ARM

CLIMATE RESEARCH FACILITY

ARM NetCDF Tutorial

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Network Common Data Form (NetCDF)

- "NetCDF is a set of software libraries and self-describing machine independent data formats that support the creation, access, and sharing of array-oriented scientific data"
- NetCDF libraries and pointers to tools in many programming languages are available from: http://www.unidata.ucar.edu/software/netcdf/
- Supported languages include Fortran, C, IDL, Matlab, and Python
- This tutorial makes use of the NetCDF4 package in Python

Why Python?

- There are a growing number of tools that make Python particularly well suited for working with ARM data:
  - NetCDF4 library for reading/writing ARM data
  - NumPy/SciPy mathematic libraries for manipulating data
  - Matplotlib scientific plotting toolkit

- Integrates scientific programming and system-level scripting

- Python is open source software that can be downloaded from the development sites – or integrated packages can be obtained at low cost.

- Recommend the Enthought distribution – particularly if you are at a University – but make sure to get the Basic distribution with NetCDF4. http://www.enthought.com/products/epd.php.

Distributed Tutorial Package

- Background and instructions for getting started with reading and visualizing NetCDF data in Python

- Sample Python scripts:
  - Output a subset of metadata from a NetCDF file
  - Manipulate ARM time
  - Plot a simple time series

Basic Steps to Plotting NetCDF Data

- run ncdumpy <filename>
  - Outputs metadata from <filename>
- whos
  - Lists variables in Python workspace
- nc_file = Dataset(<filename>,'r',format='NETCDF3_CLASSIC')
  - Loads information about file into a Python object
- var_obj = nc_file.variables[<var_name>]
  - Assign information about a particular variable to a Python object
- var_val = var_obj[:]
  - Load data from Python variable into an array
- plot(var_val)
  - Plot data from variable in work space