSE_PIXEL_HDF_FILES
private::DEFINE_PIXEL_2D_SDS
```

30. PATMOSX/level2b.f90 [Programs]

[Top] [Programs]

NAME

level2b.f90

LOCATION

/patmosx/src/**level2b.f90**

PURPOSE

Routines for creating, writing and closing L2b output files

DESCRIPTION

Routines for creating, writing and closing L2b output files

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

May 2009

COPYRIGHT

NOTES

none

EXTERNALS

```
use CONSTANTS
use HDF
use LEVEL2_ROUTINES
use SCALING_PARAMETERS

public:: LAGRANGIAN_ANCHOR_INTERP, &
         LINEAR_ANCHOR_INTERP, &
         GNOMIC_ANCHOR_INTERP
         DEFINE_SDS    !place in interface
         READ_SDS
         UNSCALE_SDS   !place in interface
         SCALE_SDS     !place in interface
         WRITE_SDS
         COPY_GLOBAL_ATTRIBUTES
         REGRID
         SUBSET_LEVEL2B
```

31. PATMOSX/level3.f90 [Programs]

[Top] [Programs]

NAME

level3.f90

LOCATION

/patmosx/src/**level3.f90**

PURPOSE

Module that houses routines to generate gridded parameters from the
pixel level parameters

DESCRIPTION

Module that houses routines to generate gridded parameters from the
pixel level parameters

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

COPYRIGHT

NOTES

none

EXTERNALS

Public routines used is this module:
 COMPILE_GRIDCELL_ARRAYS - compile gridcells stats from pixel parameters
 COMPUTE_GRIDCELL_ARRAYS - once all pixels are processed, compute the final
                           gridcell parameters
 CREATE_GRIDCELL_ARRAYS - allocate memory for grid-cell arrays
 DESTROY_GRIDCELL_ARRAYS - deallocate memory for grid-cell arrays
 INITIALIZE_GRIDCELL_ARRAYS - initialize the values of the grid-cell
                              parameters
 READ_GRIDCELL_SFCTYPE - read the gridcell surface type which is
                         precomputed for each grid format and resolution

INPUTS_OUTPUTS

```
Unit 7 is opened and closed in READ_GRIDCELL_SFCTYPE
```

32. PATMOSX/Message_Handler.f90 [Programs]

[Top] [Programs]

NAME

Message_Handler.f90

LOCATION

/patmosx/src/**Message_Handler.f90**

PURPOSE

```
Module to define simple error/exit codes
and output messages.
```

DESCRIPTION

```
Module to define simple error/exit codes
and output messages.
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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EXTERNALS

```
USE File_Utility, ONLY: Get_Lun
USE CONSTANTS

SUBROUTINE Program_Message

Module parameters
PUBLIC :: SUCCESS
PUBLIC :: INFORMATION
PUBLIC :: WARNING
```

```
PUBLIC :: FAILURE
PUBLIC :: EOF
PUBLIC :: UNDEFINED

Module procedures
PUBLIC :: Program_Message
PUBLIC :: Display_Message
PUBLIC :: Open_Message_Log
```

33. PATMOSX/naive_bayesian_cloud_mask_module.f90 [Programs]

[Top] [Programs]

NAME

naive_bayesian_cloud_mask_module.f90

LOCATION

/patmosx/src/**naive_bayesian_cloud_mask_module.f90**

PURPOSE

Routines for the determination of the baysiean cloud mask

DESCRIPTION

Routines for the determination of the baysiean cloud mask

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

```
Bayesian Surface Types:
1 - Deep_Water
2 - Shallow_Water
3 - Unfrozen_Land
4 - Frozen_Land
5 - Arctic
6 - Antarctic
```

```
7 - Desert

SHALLOW_OCEAN = 0
LAND = 1
COASTLINE = 2
SHALLOW_INLAND_WATER = 3
EPHEMERAL_WATER = 4
DEEP_INLAND_WATER = 5
MODERATE_OCEAN = 6
DEEP_OCEAN = 7
```

EXTERNALS

```
use CONSTANTS
use AVHRR_PIXEL_COMMON
use NUMERICAL_ROUTINES
use FILE_UTILITY
use CLOUD_MASK_ROUTINES

private:: COMPUTE_BAYES_SFC_TYPE
public:: READ_NAIVE_BAYES, &
         CLOUD_MASK_NAIVE_BAYES
```

34. PATMOSX/naive_bayesian_cloud_phase_module.f90 [Programs]

[Top] [Programs]

NAME

naive_bayesian_cloud_phase_module.f90

LOCATION

/patmosx/src/**naive_bayesian_cloud_phase_module.f90**

PURPOSE

Routines for the determination of the baysiean cloud phase

DESCRIPTION

Routines for the determination of the baysiean cloud phase

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

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```
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```

NOTES

```
Bayesian Surface Types
1 - Deep_Water
2 - Shallow_Water
3 - Unfrozen_Land
4 - Frozen_Land
5 - Arctic
6 - Antarctic
7 - Desert

SHALLOW_OCEAN = 0
LAND = 1
COASTLINE = 2
SHALLOW_INLAND_WATER = 3
EPHEMERAL_WATER = 4
DEEP_INLAND_WATER = 5
MODERATE_OCEAN = 6
DEEP_OCEAN = 7
```

EXTERNALS

```
use CONSTANTS
use AVHRR_PIXEL_COMMON
use NUMERICAL_ROUTINES
use FILE_UTILITY
use CLOUD_MASK_ROUTINES

private:: COMPUTE_BAYES_SFC_TYPE
public:: READ_NAIVE_BAYES_PHASE, &
         CLOUD_PHASE_NAIVE_BAYES
```

35. PATMOSX/ncep_reanalysis.f90 [Programs]

[Top] [Programs]

NAME

ncep_reanalysis.f90

LOCATION

/patmosx/src/**ncep_reanalysis.f90**

PURPOSE

```
This module houses all of the routines necessary to interface with
NCEP Reanalysis Data
```

DESCRIPTION

```
This module houses all of the routines necessary to interface with
NCEP Reanalysis Data

Note this is hardcoded for the current 2.5x2.5 degree data.  It checks
to make sure that this is the case, if not, it reports this and stops
```

```
this restriction comes from the mapping of the T62 gaussian fields to
to the 2.5x2.5 fields.  This step uses a nearest neighbor approach and
should be revisted or this step should be moved outside of CLAVR-x.
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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```

NOTES

```
none
```

EXTERNALS

```
use CONSTANTS
use HDF
use NWP_COMMON
use SORT_MODULE
use NUMERICAL_ROUTINES

Public Routines
 READ_NCEP_REANALYSIS_DATA - main routine to read in the fields from the
                             NCEP Reanalysis

Private Routines
 READ_DATA_1D - routines to read in one-dimensional fields
 READ_DATA_2D - routines to read in two-dimensional fields
 READ_DATA_3D - routines to read in three-dimensional fields
 LOCATE_OUR_TIME - given a time, locate the correct NCEP Reanalysis fields
```

INPUTS_OUTPUTS

```
Two netcdf files are opened and closed used HDF routines
```

36. PATMOSX/num_mod.f90 [Programs]

[Top] [Programs]

NAME

num_mod.f90

LOCATION

/patmosx/src/**num_mod.f90**

PURPOSE

Library of useful numerical functions

DESCRIPTION

Library of useful numerical functions

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

none

EXTERNALS

```
private::
 PIX_SWAP
 PIX_SORT
 OPT_MEDIAN9_INT8
 OPT_MEDIAN9_FLOAT32

public::
 LOCATE
 POSSOL
 JULIAN
 COMPUTE_MONTH
 COMPUTE_DAY
 VAPOR
 VAPOR_ICE
 INVERT_2x2
 INVERT_3x3
 FIND_BOUNDS
 PACK_BYTES
 COMPUTE_TIME_HOURS
 COMPUTE_SPATIAL_UNIFORMITY_NxN_WITH_INDICES
 GRADIENT_MEANDER
 COMPUTE_MEDIAN
 COMPUTE_MEDIAN_SEGMENT
 GRADIENT2d
 GRADIENT2d_REVERSE
 MEDIAN_FILTER
 GREAT_CIRCLE
```

```
POLYNOMIAL
LOGNORMAL_MODE_RADIUS
LOGNORMAL_DIST
OPTICAL_DEPTH_TO_NUM_DEN
CALCULATE_MASS_LOADING
LEAP_YEAR_FCT
GET_REGULAR_LUT_INDEX
GET_IRREGULAR_LUT_INDEX
SDEV_FROM_SUMS
MEAN_FROM_SUM
PDF_TO_NORMALIZED_CDF
NORMALIZED_CDF_TO_TILE
BYTESCALE_VALUE
```

37. PATMOSX/nwp_common.f90 [Programs]

[Top] [Programs]

NAME

nwp_common.f90

LOCATION

/patmosx/src/**nwp_common.f90**

PURPOSE

This module holds the radiative transfer quantities needed for
the algorithms

DESCRIPTION

This module holds the radiative transfer quantities needed for
the algorithms

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

```
note, there two type of nwp data
 1- the pressure level data
 2- the data on different surface grid

 the only data assumed to be a on the surface grid are
   - surface temperature
   - weasd depth
   - u and v wind speed at 10m

the surface and pressure level grid may be different
i_nwp, j_nwp points to a cell in the pressure level data

In the GFS data, the pressure and surface grids are the same, in the
NCEP reanalysis, they differ
```

EXTERNALS

```
public::
CREATE_NWP_ARRAYS
DESTROY_NWP_ARRAYS
FIND_NWP_GRID_CELL
MAP_PIXEL_NWP
KNOWING_P_COMPUTE_T_Z_NWP
KNOWING_Z_COMPUTE_T_P_NWP
KNOWING_T_COMPUTE_P_Z_NWP
FIND_NWP_LEVELS
INTERPOLATE_NWP
INTERPOLATE_PROFILE
INTERPOLATE_NWP_TZ_PROFILES
COMPUTE_COAST_MASK_NWP
QC_NWP
COMPUTE_NWP_CLOUD_PARAMETERS
COMPUTE_TSFC_NWP
PROF_LOOKUP_USING_P
PROF_LOOKUP_USING_T
PROF_LOOKUP_USING_T_LAPSE
PROF_LOOKUP_USING_T_PROF
PROF_LOOKUP_USING_Z
TEMPORAL_INTERP_TMPSFC_NWP
```

38. PATMOSX/oisst_analysis.f90 [Programs]

[Top] [Programs]

NAME

oisst_analysis.f90

LOCATION

/patmosx/src/**oisst_analysis.f90**

PURPOSE

```
Routine to handle the Reynolds OISST analysis
```

DESCRIPTION

```
Routine to handle the Reynolds OISST analysis
data is one degree resolution
http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis
global (89.875S - 89.875N)  (1440 x 720) starts at 89.5S and GM
```

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

DESCRIPTION OF THE DAILY OI SEA SURFACE TEMPERATURE (SST) ANALYSIS Version2

The SST analysis is computed daily on a 0.25 degree latitude/longitude grid.
This is version 1.0. There are two products with different satellite data.
Both products use in situ data from ships and buoys. Also SSTs are generated
for sea-ice concentrations above 50%. The sea ice for 1981-2004 is from
http://nsidc.org/data/nsidc-0051.html
(Cavalieri D., C. Parkinson, P. Gloerson, and H.J. Zwally. 1997, updated 2005.
Sea ice concentrations from Nimbus-7 SMMR and DMSP SSM/I passive microwave data,
June to September 2001. Boulder, CO, USA). The sea ice from 2005 to present is from
http://polar.ncep.noaa.gov/seaice/
(Grumbine, R. W., 1996: Automated passive microwave sea ice concentration
analysis at NCEP, 13pp. Unpublished manuscript available from NCEP/NWS/NOAA,
5200 Auth Road, Camp Springs, MD, 20746, USA.)

The first product uses NODC's AVHRR Pathfinder Version 5
http://pathfinder.nodc.noaa.gov
for September 1, 1981 though December 31, 2005 and the operational US Navy AVHRR data
(May, D.A., M. M. Parmeter, D. S. Olszewski and B. D. McKenzie, 1998: Operational
processing of satellite sea surface temperature retrievals at the Naval Oceanographic
Office, Bull. Amer. Met. Soc., 79, 397-407) from January 1, 2006, through present.
This product will henceforth be referred to as the AVHRR product.

The second product adds AMSR-E version 5 data obtained from
http://www.remss.com/
along with the AVHRR data used in version 1a and is available from June 1, 2002,
(the start of AMSR-E) through present. This product will henceforth be
termed the AVHRR + AMSR product.

Both analyses include a bias correction of the satellite data with respect to
in situ data using an empirical orthogonal teleconnection (EOT) algorithm.
A short description of the complete analysis procedure can be found in the
AMS extended abstract file (Reynolds-reviewed-rev.pdf).

The SST analyses are available in individual daily files. The AVHRR product
is named avhrr-only-v2.YYYYMMDD where YYYY is the year, MM is the month,
and DD is the day. The files can be found on
ftp://eclipse.ncdc.noaa.gov/pub/OI-daily-v2/IEEE/YYYY/AVHRR
where YYYY is the year: 1981 to present. The files were written in IEEE
binary (big-endian) and must be decompressed using gunzip.
The AVHRR + AMSR-E product is written with the same format as the AVHRR product.
However, the file names are avhrr-only-v2.YYYYMMDD. The files can be found on
ftp://eclipse.ncdc.noaa.gov/pub/OI-daily-v2/IEEE/YYYY/AVHRR-AMSR
where YYYY is the year: 2002 to present.

Each file contains 4 records with integer*4 year, month, day,
followed by a gridded integer*2 array. The first array is SST.
The second array is the SST anomaly with respect to a 1971-2000
base period. The third array is the sea ice concentration.
The fourth array is the standard deviation of the analysis error
which includes sampling, random and bias error.

```
Note: The SST, SST ANOMALY AND ERROR ARRAYS MUST BE MULTIPLIED BY 0.01
TO CONVERT THE VALUES TO DEGREE C. The sea ice concentration array is in per cent (0-100).
Missing values are -999.

All arrays consist of 1440 spatial points in longitude from 0.125E to 359.875E
in intervals of 0.25 increasing eastward, and 720 spatial points in latitude
from 89.875S to 89.875N in intervals of 0.25 increasing northward.

Each day consists of four FORTRAN records:
1. Three 4-byte integers for the year, month and day followed by
   1440*720 2-byte integer SST values.
2. Three 4-byte integers for the year, month and day followed by
   1440*720 2-byte integer SST anomaly values.
3. Three 4-byte integers for the year, month and day followed by
   1440*720 2-byte integer error values.
4. Three 4-byte integers for the year, month and day followed by
   1440*720 2-byte integer ice concentration values.

Each record is written with a FORTRAN unformatted write which adds
an extra 4 byte header and trailer word to the total record.
```

MODIFICATION HISTORY

```
Jul 2004 - modified to look for previous file if nearest is not present
Apr 2007 - Lahey fortran does not all byte swapping at compilation so it requires
           the CONVERT="BIG_ENDIAN" in the open statement.  This is not standard.
Oct 2009 - moved to daily 0.25 degree Reynolds SST
```

39. PATMOSX/planck.f90 [Programs]

[Top] [Programs]

NAME

planck.f90

LOCATION

/patmosx/src/**planck.f90**

PURPOSE

```
this module holds the routine to do rapid Planck
computations using a table lookup approach.
```

DESCRIPTION

```
this module holds the routine to do rapid Planck
computations using a table lookup approach.  This
has been shown to speed up CLAVR-x over using the
explicit planck function with expontentials.
This routine is a modication of that in GEOCAT
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

Aug 2006

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EXTERNALS

```
public::
POPULATE_PLANCK_TABLES
PLANCK_RAD_FAST
PLANCK_TEMP_FAST
PLANCK_RAD
PLANCK_TEMP
```

40. PATMOSX/process_avhrr_clavr.f90 [Programs]

[Top] [Programs]

NAME

process_avhrr_clavr.f90

LOCATION

/patmosx/src/**process_avhrr_clavr.f90**

PURPOSE

This code generates the executable, clavrxorb, in the CLAVR-x processing system

DESCRIPTION

This code serves as the NESDIS operational AVHRR cloud processing system (CLAVR-x) and the AVHRR climate data generation system (PATMOS-x)

The input to this code is controlled through three mechanisms
1. command-line options (type clavrxorb --help to see documentation)
2. a FILELIST - a list of level-1b files and directories (default name is clavrxorb_file_list)
3. a OPTIONSLIST - a list of processing options (default is clavrxorb_default_options)

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

2004

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NOTES

Clouds from AVHRR Extended (CLAVR-x) 1b PROCESSING SOFTWARE Version 5.2

Overview of capabilities.
CLAVRXORB can
- use level-1b calibration or apply new calibration routines
- use level-1b geolocation or apply new geolocation routines
- generate pixel level cloud, aerosol and surface products
- write to a series of pixel-level hdf files
- write a level-3 file (gridded data for each orbit)
- write to optional binary diagnostic files

In general, CLAVRXORB uses global data arrays and structures to pass data

CLAVRXORB operates on all NESDIS Level-1b formats and on AAPP data

Note, comments the begin with "Marker" refer to flowchart

Web-page: http://cimss.ssec.wisc.edu/clavr or http://cimss.ssec.wisc.edu/patmosx

Other points of contact: William Straka, CIMSS, wstraka@ssec.wisc.edu

41. PATMOSX/reposition_module.f90 [Programs]

[Top] [Programs]

NAME

reposition_module.f90

LOCATION

/patmosx/src/**reposition_module.f90**

PURPOSE

This module houses the non-Nagle routines for repositioning the
AVHRR lat and lon values for time corrections

DESCRIPTION

This module houses the non-Nagle routines for repositioning the
AVHRR lat and lon values for time corrections

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

Note, the mjdn numbersvary in this module. The values used to
record the clock errors are referenced to Wednesday November 17, 1858

The values used by Fred Nagles routines are referenced to 12 Z January, 1970

The offset between the two is 40,587.5

In INTERPOLATE_CLOCK_ERROR, I will use the standard definition
In REPOSITION_FOR_CLOCK_ERROR, I will use Nagle's definition

EXTERNALS

```
use CONSTANTS
use AVHRR_PIXEL_COMMON
use NUMERICAL_ROUTINES

public:: REPOSITION_FOR_CLOCK_ERROR, &
         SETUP_CLOCK_CORRECTIONS, &
         INTERPOLATE_CLOCK_ERROR
```

REPOSITION_FOR_CLOCK_ERROR - compute the time for each pixel from the scan value

42. PATMOSX/rt_utils.f90 [Programs]

[Top] [Programs]

NAME

rt_utils.f90

LOCATION

/patmosx/src/**rt_utils.f90**

PURPOSE

This module holds the routines needed to compute the clear-sky RT parameters

DESCRIPTION

This module holds the routines needed to compute the clear-sky RT parameters
RT_UTILITIES houses most routines used for processing the RTM data structure

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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EXTERNALS

Dependencies: (Following are names of other CLAVR-x modules)
CONSTANTS
NWP_COMMON
AVHRR_PIXEL_COMMON
NUMERICAL_ROUTINES
PLANCK
SURFACE_PROPERTIES

Calling Sequence:
use RT_UTILITIES

Public Routines within this Module:
MAP_NWP_RTM
CREATE_TEMP_NWP_VECTORS
DESTROY_TEMP_NWP_VECTORS
CONVERT_ATMOS_PROF_NWP_RTM
COMPUTE_CLEAR_RAD_PROFILES_RTM
GET_PIXEL_NWP_RTM
COMPUTE_TPW_PROFILE_NWP
CONVERT_NWP_H2O
ALLOCATE_RTM
DEALLOCATE_RTM
DEALLOCATE_RTM_VARS
ALLOCATE_RTM_CELL
DEALLOCATE_RTM_CELL
INTERP_RTM_KNOWING_Z
FIND_RTM_LEVELS
KNOWING_T_COMPUTE_P_Z_RTM
KNOWING_P_COMPUTE_T_Z_RTM
KNOWING_Z_COMPUTE_T_P_RTM
calculate_cloud_emissivity
nadir_cloud_emissivity
calculate_cloud_beta
calculate_demiss_dBsfc
calculate_demiss_dTsfc
calculate_dbeta_demiss
calculate_dbeta_dTsfc
calculate_demiss_dBcld
calculate_demiss_dTcld
calculate_demiss_dRcld
apply_rtm_sensitivity
bias_correct_radiance_using_bt
get_cloud_emissivity_level
Scaled_Reflectance_Ratio

43. PATMOSX/scaling_params.f90 [Programs]

[Top] [Programs]

NAME

scaling_params.f90

LOCATION

/patmosx/src/**scaling_params.f90**

PURPOSE

Contains the scaling parameters for all scaling/unscaling performed
in CLAVR-x

DESCRIPTION

Contains the scaling parameters for all scaling/unscaling performed
in CLAVR-x

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

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NOTES

none

44. PATMOSX/sfc_emiss.f90 [Programs]

[Top] [Programs]

NAME

sfc_emiss.f90

LOCATION

/patmosx/src/**sfc_emiss.f90**

PURPOSE

Routines for opening, reading and closing the SEEBOR Emissivity database

DESCRIPTION

Routines for opening, reading and closing the SEEBOR Emissivity database

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

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EXTERNALS

```
use HDF
use CONSTANTS
use NUMERICAL_ROUTINES

private :: read_integrated_seebor_hdf
public  :: open_seebor_emiss, close_seebor_emiss, read_seebor_emiss
```

45. PATMOSX/sfc_prop_umd.f90 [Programs]

[Top] [Programs]

NAME

sfc_prop_umd.f90

LOCATION

/patmosx/src/**sfc_prop_umd.f90**

PURPOSE

```
This is a module of surface properties (reflectance, emissivity) for
the UMD surface type classification
```

DESCRIPTION

```
This is a module of surface properties (reflectance, emissivity) for
the UMD surface type classification
Note: surface albedoes range from 0 to 1.0
```

AUTHOR

```
Andrew Heidinger, NOAA/NESDIS
```

CREATION DATE

```
unk
```

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NOTES

```
  0: Water
  1: Evergreen Needleleaf Forests
  2: Evergreen Broadleaf Forests
  3: Deciduous Needleleaf Forests
  4: Deciduous Broadleaf Forests
  5: Mixed Forests
  6: Woodlands
  7: Wooded Grasslands/Shrubs
  8: Closed Bushlands or Shrublands
  9: Open Shrublands
  10: Grasses
  11: Cropland
  12: Bare
  13: Urban and Built
  14: Snow  (not in original, based on input snow data)
  15: Sea_Ice  (not in original, based on input snow data)
```

EXTERNALS

```
SETUP_UMD_PROPS - assign values to radiative properties for each land type
READ_LAND_COVER_UMD - read the 8km UMD land cover type
GET_PIXEL_SFC_TYPE - spatially interpolate lover cover to each pixel
```

INPUTS_OUTPUTS

```
Unit 7 is opened and closed in READ_LAND_COVER_UMD
```

46. PATMOSX/subset_mapped.f90 [Programs]

[Top] [Programs]

NAME

subset_mapped.f90

LOCATION

/patmosx/src/**subset_mapped.f90**

PURPOSE

This Module contains the subroutines needed to subset the HD4 files

DESCRIPTION

This Module contains the subroutines needed to subset the HD4 files

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

Oct 2007

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NOTES

none

EXTERNALS

READ_CLAVRX_HDF_GLOBAL_ATTRIBUTES
WRITE_CLAVRX_HDF_GLOBAL_ATTRIBUTES

47. PATMOSX/reposnx.f [Subroutines]

[Top] [Subroutines]

NAME

reposnx.f

LOCATION

/patmosx/src/**reposnx.f**

PURPOSE

To reposition AVHRR or other data arrays to correct timing error

DESCRIPTION

To reposition AVHRR or other data arrays to correct timing error
The times, latitudes, and longitudes are adjusted and returned by this routine

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

This routine was originally written in Meteorological Fortran
(MeteFor), an extension of Fortran-77, in order to utilize the
vector and matrix notation available in MeteFor. This
routine is also maintained in MeteFor. Some of the original
MeteFor code may appear in statements which have been commented
out. The original MeteFor source (suffix .hlf) is more
readable and self-documenting. See the document MeteFor.doc.

INPUTS_OUTPUTS

dts(imax,jmax) - an array of FOV times in MJDN, possibly erroneous
slats(imax,jmax) - an array of FOV geodetic latitudes to be adjusted
slongs(imax,jmax) - an array of FOV longitudes to be adjusted
timerr - Timing error in seconds; a positive value means the spacecraft
clock is too fast.
imax,jmax - the cross-scan and along-scan dimensions of the above arrays

48. PATMOSX/tranmavhrr.f [Subroutines]

[Top] [Subroutines]

NAME

tranmavhrr.f

LOCATION

/patmosx/src/**tranmavhrr.f**

PURPOSE

Calculate AVHRR transmittances, version of 01.08.06
for TIROS-N, NOAAA-6 ... NOAA-18, METOP-A, ff

DESCRIPTION

Calculate AVHRR transmittances, version of 01.08.06
for TIROS-N, NOAAA-6 ... NOAA-18, METOP-A, ff
LarrabeeStrow/HalWoolf/PaulVanDelst regression model based on
LBLRTM line-by-line transmittances.
Input temperatures, and water-vapor and ozone mixing ratios, must
be defined at the pressure levels in array 'pstd'
(see block data 'reference_atmosphere').

AUTHOR

Andrew Heidinger, NOAA/NESDIS

CREATION DATE

unk

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NOTES

Units: temperature, deg-K; water vapor, g/kg; ozone, ppmv.
Logical units 71-75 are used for coefficient files.
Component tau's are returned through common, product in 'taut'.

INPUTS_OUTPUTS

Inputs:
  temp = temperature profile (degK)
  wvmr = water-vapor mixing-ratio profile (g/kg)
  ozmr = ozone mixing-ratio profile (ppmv)
  zena = local zenith angle in degrees
  craft = spacecraft: tirosn,noaa06...noaa18, metopa, ... upper or lower case
  kban = band number: 3...5

Outputs:
  taut = total transmittance
     * = alternate return if any coefficient-file I/O problems

```
            in common/taudwo/
      taud  = transmittance due to uniformly mixed gases
      tauw  = transmittance due to water vapor
      tauo  = transmittance due to ozone
```

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