



Overview of SatCORPS Satellite-Derived Cloud and Radiation Retrieval Coverage of ARM Domains



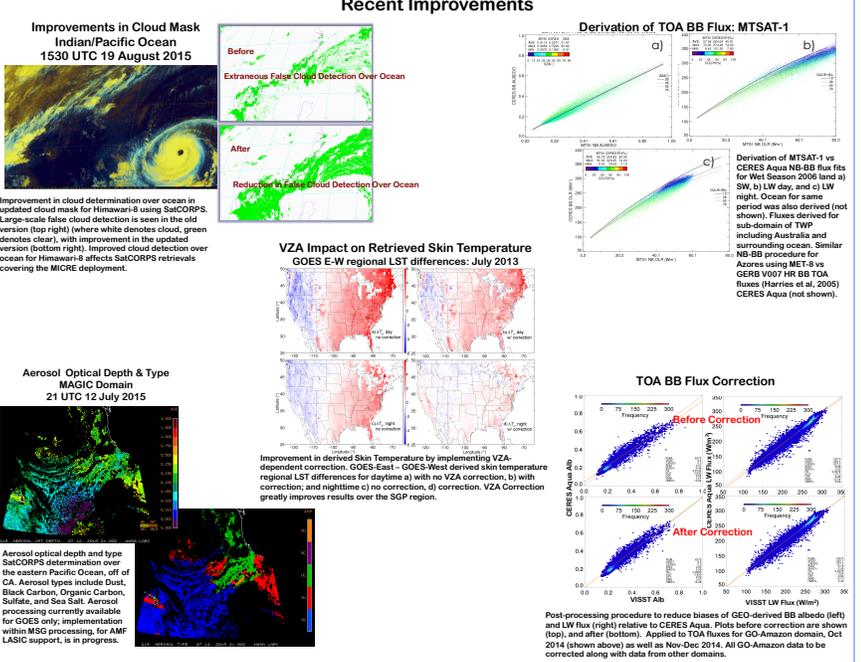
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Motivation
ASR provides ground-based cloud and radiative measurements at numerous climatically representative sites. Measurements taken at these localized areas can be complemented by satellites to provide cloud property information over larger scale regions. Satellite-derived cloud and radiation properties (such as TOA BB fluxes) covering large regions, are especially useful for cloud modeling and radiative closure endeavors.

Objective
The NASA/Langley Cloud group produces large-scale satellite-derived cloud and radiative parameters covering the ARM fixed and Mobile Facility sites, in both near-real-time and as historically reprocessed datasets. Results are compared with ARM ground-based instruments to evaluate consistency with ARM measurements.

- Data and Methodology**
- Cloud and radiative parameters derived from geostationary (GEO) and low-Earth orbiting satellites (LEO)
 - Calibrate all satellites against common reference (Aqua MODIS Channel 1)
 - Applied to GOES, MSG, MTSAT, Himawari, AVHRR, MODIS, Suomi NPP
 - Cloud retrieval algorithm: SatCORPS (Satellite Cloud Observations and Radiative Property retrieval System)
 - Includes VISST/IST/SINT (Minnis et al, 2011); currently working on algorithm for CERES Edition 5
 - Recently updated algorithm (consistent with CERES Edition 4) newly applied to Himawari-8; improvements include:
 - Reduced false nighttime low cloud detection over ocean/land/sea
 - Improvement in cloud detection along coast of Australia
 - Himawari provides coverage of MICRE AMF
 - Spatial cross talk issue affecting MTSAT-1 satellite has been addressed (Khlopenkov et al, 2015)
 - MTSAT-1 2006-2010+ dataset (including TWP-ICE) can now be reprocessed
 - Multilayer retrieval algorithm MGCAT (Chang et al 2010)
 - Requires 13.3 um channel (only on certain satellites, e.g. GOES-13, MSG3, Himawari, MODIS)
 - Derive TOA BB SW and LW fluxes based on narrowband (NB)-to-broadband (BB) matching with CERES (Loeb et al, 2005)
 - Match/regress 1° avg calibrated 0.65-µm albedos and 10.8-µm fluxes with CERES SFC TOA BB SW and LW fluxes
 - Land/Ocean, Day/Night fits based on NB-BB matches within +/- 15 minutes
 - Can also improve GEO-derived BB fluxes post-processing, by deriving BB correction based on CERES Aqua
 - Currently being applied to GO-Amazon; recently applied to Azores AMF, COPS AMF; TWP-ICE/MTSAT1 reprocessing next



NASA Langley ASR-focused webpage

<http://www-pm.larc.nasa.gov/cgi-bin/site/showdoc?docid=4&cmd=field-experiment-homepage&exp=ARM>

Links to pages provide information for 3 fixed ARM sites, AMF deployment sites, and past campaigns; site-specific pages provide easy access to SatCORPS-derived data and imagery covering the ARM sites
Real-time imagery, pixel-level, gridded, 10km/20km average ground site data available
Pixel, gridded data also available from ARM archive

Images of SatCORPS-derived Cloud and Radiation products over ARM Domains (LASIC pictured here)

New AMF Support: LASIC (also MICRE, AWARE)

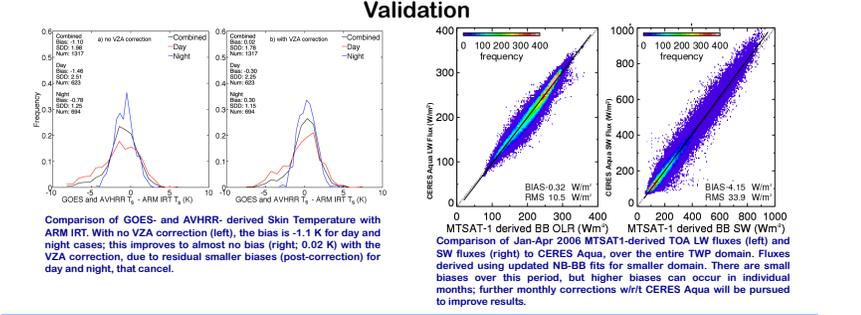
Ground Site Cloud Product: Allows visualization of 10km/20km averaged data surrounding the ARM site.

NASA-Langley MET10 VISST Derived Cloud Products for ARM AMF LASIC Ground Site over the LASIC_SPL_04RIL_2016

Main page shows Realtime imagery and links to 3 Main Sites: SGP, NSA, ENA

Datasets currently being processed in near-real-time: Southern Great Plains*, NSA, Eastern North Atlantic, LASIC, MICRE, AWARE

Ongoing: Efforts to fill time gaps, Revisions of datasets
*1-day delay until real time requested



Summary and Future Work

- Cloud & radiative parameters derived from satellite imager data for ARM fixed sites & AMF campaigns**
Real-time imagery, pixel-level, gridded, 10km/20km average ground site data available from NASA Langley website
Pixel and gridded data also available from ARM archive
Newest domains: MICRE, LASIC, AWARE
Data for missing times being added when new algorithms completed
Currently reprocessing MTSAT-1 2006-2010, backfilling GO-AMAZON 2014
Backfilling of AZORES ENA site (Oct 2013 on) next
- Cloud retrieval & flux estimation algorithm improvements implemented**
Surface skin temperature retrieval with VZA correction underway over SGP (compares well with ARM CFRT)
Surface flux derivation over SGP currently in development
ARM datasets to be reprocessed going forward
- Polar Site Datasets:** New effort (once ARM archive approves) to supply subsampled data about NSA and other sites:
CERES Edition 4 SFS Flux dataset
NOAA-xx AVHRR-derived SatCORPS dataset
- Validation with ARM ground-based measurements and other datasets ongoing**
- Feedback and requests from users are always welcome**
- Acknowledgment**
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