

Appendix 1 – AMF3 instrumentation

The following information is subject to change. The intent is to provide some background for the proposal teams on the instrumentation currently anticipated to be deployed with the AMF3.

Initial core instrumentation

The following set of core instruments are expected to be deployed at the central facility of the AMF3 for initial operations:

- Radiometry
 - o 2- or 3-channel microwave radiometer
 - o Upward looking broadband shortwave and longwave radiometers
 - o Downward looking broadband shortwave and longwave radiometers
 - o Sun photometer and/or multifilter rotating shadowband radiometer (MFRSR)
 - o Atmospheric Emitted Radiance Interferometer (AERI)
- Sky imager
- Standard surface meteorological measurements, including bulk precipitation
- Ka-band zenith ARM radar (KAZR)
- Ceilometer
- Micropulse lidar
- Doppler lidar
- Aerosol Observing System (AOS)
 - o aerosol chemical speciation monitor (ACSM)
 - o cavity attenuated phase shift monitor (CAPS)
 - o carbon monoxide/nitrous oxide/water vapor
 - o cloud condensation nuclei (CCN)
 - o condensation particle counter (CPC)
 - o ultra-fine condensation particle counter
 - o CO₂, CH₄, O₃
 - o humidified tandem differential mobility analyzer (HTDMA)
 - o nephelometer
 - o particle soot absorption photometer (PSAP)
 - o scanning mobility particle sizer (SMPS)
 - o ultra high sensitivity aerosol spectrometer (UHSAS)
- Radiosondes and ground station
- Disdrometer

Phase 2 core instrumentation

The following set of instruments are also expected to be deployed as a core part of the AMF3, but will likely be deployed in a phased approach (installed after initial operations begin) and may require input from the site science team on the sampling approach (surface types/spatial distribution/distance from central facility):

- Soil temperature and moisture properties
- Surface fluxes (eddy correlation)
- Scanning precipitation radar
- Radar wind profiler (RWP)

Advanced or spatially distributed instrumentation

The ARM facility is also considering the possibility of deploying additional advanced instrumentation and/or spatially distributed instrumentation as part of the AMF3 site. Such instrumentation would likely be deployed in a phased approach, after the initial installation of the AMF3 central facility, and details will depend on logistical and budgetary constraints. Information from the site science team on scientific prioritization of such instrumentation through modeling studies, observation simulation system experiments, or other analyses will be valuable to ARM. For example, for deployment of auxiliary sites with spatially distributed measurements, information of interest could include types of measurements, number of sites, and/or distance from central facility needed to address different science questions.

The following set of instrumentation is potentially available for deployment as part of the AMF3. This list is intended to be illustrative, not comprehensive; it is unlikely that all of the below instrumentation can be deployed as part of the AMF3. The ARM facility will make final decisions on all instrument deployments.

Potential advanced/spatially distributed/other instrumentation:

- Scanning cloud radar
- Advanced lidar (e.g., Raman lidar, differential absorption lidar, high spectral resolution lidar)
- Auxiliary sites with a subset of instruments (e.g., sites similar to the Southern Great Plains extended facilities and/or boundary layer profiling sites or other types of sites to address specific science needs)
- Stereo photogrammetry
- Narrow field of view radiometer
- Additional scanning precipitation radar

ARM also expects that the ARM tethered balloon system (TBS) and unmanned aerial system (UAS) assets will be available for potential deployments at the AMF3 site.