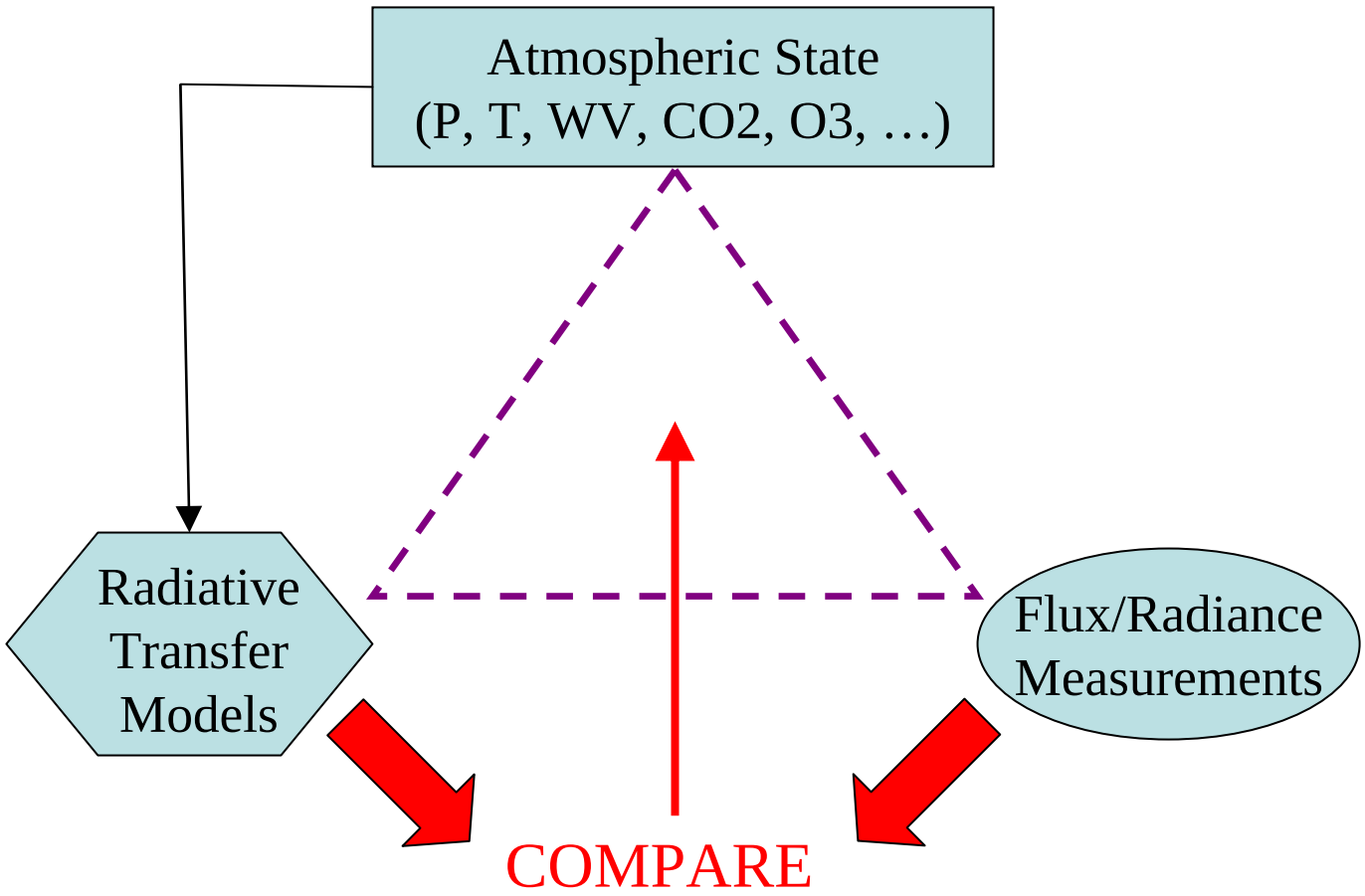
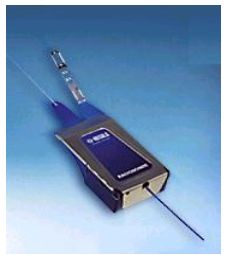
Clear-Sky QME Concept



LW QMEs (LBL)

MWR

Radiosonde



Atmospheric State

⇕

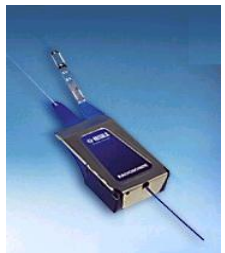
RT Model 'rundecks'

(LBLRTM)

LW QMEs (LBL, AERI)

MWR

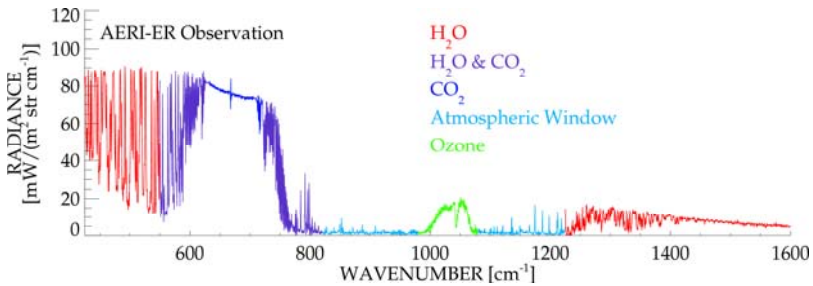
Radiosonde



Atmospheric State

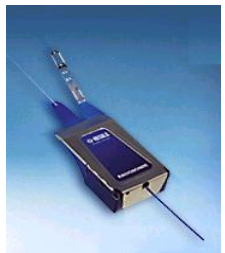
RT Model Output (LBLRTM)

Line Parameters (HITRAN) & MT_CKD Continuum Model



Radiance Measurements (AERI-ER)

LW QMEs (LBL, AERI, LWFLUX)



Atmospheric State

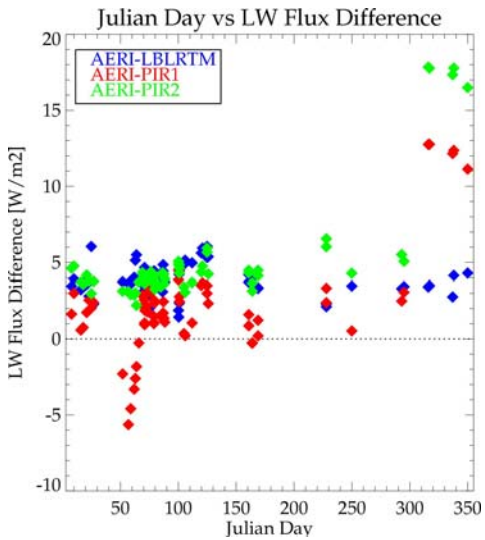
RT Model Output

(LBLRTM, RRTM)

Line Parameters (HITRAN) & MT_CKD Continuum Model

Radiance Measurements (AERI-ER)

Flux Measurements (PIR)



Users of RRTM Models

- Global GCMs
  1. ECMWF forecast model (using LW and testing SW)
  2. NCEP Global Forecast System (GFS) (using LW and testing SW)
  3. Max Planck Institute climate model (ECHAM5) (using LW)
  4. NCAR atmosphere model (CAM3) (using LW and SW at AER)
  5. GFDL climate model (testing LW and SW)

- Mesoscale/Regional Models
  1. Penn State/NCAR (MM5) (using LW)
  2. NCAR Weather Research and Forecasting (WRF) (using LW in NCAR/EM)
  3. UC/CIRES Arctic regional climate model (ARCSyM) (using LW)

- Dept. of Energy ARM Program
  1. Various Single Column Models (Scripps, LLNL, etc.) (using LW)
  2. BBHRP (using LW and SW)
  3. McICA (implemented in LW and SW)

- NPOESS (algorithm component; clear sky only)
  1. AER/NGST VIIRS net heat flux and ocean albedo (using LW and SW)

Value of RT QMEs

- Scientific
  - Improved modeling of longwave downwelling radiation
    - Validation of spectroscopic line parameters
    - Refinement of water vapor continuum
  - MWR-scaling of input water vapor profile improved radiance calculations over nominal radiosondes
  - Publication in J. Atmos. Science (Turner et al. 2004)

Upcoming RHUBC campaign at NSA will provide new spectroscopic/continuum developments

- Quality Control - Excellent means of detecting issues in
  - Data streams (MWR, PIR,…)
  - VAPS (Merged Sounding,…)

What needs to be done at SGP?

- LBL input adjustments
  - WV (lssonde): Scale to best available estimate of PWV (Turner, mwrret product)
  - CO2: Monthly average value (Turner)
  - O3: Improved monthly climatological profiles, scale to TOMS (Clough)

- Model upgrades
  - LBLRTM, CONTINUUM (Series 10)
  - HITRAN
  - RRTM (companion to LBLRTM)

What needs to be done at SGP?

- AERI data
  - Emissivity adjustments (consider for archive)
  - Determine source of additional 3/4 radiance unit seen in spectral residuals (Revercomb)

- Revised PIR calibration (post-2003)

- Improved documentation of what is available at the archive

LBL Archive

Value-Added Products (VAPs) Produced

- lblch1 - AERI: LBLRTM, calc. downwelling longwave radiance, 520-1800 wnum
- lblch1a - AERI: LBLRTM, 520-830 wavenumbers
- lblch1aeri - AERI: LBLRTM using scaled sondes, for merging atm and AERI trailer
- lblch1atm - AERI: LBLRTM using scaled sonds, 520-1800 wnum
- lblch1b - AERI: LBLRTM, 830-1800 wavenumbers
- lblch1flux - AERI: LBLRTM, channel 1 flux, run deck file
- lblch1ls - AERI: LBLRTM, calc. downwelling longwave radiance, 520-1800 wnum, w/lssonde
- lblch1ss - AERI: LBLRTM using LBL/MWR rescaled sondes, 520-1800 wnum
- lblch1trailer - AERI: LBLRTM using scaled sonds for AERI trailer, 550-1800 wnum
- lblch2 - AERI: LBLRTM, calc. downwelling longwave radiance, 1800-3020 wavenumbers
- lblch2aeri - AERI: LBLRTM using scaled sonds, for merged atm and AERI trailer, 1800-3020 wnum
- lblch2atm - AERI: LBLRTM using scaled sonds, 1800-3020 wnum
- lblch2flux - AERI, line by line channel 2 flux, run deck file
- lblch2ls - AERI: LBLRTM, calc. downwelling longwave radiance, 1800-3020 wnum, w/lssonde
- lblch2ss - AERI: LBLRTM, calc. downwelling longwave radiance, 1800-3020 wnum, w/lblsonde
- lblch2trailer - AERI: LBLRTM model runs, using Liebe scaled sondes, for AERI trailer
- lblcloudech1ls - AERI: LBLRTM, cloud emissivities, calc. 520-1800 cm-1 w/ lssonde
- lblcloudech2ls - AERI: LBLRTM, cloud emissivities, calc. 1800-3020 cm-1 w/ lssonde
- lblsonde - BBSS: derived, relative humidity scaled with LBL and MWR

QMEAERI Archive

Available Instruments

Select	Instruments/Facilities	Start Date	End Date
Southern Great Plains (sgp)			
☑	AERI: LBLRTM spectral residuals (aerilbldiff)	12/08/1993	01/08/2005
Facilities:	Central Facility, Lamont, OK(C1)		
☑	AERI: LBLRTM spectral residuals, w/ scaled (lssonde) sonde input (aerilbldiffls)	04/11/1994	01/08/2005
Facilities:	Central Facility, Lamont, OK(C1)		
✗	AERI: LBLRTM spectral residuals, w/ scaled (lbsonde) sonde input (aerilbldiffss)	03/18/1996	09/27/1996
☑	QME: derived AERI vs. LBRTM-resid. stats as f of bin, process, channel (qmeaerilbl)	12/08/1993	01/08/2005
Facilities:	Central Facility, Lamont, OK(C1)		
☑	QME: derived AERI vs. LBLRTM-resid. stats w/scaled (lssonde) sonde input (qmeaerilblls)	04/11/1994	01/08/2005
Facilities:	Central Facility, Lamont, OK(C1)		
☑	QME: derived AERI vs. LBLRTM-radiance stats as f of bin, proc. & channel (qmeaerimeans)	12/08/1993	01/08/2005
Facilities:	Central Facility, Lamont, OK(C1)		
✗	QME: derived AERI vs. LBLRTM-resid. stats w/scaled (lblsonde) sonde input (qmeaerilblss)	03/18/1996	09/27/1996
✗	QME: derived AERI vs. LBLRTM-rad. stats w/scaled (lblsonde) sonde input (qmeaerimeansss)	03/18/1996	09/27/1996

Estimated Order Details (01/01/2005 to 01/04/2005)

Select	Datastreams	Files	Size (MB)	DQR Days (?)	QLs (?)
☐	sgpaerilbldiffC1.c1	7	1.0	0	0
☐	sgpaerilbldifflsC1.c1	5	1.0	0	0
☐	sgpqmeaerilblC1.c1	7	<1 MB	0	0
☐	sgpqmeaerilbllsC1.c1	5	<1 MB	0	0
☐	sgpqmeaerimeansC1.c1	7	<1 MB	0	0

Save to Cart

QMELWFLUX Archive

Selected Instrument: Comparison of Longwave Flux Data from AERI and LBLRTM vs. pyrgeometer

Routine ARM Data

Finalize your desired date range and click on the "Select Date Range" button to view / update the list of available data streams.

Start Date: 04/02/2001 **End Date:** 04/16/2003 Select Date Range

Available Instruments				Estimated Order Details
Select	Instruments/Facilities	Start Date	End Date	
Southern Great Plains (sgp)				** Please select sites/facilities on t
☐	QME: longwave Flux, between AERI, LBLRTM, RRTM, and the pyrgeometer (qmelwflux)	04/02/2001	04/16/2003	

What needs to be done at SGP?

- AERI data adjustments
  - Emissivity adjustments
  - Determine source of additional 3/4 radiance unit seen in spectral residuals (Revercomb)

- Revised PIR calibration (post-2003)

- Improved documentation of what is available at the archive

- Improve real-time QC capability
  - Establish clear-sky flagging technique
  - Develop “flags” and running averages of key parameters for QC
  - Improved communication between instrument mentors and QME team (developer, translator, principal scientist)

Implement QME at NSA, TWP, AMF