

ARMBE: ARM Best Estimate Data Products

The ARM Best Estimate data product (ARMBE, Xie et al., 2010), formerly known as Climate Modeling Best Estimate (CMBE) dataset, was created to encourage greater use of ARM data in climate studies and model development by the climate community. It assembles a best estimate of cloud, radiation, atmospheric quantities, and surface/land properties that are both well observed by ARM and commonly used in model evaluation into one single dataset. Most of these quantities are measured by ARM ground-based instruments for over two decades, including cloud radars, micropulse lidars (MPLs), laser ceilometers, microwave radiometers (MWRs), solar and infrared radiation stations (SIRSSs), etc. The ARMBE data product is specifically tailored to climate modelers for use in the evaluation of global climate models, with hourly temporal resolution comparable to a typical resolution used in climate model output. It also includes standard deviations within the averaged hour and quality control flags for the selected quantities to indicate the temporal variability and data quality. Currently, the ARMBE data product is available at the ARM's Southern Great Plain (SGP), Tropical Western Pacific (TWP) and North Slope Alaska (NSA) Research Facility. ARMBE for other ARM permanent and Mobile Facilities sites will be developed in the near future.

The ARMBE data product provides detailed observations of clouds and their associated large-scale environment in different climate regimes and is widely applied in process studies to improve cloud parameterization in climate models. Additionally, the long-term ARMBE dataset of cloud observations from ground-based radars and lidars, with hourly resolution and high vertical resolution, makes it a great fit to examine climate variability and change, as well as to statistically evaluate climate models. The ARMBE data product also serves as input to many ARM Value-Added Products (VAPs), such as the ARM Diagnostics for Climate Model Evaluation (ADCME), the large-scale forcing data from constrained variational analysis (VARANAL) and etc.

Most quantities in the ARMBE data product are assembled from other ARM VAPs, including the Active Remote Sensing of Clouds (ARSCL) VAP, the Microwave Radiometer Retrievals (MWRRET) VAP, the TSI VAP, the Data Quality Assessment for ARM Radiation Data (QCRAD) VAP, the Energy Balance Bowen Ratio (EBBR) VAP, and the Eddy Correlation Flux Measurement System (ECOR) VAP. To further improve the data quality, additional quality control checks, such as outlier and time variability checks, are also applied in the ARMBE dataset. We recommend that users read the references on each VAP product mentioned above and contact the relevant ARM Engineering or the ARM Translators for more information on the data limitation/uncertainties.

References:

- Xie, S, and 16-coauthors, 2010: Clouds and more: ARM climate modeling best estimate data. *Bull. Amer. Meteor. Soc.*, **91**, 13–20. doi:10.1175/2009BAMS2891.1.
- Tang, Q., and S. Xie (2015), Station-based Surface Data Value-Added Product, DOE/SC-ARM/TR-151, ARM Climate Research Facility.
- Tang, Q., and S. Xie (2015), 2D Gridded Surface Data Value-Added Product, DOE/SC-ARM/TR-152, ARM Climate Research Facility.