

Statistical Summaries of ARM Data for Climate Modelers - a New ARM Product

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Introduction

We present a **prototype statistical summary** of ARM observations designed for use by climate modelers. LLNL developed this prototype as a way of obtaining modeler feedback and providing guidance to the ARM Archive in their broader development of statistical summaries of ARM data.

The statistical summaries are based on a **3-year ARM SGP data set (1999-2001)** designed for forcing and diagnosing **SCMs** and **CRMs**. Comparisons are made with output from the **NCAR** and **GFDL** climate model simulations.

SGP – ARM Southern Great Plains Site
SCM – Single Column Model
CRM – Cloud Resolving Model
NCAR – National Center for Atmospheric Research
the Community Atmospheric Model (CAM)
GFDL – Geophysical Fluid Dynamics Laboratory model

The Purpose

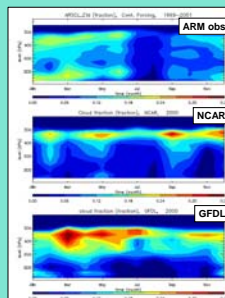
- **Encourage** greater use of ARM data by the **modeling community**
- Create **highly polished datasets** suitable for modelers
- Possible future availability of **statistical summaries for all standard ARM products** (plots and/or datasets)
- Possible future **'on the fly' calculation of statistical quantities**, integrated into ARM archive interface

"We'd like to hear from you..."

- Are Statistical Summaries helpful for your research?
- What variables of interest should have Statistical Summaries?
- What statistics should be used in the Summaries?
-Please provide specific examples of combinations of variables and statistics
- Are you interested in multivariate Statistical Summaries?
-Please provide specific examples
- Do you have Statistical Summaries (and input data sets) to be shared with the ARM community (and beyond) via ARM Archive?
-If so, for additional discussion please contact Raymond McCord (Archive Manager, mccordra@ornl.gov)

Statistical Summaries

Seasonal Cycle at the Southern Great Plains



Cloud Fraction seasonal cycle

The center piece of ARM is the millimeter wavelength cloud radar which continuously monitors the vertical profile of clouds.

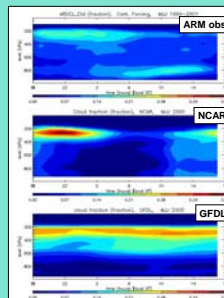
The analysis on the left shows the **seasonal variation in monthly mean cloud fraction** deduced from the cloud radar.

Also shown are the results from simulations of the **NCAR and GFDL** climate models.

Diurnal Cycle at the Southern Great Plains

The Southern Great Plains site has a **strong diurnal cycle particularly in the months of May through July**.

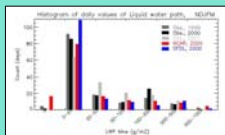
The cloud radar observations display the prominent maximum in upper tropospheric cloud due to nocturnal precipitation as well as the occurrence of shallow cumulus clouds that grow atop the daytime boundary layer.



Cloud Fraction diurnal cycle

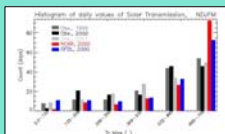
Histograms of Radiation and Clouds

Histograms can highlight aspects of the data not readily apparent from their long-term means. Examples are shown below for the **cool season (Nov-Mar)**.



Histogram of Liquid Water Path

The frequency of occurrence of the vertically integrated amount of cloud liquid strongly decreases with higher values.



Histogram of Solar Transmission

The frequency of occurrence of solar transmission strongly increases with higher values and differences from the models are apparent.

Evolving Web Access

First Prototype on CMWG Web Page



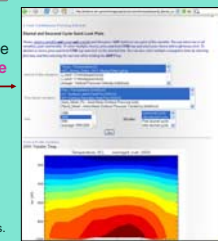
A **prototype** webpage to showcase the Statistical Summaries into data product was created on the **CMWG webpage**.

Notice **browsing dataset** and statistical analysis capabilities!

http://science.arm.gov/wg/cpm/scml/statistical_summaries.html

CMWG – ARM Cloud Modeling Working Group

The little boxes direct you to the page that allows you to **browse the data interactively**

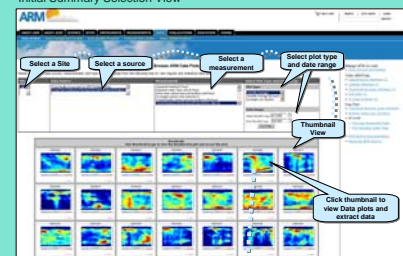


Many other quantities such as surface radiation, precipitation and integrated cloud liquid water path which are monitored from a network of surface stations may be viewed from those pages.

Evolving Prototype Design for ARM/Archive Web Site

<http://www.archive.arm.gov/armstatnb.jsp>

Initial Summary Selection View



More Detailed Summary Display and Access to Statistics and Data

