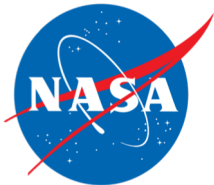


EarthCARE validation by CERES data products

PI: Norman G. Loeb

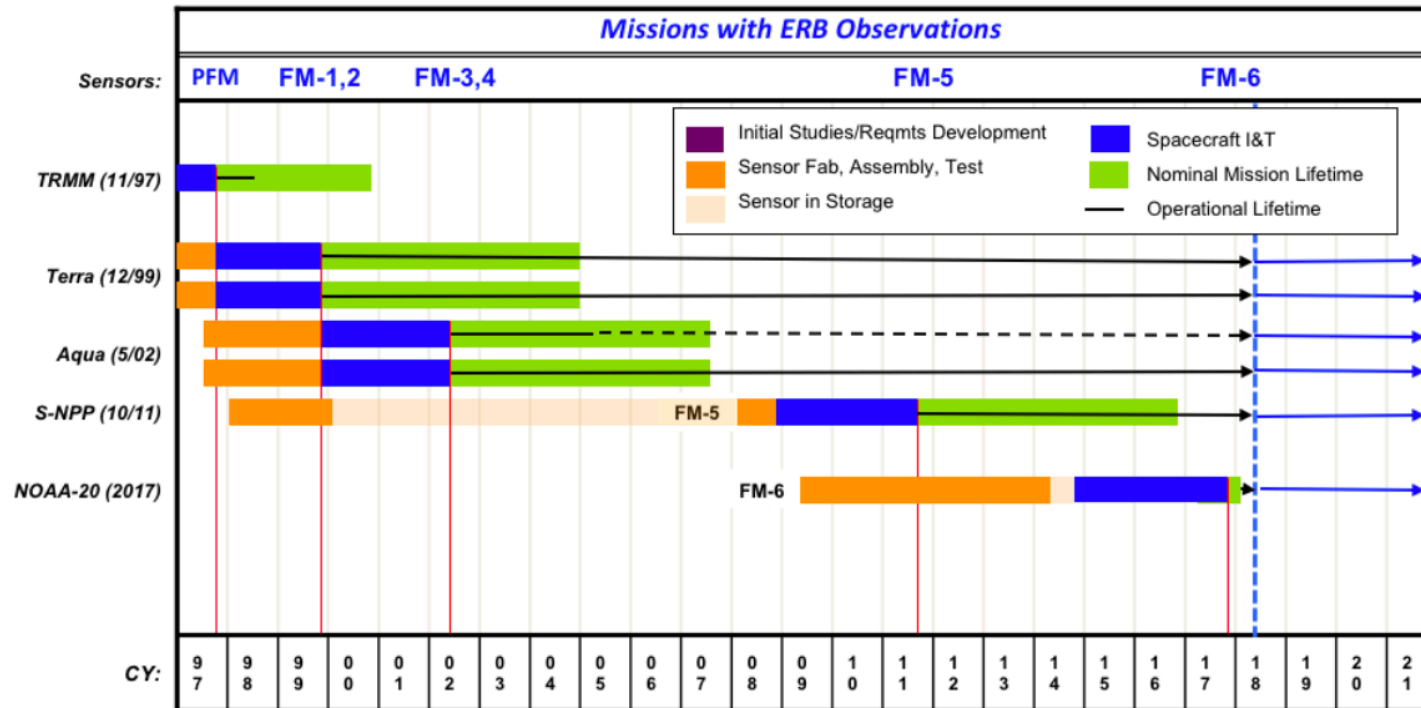
Co-Is: Kory J. Priestley, Wenying Su, Seiji Kato,
William L. Smith, and David R. Doelling



NASA Langley Research Center



CERES Flight Schedules



- Currently, 6 CERES instruments fly on 4 satellites: Terra (L1999), Aqua (L2002), SNPP(L2011), NOAA-20 (L2017)

Proposed validation plan

- Evaluation of broadband radiances observed by the BBR instrument with co-located broadband radiances observed by CERES instruments.
- Evaluation of broadband top-of-atmosphere (TOA) irradiances derived from BBR radiance observations with co-located CERES- and geostationary-derived TOA irradiances.
- Evaluation of EarthCARE computed TOA and surface irradiances with surface irradiances derived from CERES algorithms and evaluation of EarthCARE surface irradiances with surface observations.
- Evaluation of EarthCARE cloud properties with cloud properties derived from Moderate Resolution Imaging Spectroradiometer (MODIS) and geostationary satellites with the CERES cloud algorithm and evaluation of other input variables such as surface albedos and temperature and humidity profiles used in irradiance computations.

TOA radiance and irradiance comparisons

- Collocate CERES footprints with BBR footprint
 - Sampling issue needs to be addressed
- Radiance comparison addresses calibration differences
- Irradiance comparison addresses angular distribution model differences
 - CERES angular distribution model was built empirically
 - BBR angular distribution model was built theoretically (radiance at multi angles from the same scene is available)
- Irradiance derived from geostationary satellite other than Terra and Aqua overpass time.

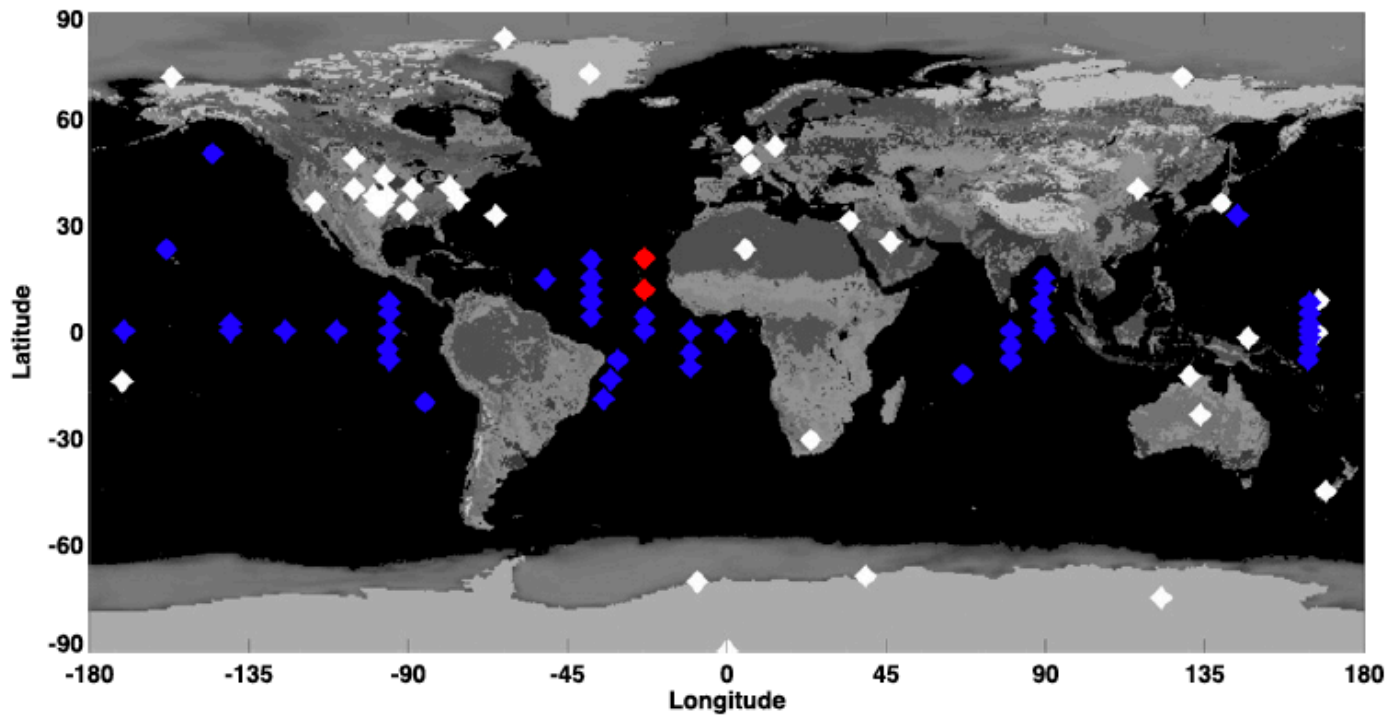
Cloud property comparisons

- Collocate VIIRS and geostationary satellite observations with EarthCARE active sensors
- Evaluation of VIIRS and geostationary derived cloud properties by active sensors.

CERES surface and in atmosphere irradiance comparisons

- Vertical irradiance comparisons for collocated cloud observations
 - i.e. irradiances computed with VIIRS + geostationary satellites versus irradiances computed with EarthCARE active and passive sensors

CERES surface irradiance validation



Location of 46 buoys and 36 land sites that are currently used in the CERES project

Example of surface irradiance validation

Because surface irradiances within 100 km from ground sites are compared with surface observations, the standard RMS difference is expected to be large

