CDR IN OPERATIONS

Bulk Atmospheric Temperature Products from Microwave Sensors

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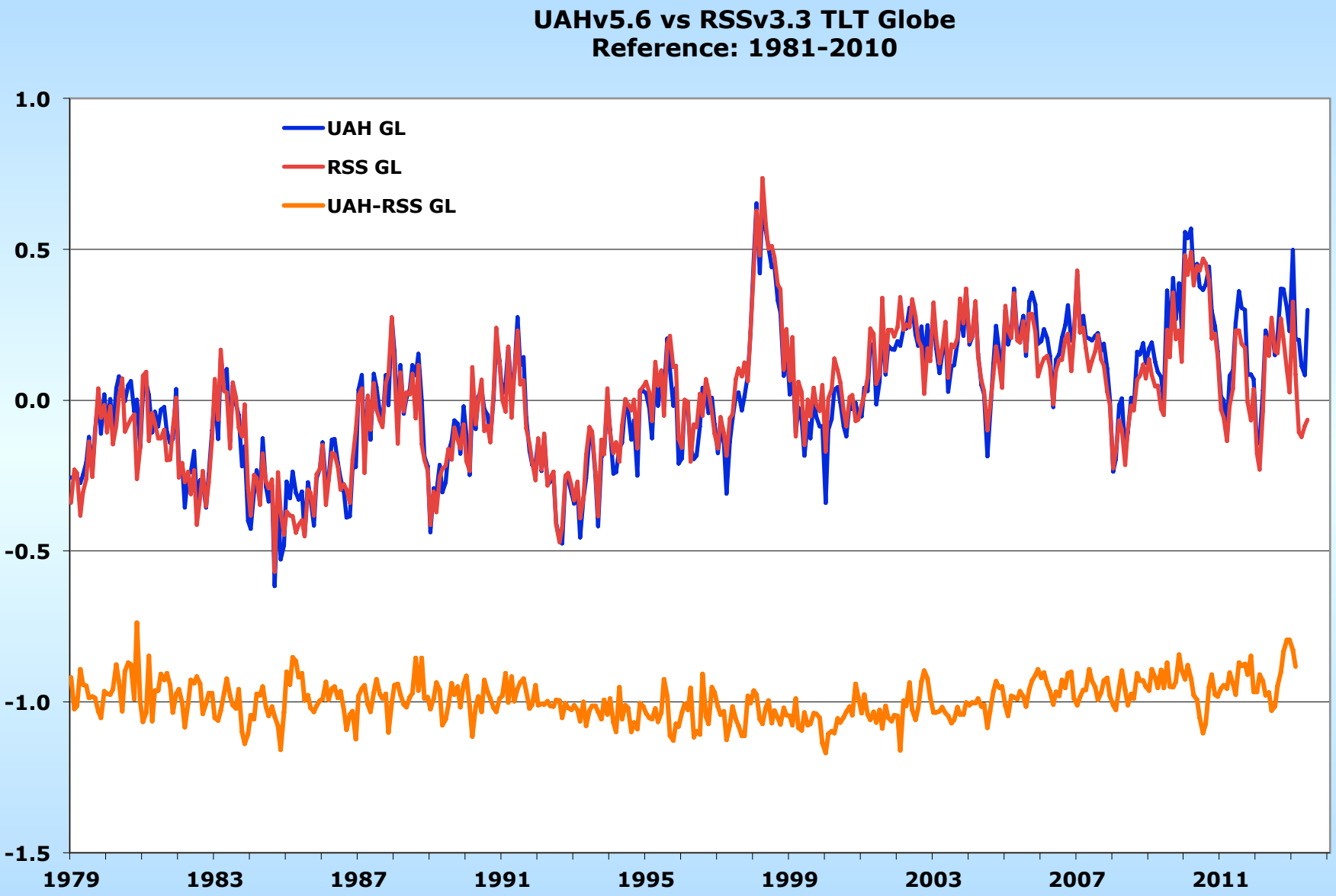
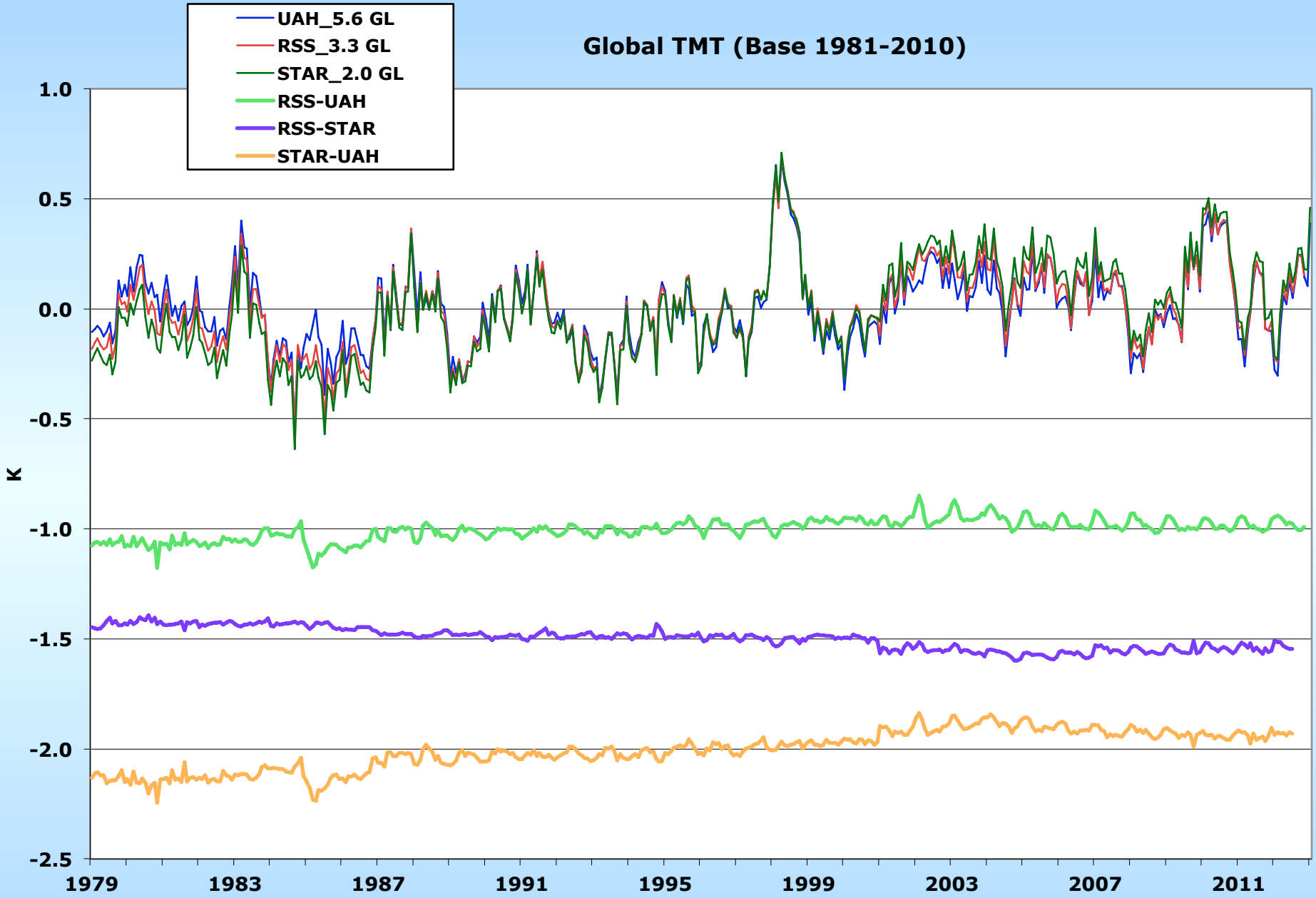
Outline

<<Warning: Presentations are limited to 15 minutes each (incl. 1-2 Q&As). Due to the number of speakers, this must be strictly enforced!>>

Product Description

- Describe your CDR (2 slides):
  1. This slide: High level description and uses, <u>with image(s)</u>
     1. Bulk atmospheric temperatures from microwave emissions
     2. Daily zonal-mean values and monthly grids
     3. TLT Lower Tropospheric Temperature (Sfc-250 hPa)
     4. TMT Mid-Tropospheric Temperature (Sfc-70 hPa)
     5. TLS Lower Stratosphere Temperature (120-20 hPa)
  2. Next slide: Complete table and list collateral products, etc.


UAHv5.6 vs RSSv3.3 TLT Globe
Reference: 1981-2010
UAH GL
RSS GL
UAH-RSS GL
1.0
0.5
0.0
-0.5
-1.0
-1.5
1979
1983
1987
1991
1995
1999
2003
2007
2011


Global TMT (Base 1981-2010)
UAH_5.6 GL
RSS_3.3 GL
STAR_2.0 GL
RSS-UAH
RSS-STAR
STAR-UAH
K
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
1979
1983
1987
1991
1995
1999
2003
2007
2011

Product Delivery Description

CDR(s)	Period of Record	Temporal Resolution	Update Frequency	Update Lag	Spatial Resolution	Data file distinction criteria	Do you publicly serve the CDR at your institution?
Daily and Monthly anomalies of 3 bulk layer temperature products	16Nov1978 to present	Daily (zonal) and monthly (grids)	Monthly	10 days	2.5 deg	Major criterion is specific layer (lower troposphere, mid-troposphere and lower-stratosphere)	Yes

- A running log of updates and changes in readme files is also provided via the web

Validation & Quality Assurance

- Validation work is (a) internal (intercomparisons of simultaneously operating satellites) and (b) external (comparisons with other independent satellite and radiosonde datasets)

- Product quality for daily data (on which monthly data depends) is examined through statistical analysis of intersatellite comparisons, both daily noise (intersatellite differences) and period-trends during overlaps.

Concerns, Risks and Issues

- Vast majority of problems discovered are documented in the metadata readme files. Past 5 years:
  - NOAA-16 ASMU drifting sensors
  - Increase in AQUA AMSU noise and drift ~2009
  - Spurious drift in NOAA-12?

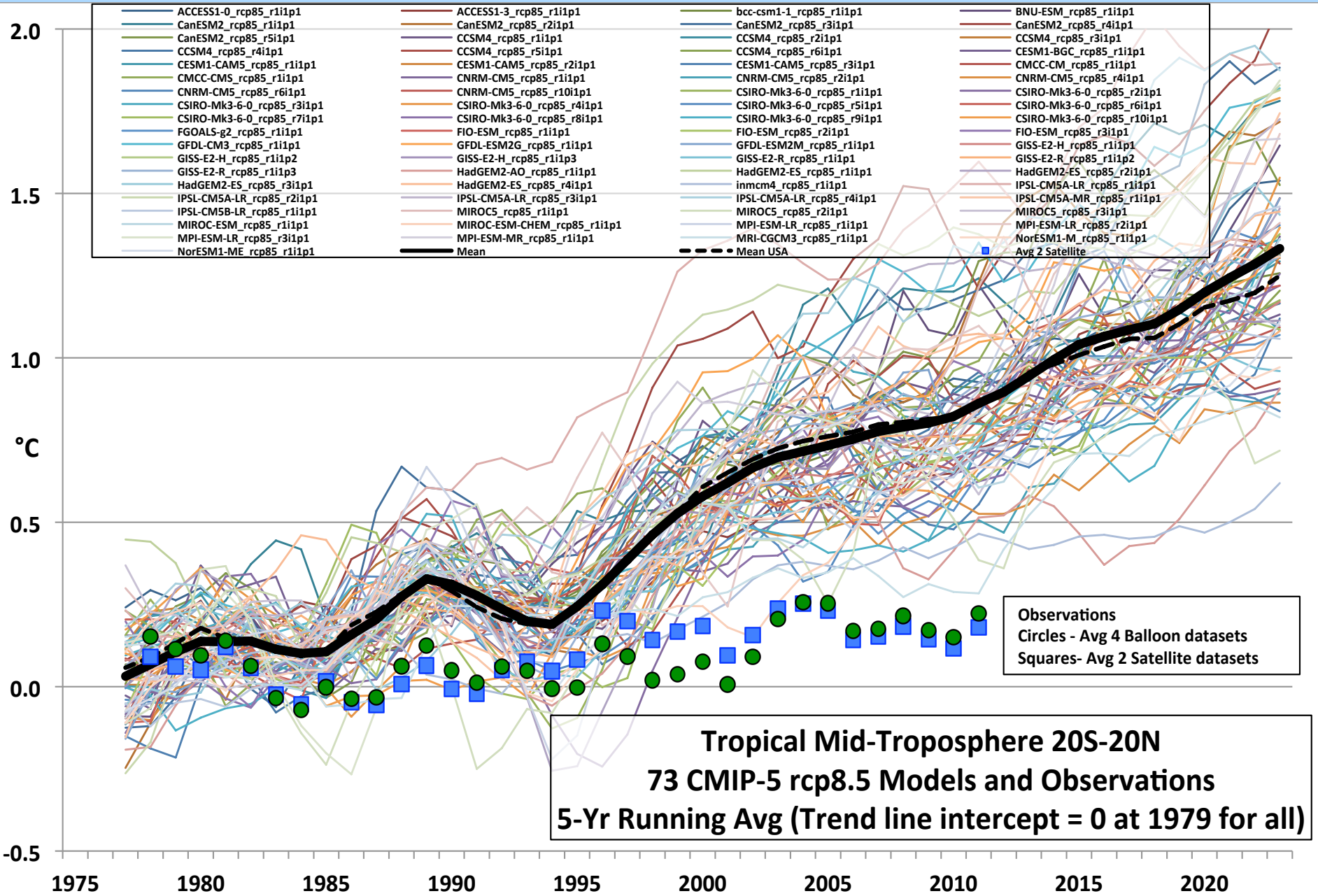
- Technical risks over next 3 years
  - Funding for the other 93 – 99 % of key scientists' salaries must be maintained
  - Code is being rewritten from scratch for portability if external funding can be maintained
  - Multiple satellite failures and/or cancelation of replacements

Uses & Applications

- Applications and Uses
  - (1) **Scientific** (e.g. stratospheric dynamics, atmospheric heat content)
  - (2) **Policy** (e.g. state (WA, CA, NM, KS, AL, GA, FL) and congressional hearings)
  - (3) **Legal** (e.g. state regulatory boards, federal courts, e.g. NM)
  - (4) **Major utility, manufacturing and mining** companies (for reasons 2 and 3),
  - (5) **Education** (e.g. academic and general public lectures),
  - (6) **GCM evaluation** for 1-3 above
  - (7) **National and International Assessments** (e.g. IPCC, BAMS State of Climate)

- Key Scientific Findings (from yours, or similar CDRs by others)

  - Document the lack of bulk atmospheric heat content, especially in the tropics, that was anticipated through climate model simulations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BNU-ESM_rcp85_r1i1p1
CanESM2_rcp85_r1i1p1
CanESM2_rcp85_r2i1p1
CanESM2_rcp85_r3i1p1
CanESM2_rcp85_r4i1p1
CanESM2_rcp85_r5i1p1
CCSM4_rcp85_r1i1p1
CCSM4_rcp85_r2i1p1
CCSM4_rcp85_r3i1p1
CCSM4_rcp85_r4i1p1
CCSM4_rcp85_r5i1p1
CCSM4_rcp85_r6i1p1
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CESM1-CAM5_rcp85_r1i1p1
CESM1-CAM5_rcp85_r2i1p1
CESM1-CAM5_rcp85_r3i1p1
CMCC-CM_rcp85_r1i1p1
CMCC-CMS_rcp85_r1i1p1
CNRM-CM5_rcp85_r1i1p1
CNRM-CM5_rcp85_r2i1p1
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CSIRO-Mk3-6-0_rcp85_r2i1p1
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CSIRO-Mk3-6-0_rcp85_r4i1p1
CSIRO-Mk3-6-0_rcp85_r5i1p1
CSIRO-Mk3-6-0_rcp85_r6i1p1
CSIRO-Mk3-6-0_rcp85_r7i1p1
CSIRO-Mk3-6-0_rcp85_r8i1p1
CSIRO-Mk3-6-0_rcp85_r9i1p1
CSIRO-Mk3-6-0_rcp85_r10i1p1
FGOALS-g2_rcp85_r1i1p1
FIO-ESM_rcp85_r1i1p1
FIO-ESM_rcp85_r2i1p1
FIO-ESM_rcp85_r3i1p1
GFDL-CM3_rcp85_r1i1p1
GFDL-ESM2G_rcp85_r1i1p1
GFDL-ESM2M_rcp85_r1i1p1
GISS-E2-H_rcp85_r1i1p1
GISS-E2-H_rcp85_r1i1p2
GISS-E2-H_rcp85_r1i1p3
GISS-E2-R_rcp85_r1i1p1
GISS-E2-R_rcp85_r1i1p2
GISS-E2-R_rcp85_r1i1p3
HadGEM2-AO_rcp85_r1i1p1
HadGEM2-ES_rcp85_r1i1p1
HadGEM2-ES_rcp85_r2i1p1
HadGEM2-ES_rcp85_r3i1p1
HadGEM2-ES_rcp85_r4i1p1
inmcm4_rcp85_r1i1p1
IPSL-CM5A-LR_rcp85_r1i1p1
IPSL-CM5A-LR_rcp85_r2i1p1
IPSL-CM5A-LR_rcp85_r3i1p1
IPSL-CM5A-LR_rcp85_r4i1p1
IPSL-CM5A-MR_rcp85_r1i1p1
IPSL-CM5B-LR_rcp85_r1i1p1
MIROC5_rcp85_r1i1p1
MIROC5_rcp85_r2i1p1
MIROC5_rcp85_r3i1p1
MIROC-ESM_rcp85_r1i1p1
MIROC-ESM-CHEM_rcp85_r1i1p1
MPI-ESM-LR_rcp85_r1i1p1
MPI-ESM-LR_rcp85_r2i1p1
MPI-ESM-LR_rcp85_r3i1p1
MPI-ESM-MR_rcp85_r1i1p1
MRI-CGCM3_rcp85_r1i1p1
NorESM1-M_rcp85_r1i1p1
NorESM1-ME_rcp85_r1i1p1
Mean
Mean USA
Avg 2 Satellite
2.0
1.5
1.0
°C
0.5
0.0
-0.5
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Observations
Circles - Avg 4 Balloon datasets
Squares- Avg 2 Satellite datasets
Tropical Mid-Troposphere 20S-20N
73 CMIP-5 rcp8.5 Models and Observations
5-Yr Running Avg (Trend line intercept = 0 at 1979 for all)

Schedule

- CDR status
  - CDR is up-to-date
- 1-3 Year Planning Horizon
  - A major new version (v6.0) is in process of being created – 1.5 years of work already. New adjustments for diurnal drift, target temperature and limb correction, as well as new methods for gridding, will be employed. This version will use the new code that is portable. Many new issues have been discovered in this rebuilding process, some of which will not be addressed in v6.0. "Operational Research" will continue as we learn the various issues of each new (and old) sensor.
  - Our core input always expands to include the latest polar orbiters, usually after at least 2 years of data become available. V5.6 already includes NOAA-19 and METOP-A, while the contracted version (v5.5) does not.
  - No retirements are currently planned in the next 3 years (could change if funding is not found for bulk of salaries.)
- Requests/Recommendations for the CDR Program
  - joules