Climate Modeling Best Estimate (CMBE) Dataset – Updates and Future Plans
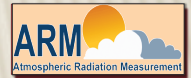
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Introduction

The **Climate Modeling Best Estimate (CMBE)** data was created to serve the needs of climate model development.

The dataset was assembled from the **highest quality ARM observational and Value-Added Product (VAP) data** relevant to climate model evaluation and diagnostics.

The temporal resolution was chosen to be comparable with the climate model **resolution of one hour**. It is a multi-year dataset over the 5 primary ARM sites at **SGP, NSA and TWP.**

Detailed description of the data and **to download**:

http://www.arm.gov/data/cmbe

SGP – ARM Southern Great Plains Site, **NSA** – North Slope of Alaska, **TWP** – Tropical Western Pacific

CMBE Purpose

• **Encourage** greater use of ARM data by the **modeling community.**

• Create **highly polished, multi-year datasets** suitable for modelers (1 hour average).

• Facilitate the use of ARM observational data by model developers in the **model diagnosis, evaluation and improvement.**

## Geophysical Parameters

- **cmbe_cldrad** (cloud and radiation fields component):
  - **cloud fraction, total cloud**   *(ARSCL,TSI),*
  - **liquid water path and precipitable water** *(MWRRET),*
  - **surface radiation fluxes** *(QCRAD).*
  - **top of the atmosphere radiative fluxes, cloud heights** *(satellite VISST & CERES data - **NEW for NSA and TWP)***

- **cmbe_atm** (atmospheric profiles and surface data)
  - **soundings**   *(wnpn, lssonde, sonde),*
  - **surface precipitation**   *(SMOS, met),*
  - **surface turbulent fluxes**   *(BAEBBR),*
  - **surface meteorology fields**   *(SMOS, met),*
  - **Numerical Weather Prediction model analysis data** *(ruc for SGP)*

The CMBE data is a condensed and integrated subset from ACRF data collection with measurements that have undergone stringent quality controls and are usually "best estimates" derived from several instruments and /or VAPs.

Recent Updates

• creation of atmospheric profiles and surface meteorological quantities for NSA.C1 and TWP.C1, C2 and C3.

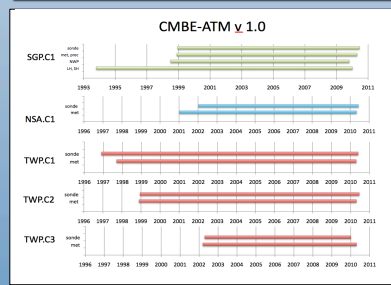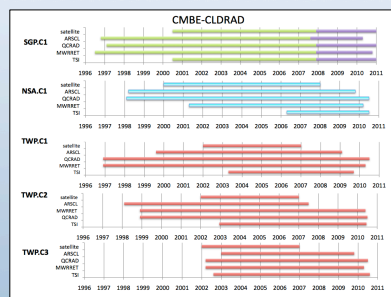Annual climatology of monthly mean temperatures at NSA.C1
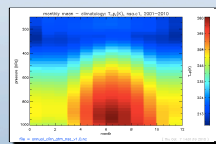
• addition of TOA fluxes and cloud heights from satellites measurements derived from VISST and CERES products for the NSA.C1 and TWP.C1, C2 and C3.

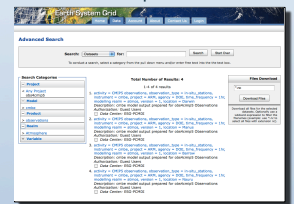Monthly mean climatology of swdn TOA at TWP.C1

VISST | CERES
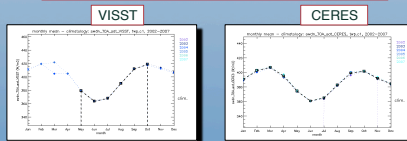
Availability

CMBE-CLDRAD

CMBE-ATM v 1.0

CMBE in ESG

The CMBE data is being published in Earth System Grid **(ESG)** data holdings, which will serve the **IPCC CMIP5** data. Our dataset will be used as a validation dataset for the climate model output data.

ESG Gateway

http://pcmdi3.llnl.gov/esgcet

To insure transparent analysis and comparison of CMIP5 and CMBE data in ESG portal, our observational data was rewritten in close accordance to the CMIP5 model data output specifications and requirements. This effort included:

1) defining the appropriate standardized observational metadata (international collaboration of observational data centers),

2) rewriting the data to meet those stringent requirements of CMIP5 data (used CMOR software, one variable per file, CF-compliant NetCDF, follow strict CMIP5 definition of variables),

3) defining and verifying the ESG publication process

4) test publishing of CMBE data was accomplished in both PCMDI Gateway and ORNL Gateway.

ORNL ESG   **http://esg.ccs.ornl.gov/esgcet**

Publication process: http://cmip.llnl.gov/cmip5/obs4cmip5.html

Future Work

- **SGP**
  - update to current - add 2009/2010
  - new release of cmbe-cldrad due to reprocessed MWRRET
  - add clear-sky radiative fluxes
  - BNL corrected soundings
  - Add area-mean CMBE

- **NSA**
  - Add ETA analysis data
  - Add SH and LH (need to check the data availability and quality)
  - Add NWS soundings, BNL corrected soundings

- **TWP**
  - Add ECMWF analysis data
  - BNL corrected soundings
  - Add TRMM area-mean precipitation

- **AMF**
  - Development of CMBE for China and Azores

- **ESG**
  - Publishing full CMBE in ESG IPCC CMIP5 data holdings