

ARM IRF Working Group Recommendations
November 2005

CLOWD

The CLOWD focus group presented a list of priority instrumentation listed below in order of the CLOWD priority.

1. Purchase and deploy 90 GHz microwave radiometers at all sites
2. Increase the sampling rate of the AERIs as per previous recommendations
3. Increase the sampling rate of the MWRs, the details for which are under study
4. Modify the MFRSR to allow better liquid water path (LWP) determinations
5. Purchase a two-channel NFOV instrument and permanently deploy one at the SGP and AMF. Routine calibrations should be part of the deployment. This instrument is in addition to the one already purchased.
6. Deploy a CIMEL on the AMF for 2-NFOV work (post-Niger deployment). (Comments: Even at Goddard after calibrating 2NFOV it is compared with the CIMEL to be sure the measurements are correct. Another reason is to have simultaneous retrievals of aerosol and cloud properties.)
7. Provide Trishchenko-like BDRF product (0.5 km resolution averaged over 10 days). (Comments: In its stead, they can use the MODIS BDRF at 1 km resolution averaged over 16 days, and MISR data, if available (although the longer averaging period could miss important temporal variations).

NSA H₂O Vapor Measurements

The IRF recommends that ARM

- Launch four radiosondes per day, particularly during winter to obtain accurate profiles of H₂O vapor. Associated with this, we recommend ARM investigate shared costs with NOAA and/or an automatic sonde launching facility.
- Deploy a 183 GHz microwave radiometer. Independent of the increased sonde launching, the advancement of understanding of LW radiation problems under cold, dry conditions requires better measurements of the columnar water vapor. We again recommend that ARM invest in a 183 GHz microwave radiometer for this purpose.

Longwave Radiation

The IRF recommends that ARM

- Resolve the apparent large discrepancies between the NREL Blackbody and that used by other international organizations. Also employ an independent statistician to help investigate the validity of the NREL 4-coefficient formulation, particularly the inclusion of the "K₀" constant offset.
- Use the Eppley factory thermopile calibrations (K1's) together with the NREL (new blackbody) determinations of K3's in the two-parameter fit to new blackbody calibration data to reprocess historical data *until the issues concerning the NREL blackbody issues are resolved.*

- Implement current collections using the two-parameter formulation as soon as possible until the concerns regarding the blackbody calibration and 4-coefficient formulation can be addressed. This is especially critical to have in place for data collected during the upcoming TWP-ICE.
- Analyze the AERI SGP QME results to determine the start a of the apparent 5 W/ sq. m bias between the AERI and LBLRTM estimated fluxes.
- Purchase a sky-scanning longwave radiometer and use it in the operational calibrations.
- review the manner by which baseline change requests (BCRs) are implemented so that input is obtained on the potential science impacts of recommended changes due to the scientific interconnection between various data streams.

RSS

- Encourage a proposal to address the correction of the stability of the RSS. Consideration of the proposal should include a determination of the cost effectiveness of correcting the RSS verses the purchase of a similar, new instrument.

IRF High Altitude IOP

- Encourage the development of a proposal (possibly AMF) for an IOP at a high altitude location that would enable the investigation of heretofore unexplored, important portions of the electromagnetic spectrum. These regions include wavelengths greater than about 25 microns and the solar infrared, spectral regions that largely control LW cooling and SW heating of the atmosphere. We expect to devote a breakout session to this issue at the 2006 ARM Science Team Meeting.

Flux Divergence

- Encourage the measurement of radiative flux divergence as part of the planned CLASSIC IOP, thereby helping to fulfill the needs of the BBHRP. Perhaps the previously developed instrument HONER could be deployed for this purpose.

Priority IRF Instrumentation Purchases/deployments,

Listed below are the IRF recommendations on a scale of 1 to 3, with 1 being highest.

1.

- i. 90 GHz microwave radiometers at all sites
- ii. Sky-scanning longwave radiometer
- iii. Mount downward a looking MFR instrument on the aerosol aircraft

2.

- i. Modified MFRSRs for better liquid water path (LWP) determination
- ii. Two-channel NFOV instrument at the SGP and AMF
- iii. Address the correction of the stability of the RSS

3.

- i. 1.6 micron channel on the NFOV instrument