Climate Data Analysis Tools

Merging Technologies for Climate Change Research

Lawrence Livermore National Laboratory

http: cdat.sf.net

Program for Climate Model Diagnosis and Intercomparison

1. Introduction

The Climate Data Analysis Tools (CDAT) **is a suite of interrelated diagnostic software tools** that are flexible, portable, adaptable, efficient, easy-to-use, shareable, free and capable of operating in a distributed environment.

More importantly, the open nature of the system permits **any member of the climate community to contribute to the system** on an equal footing with the members of PCMDI.

CDAT's focus is to allow climate researchers the ability to **access and analyze multidimensional climate datasets** located at various sites.

2. Primary Focus

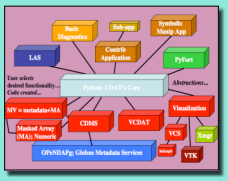
Originally developed to promote the archiving and diagnosing of model intercomparison data, it has evolved into **a seamless data access and manipulation tool** that allows users to analyze, visualize, and discover various aspects of disparate data.

Moreover, as a collaboration tool, it promotes **knowledge sharing** by **leveraging off the work of others** in a multitude of science and engineering disciplines (i.e., physics, earth sciences, etc.).

3. What is CDAT

CDAT **extends** Python by providing significantly enhanced climate packages and provides climate researchers with a **productive working environment from start to finish**. Added packages include:

- CDMS (Climate Data Management System)
- Numeric/MA/MV
- Visualization
- Miscellaneous
  - genutil, cdutil



Python is a powerful **user-friendly object-oriented scripting language** that is used in thousands of real-world business and scientific applications world-wide.

4. CDAT Users

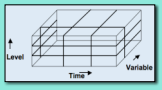
- Over 120 mailing list registers
  - Probably 10 to 15 times more casual users
- Mailing list archive: over 4,000 messages (~30 per month)
- 2,000 downloads since May 19, 2006 for version 4.0
- Improved documentation

Many **collaboration sites** world-wide, sites include:

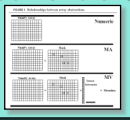
- British Atmospheric Data Center, U.K.
- Lawrence Berkeley National Laboratory
- Laboratory of Science of Climate and the Environment (LSCE), FR
- PCMDI
- University of Chicago
- University of Reading, UK

5. CDAT Data Manipulation

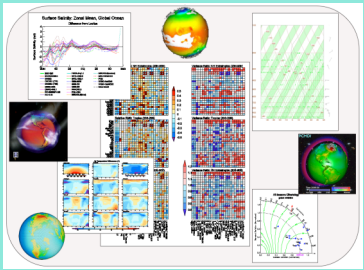
CDAT supports **data aggregation** via the cdscan utility that uses XML representation. Data aggregation is a **collection of files or datasets that are treated as single entities**.



Through the CDMS package, variables **maintain their mask and metadata information** during numerical operations.



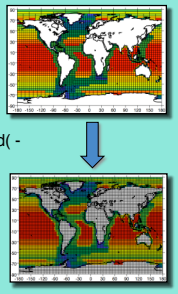
6. CDAT Analysis Products



7. CDAT Ease of Use

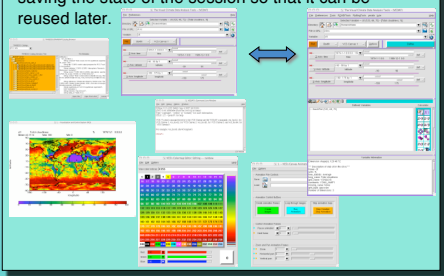
Regrid example:

```
#!/usr/local/cdat/bin/python
import cdms
from regrid import Regridder
f = cdms.open('temp.nc')
t= f.variables['t']
ingrid = t.getGrid()
outgrid = cdms.createUniformGrid( -
90.0, 46, 4.0, 0.0, 72, 5.0)
regridFunc = Regridder(ingrid,
outgrid)
newt = regridFunc(t)
import vcs
vcs.init().plot(t)
vcs.init().plot(newt)
```



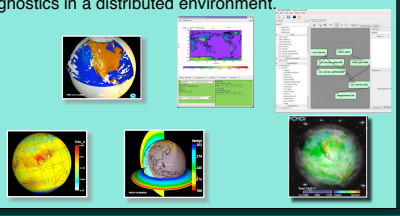
8. CDAT Graphical User Interface

The Visual Climate Data Analysis Tools (**VCDAT**) can be **used for quickly accessing and computing data**, producing a picture that visually represents the data values, refining the picture, and saving the state of the session so that it can be reused later.



9. CDAT Future

- **Officially release** the next generation of **CDAT v5.0** to the community. (Will include: NumPy and 3D graphics.)
- Merge CDAT software with the Earth System Grid (ESG) to provide user defined products and diagnostics in a distributed environment.



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This work was performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48. UCRL-PRES-234541