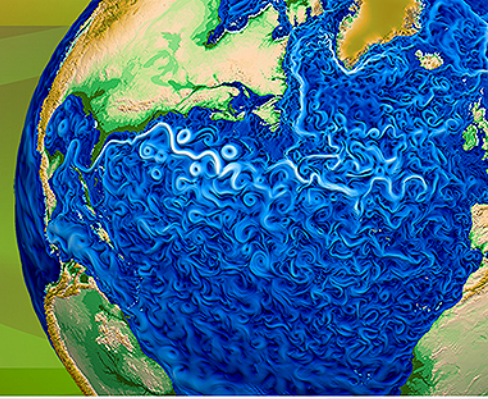




Accelerated Climate Modeling
for Energy



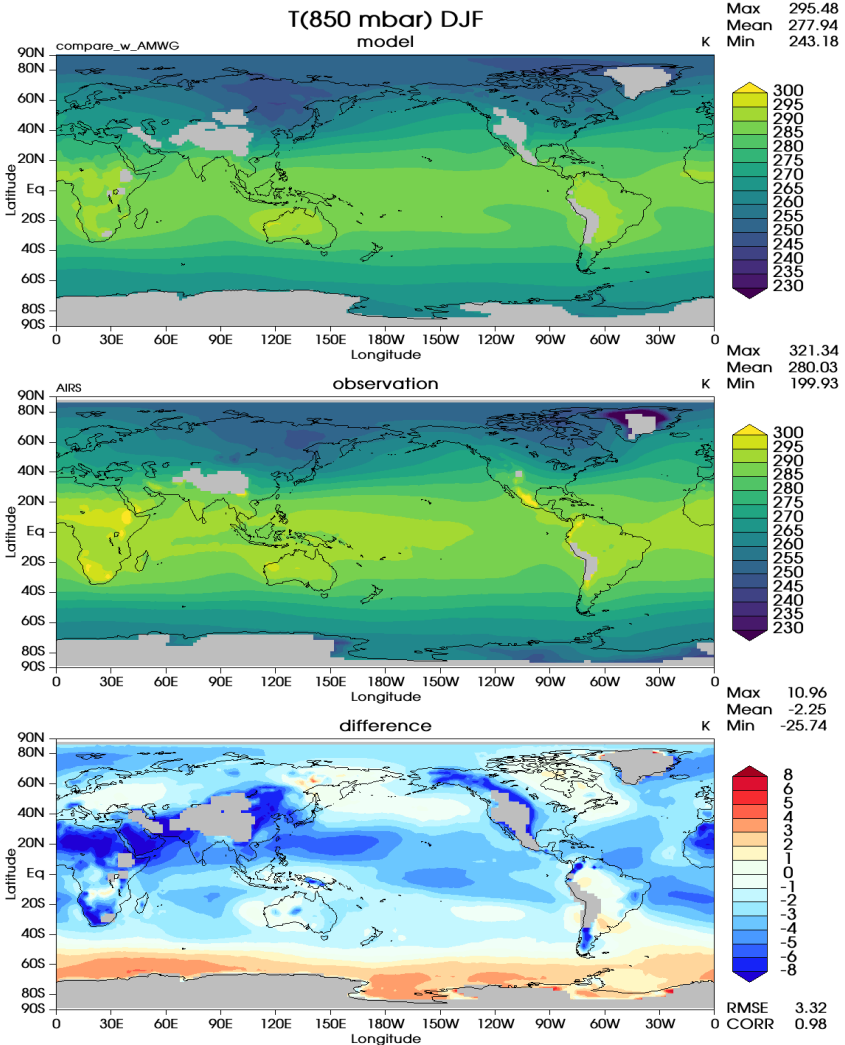
Workflow Group: ACME Diagnostics

A flexible diagnostics package for ACME

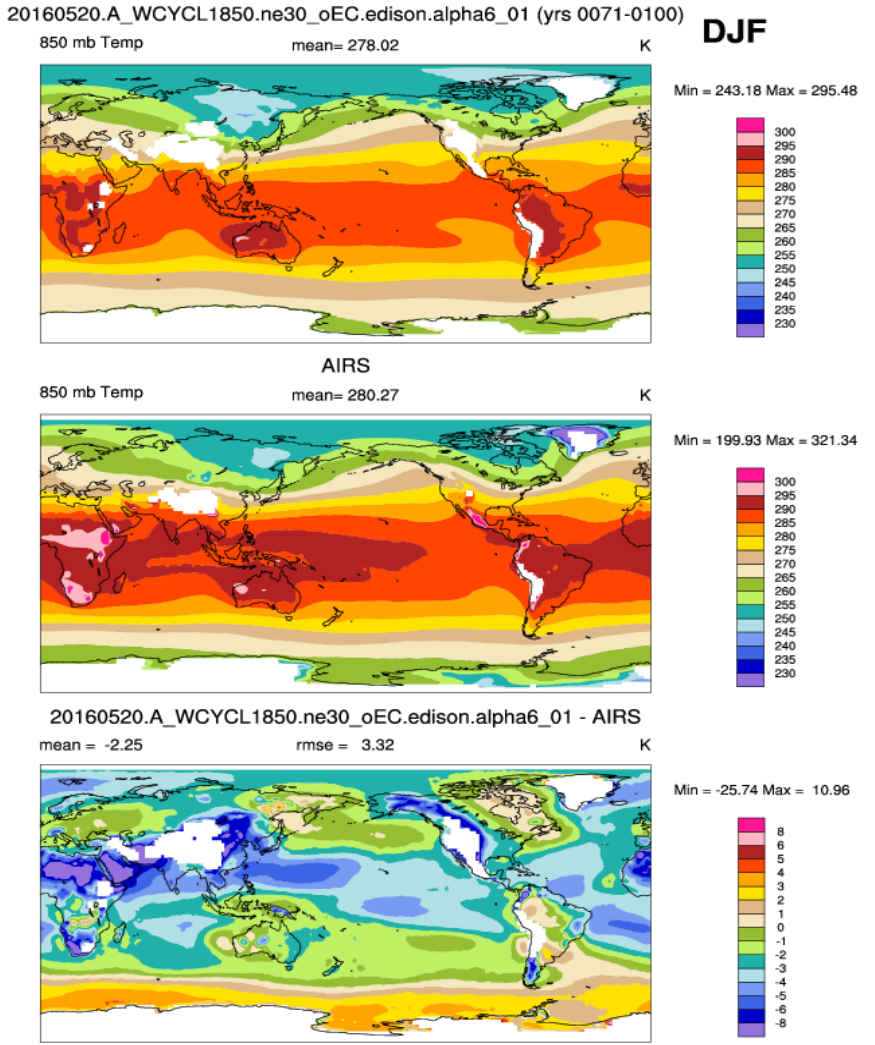
Team Lead: Jim McEnerney
Chris Golaz, Jerry Potter, Jim McEnerney, Jeff Painter,
Sam Fries, Charles Doutriaux, Dean N. Williams

- ACME needs a flexible dynamic model diagnostics package
 - Input from a number of different scientists
 - (e.g., Chris, Jerry, Susannah, Marcia, and others)
 - Need to be able to easily add new diagnostics and graphics customized to ACME requirements
 - Needs ability to add new observation data sets as they become available
 - Needs to be portable across platforms
 - Needs a dynamic quick look viewer

Comparison of plot set 5 for ACME Diagnostics and NCAR-AMWG Horizontal Contour Plots of Seasonal Means (DJF) of T 850 hPa compared to AIRS

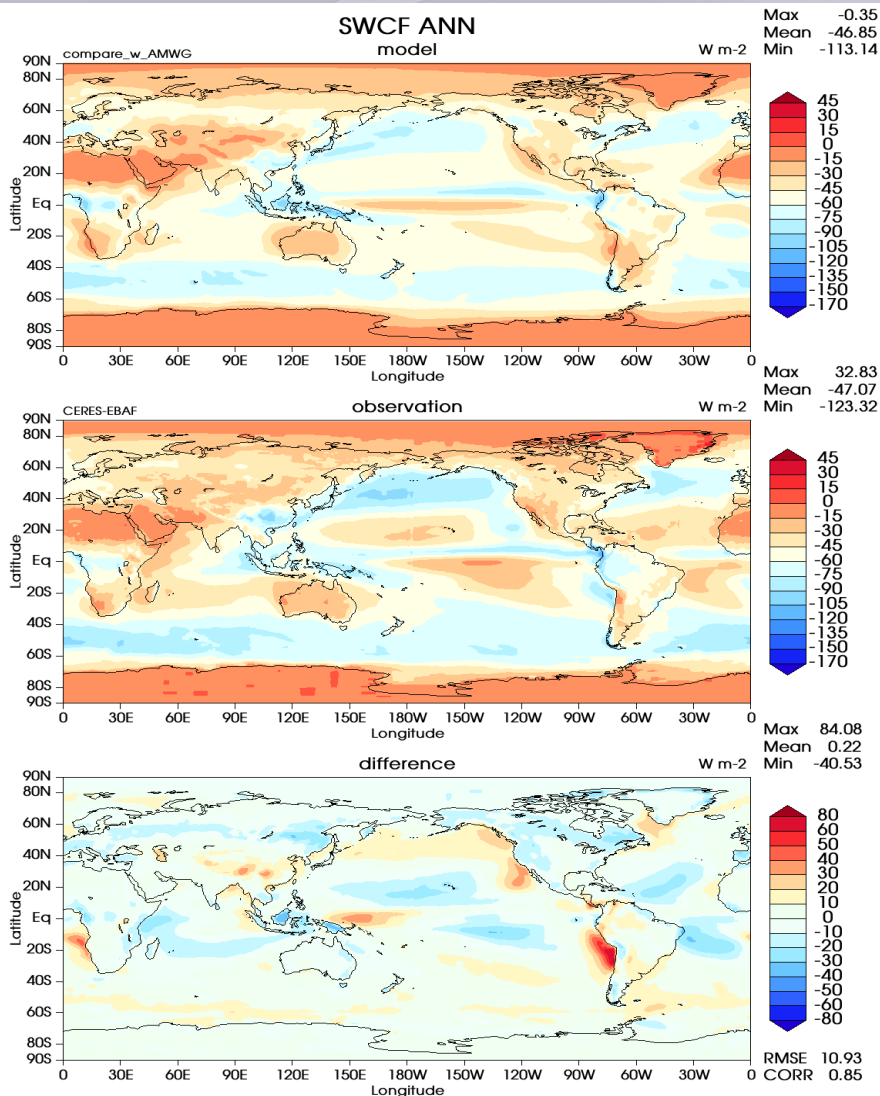


ACME Diagnostics

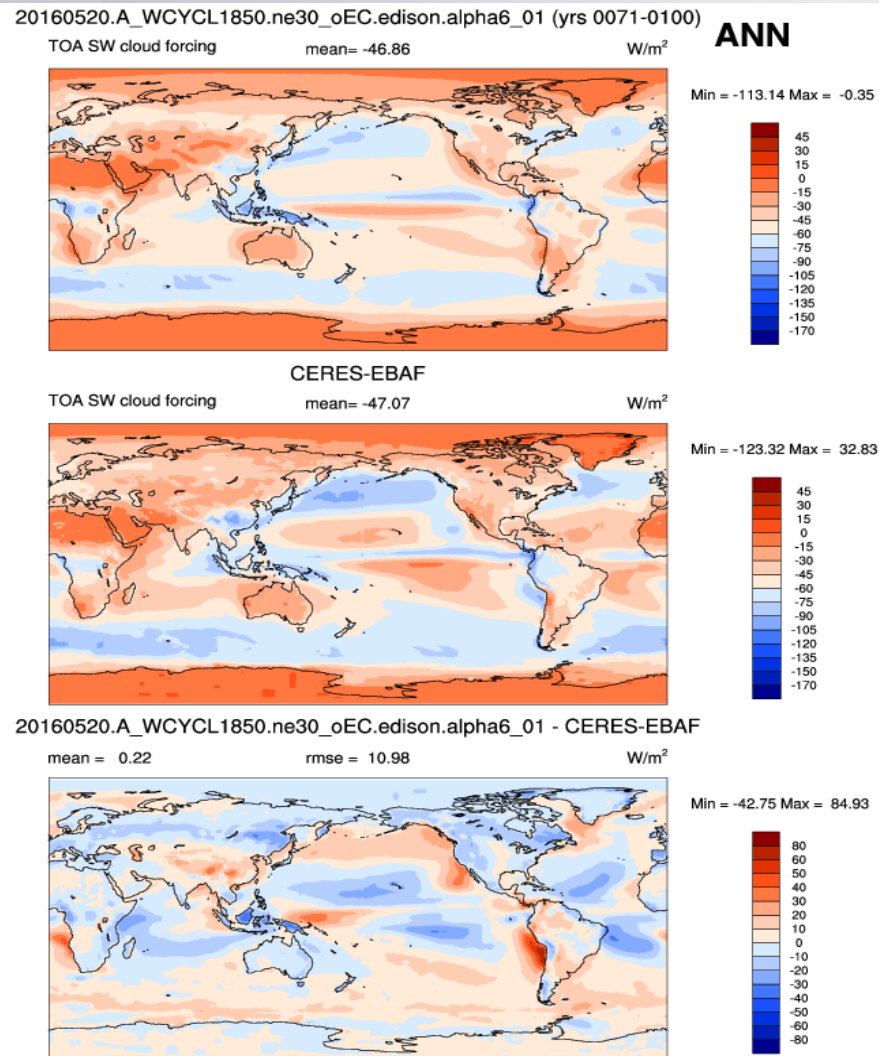


NCAR AMWG

Comparison of ACME Diagnostics and NCAR-AMWG for Model vs CERES-EBAF SWCF (short-wave cloud forcing)



ACME Diagnostics



NCAR AMWG Diagnostics

Features of ACME Diagnostics and Viewer

- No special model file names required
- Custom colormap specification
- Provenance for plots
- Downloadable from viewer
- Add observations as they become updated or available
- Specify short run name
- Simple command line for input – not necessary to change script
- Viewing from output directory (with download capabilities)
 - Not necessary to move files for viewing
- Viewing files are portable
- Table output simplified
- Produces correlation and RMSE
- Use multiprocessing for performance
- Variables are not hard-wired into ACME Diagnostics
 - Any variable defined in the data can be plotted
- Support
- Extensive testing procedure with bit for bit comparison of graphical image and contest
 - Test script
 - Uses examples
 - Runs provenance for plots
- Improved use plotting real estate
- If ACME model output is modified, any new variables can be plotted immediately, without waiting for diagnostics code updates.

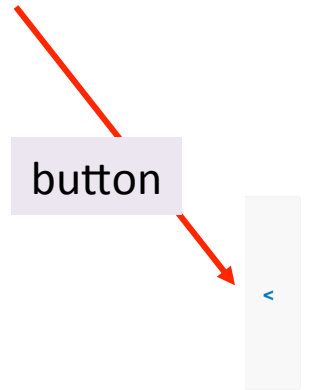
Viewer allows comparison of seasons, download plots and data, provenance

UVCMetrics AMWG Plotset 5

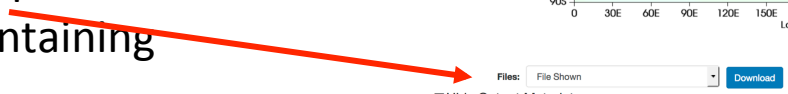
Customize run name



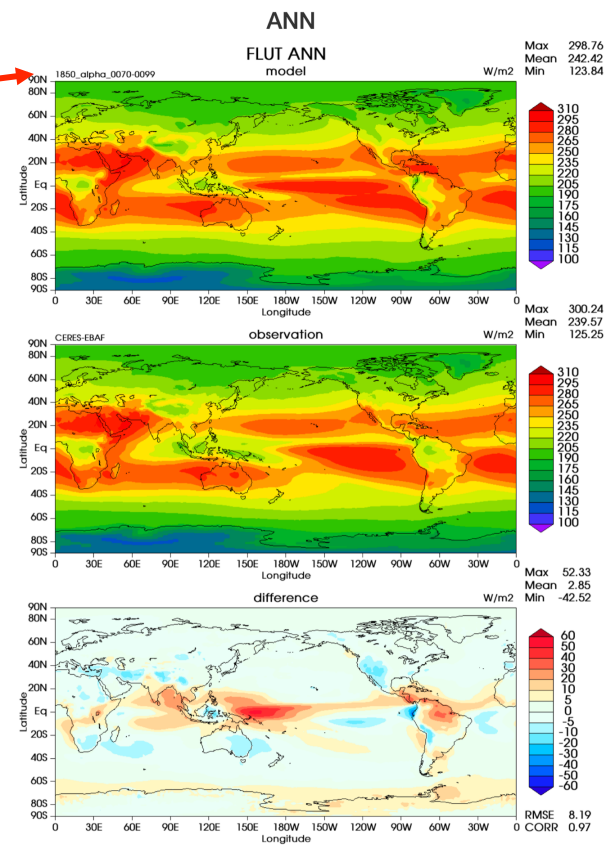
Scroll through seasons



Download figure
(.svg, .png, or .pdf and
netCDF file containing
the data



Provenance



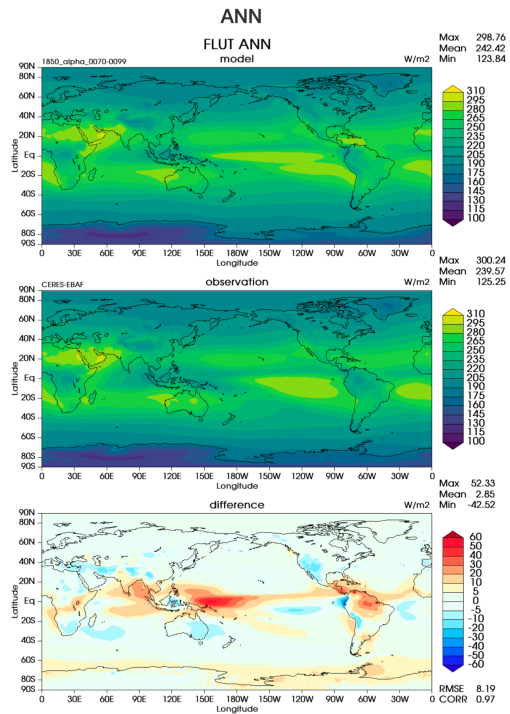
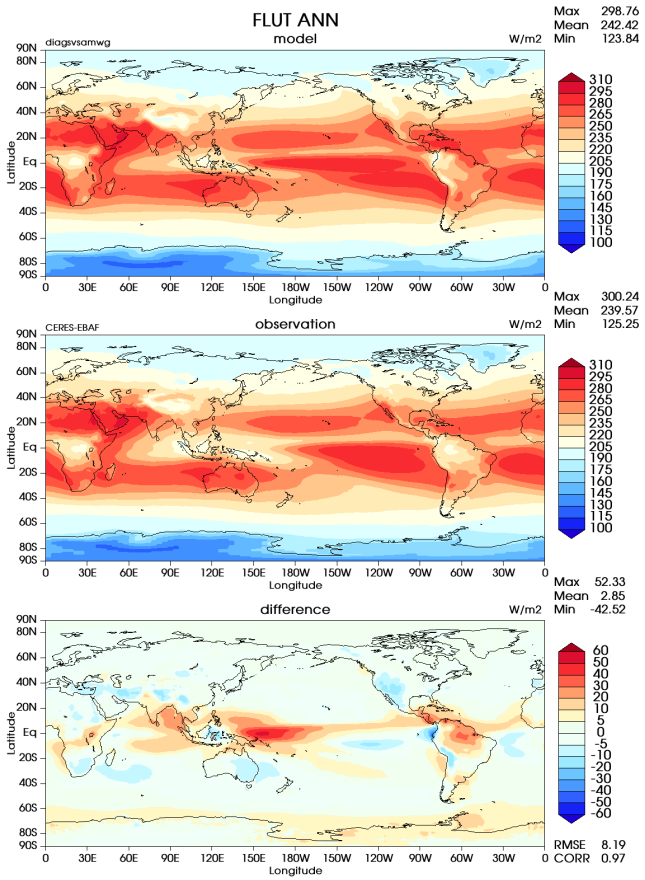
Files: File Shown [v] Download

▼ Hide Output Metadata

Metadata Key	Metadata Value
version	g7c308d
UVCDAT	UV-CDAT: 2.6.42.g910814b Metrics: 1.0.0 (g7c308d) script_sha1: 3a6cb0e0bfb4e6011f6a39aa65eb07d19d13d36
history	2016-10-30 18:48:45.626438: created by potter2 from path: /space1/test_data/diags_output with input command line: /usr/local/anaconda2/envs/ltest/bin/diags --model path=/space1/test_data/cam36_test /20160520_A_WCYCL1850_n30_gEC-edison.alpha01_c1climos=yes.type=model.name=1850_alpha_0070-0099 --obs path=/space1/test_data/obs_for_diagnostics/climos=yes.filter=f.startswith(CERES-EBAF) --logo no --colormaps diff=bl_to_darkred model=rainbow obs=rainbow --package AMWG --set 5 --seasons ANN --vars FLUT --outdir /space1/test_data/diags_output/amwg --prefix set5 --postfix CERES-EBAF --log_level DEBUG --log_file /space1/test_data/diags_output/amwg/DIAGS_OUT/PUT/48c0651521494bb31f573b6a5bbf5166/AMWG_5_CERES-EBAF_FLUT_ANN.log

Variety of colormaps available

```
diags --model path=${MODEL_PATH},climos=yes,type=model,name=diagsvsamwg
--obs path=${OBS_PATH},climos=yes,filter=f_startswith('CERES-EBAF')
--logo no --colormaps diff=bl_to_darkred model=bl_to_darkred obs=bl_to_darkred
--package AMWG --set 5 --seasons ANN --vars FLUT --outputdir ${OUTPUT_PATH} --prefix set5 --postfix CERES-EBAF
```



Files:

▼ Hide Output Metadata

Metadata Key	Metadata Value
version	g7c30f9d
UVCDAT	UV-CDAT: 2.6.42.gf10814b Metrics: 1.0.0 (g7c30f9d) script_ahat1: 3af5cb0e0dbf4e6011f6e39aa65e67d19d13d3e
history	2016-10-30 16:55:14.234092: created by potter2 from path: /space1/test_data with input command line: Asr/fccal/anaconda2/envs/test/bin/diags --model path=/space1/test_data/cam35_test/20160520_A_WCYCL1850.ne30_c0E0.edison.alpha.01.climos=yes.type=model.name=1850_alpha_0070-0099 --obs path=/space1/test_data/obs_for_diags/climos=yes.filter=f_startswith('CERES-EBAF') --logo no --colormaps diff=bl_to_darkred model=bl_to_darkred obs=bl_to_darkred --package AMWG --set 5 --seasons ANN --vars FLUT --outputdir /space1/test_data/diags_output/diaweg --prefix set5 --postfix CERES-EBAF --log_level DEBUG --log_file /space1/test_data/diags_output/amwg/DIAGS_OUTPUT/48c051521494bb315736a8a5b1866AMWG_5_CERES-EBAF_FLUT_ANN.log

Comparison of NCAR-AMWG and ACME Diagnostics

Field	PACKAGE	MODEL MEAN	OBS MEAN	Bias	RMSE
CERES-EBAF FSNTOA ANN	NCAR-AMWG	243.70	240.48	3.22	11.89
	ACME Diagnostics	243.69	240.48	3.21	11.85
CERES-EBAF Albedo ANN	NCAR-AMWG	0.29	0.31	-0.02	0.05
	ACME Diagnostics	0.30	0.31	-0.02	0.05
CERES-EBAF LWCF	NCAR-AMWG	23.97	26.07	-2.10	6.08
	ACME Diagnostics	23.97	26.06	-2.10	6.06
JRA25 THREFT ANN	NCAR-AMWG	286.93	287.61	-0.67	2.02
	ACME Diagnostics	286.94	287.61	-0.67	2.01

Plans for standardizing observations

Problem

- ACME Diagnostics metrics relies on many datasets that are *outdated* and of *unknown provenance*.
- Duplicate data sets with no documentation

Solution

- Update datasets without re-inventing the wheel and duplicating existing efforts.
- Start using two sources for data
 - [obs4mips](#) for satellite data products,
 - [CREATE-IP](#) for reanalysis data products.
- Data products have been formatted in a common format and variables follow a pre-determined naming convention. This should significantly decrease efforts needed to import new datasets into ACME Diagnostics or update existing ones.
- Provenance of the data is well documented.
- Technical documentation is available.

New approach import new data products in ACME Diagnostics

- Near term vision
 - Prepare for multiple users
 - Customize table generation for individual user
 - Extend user defined diagnostics capability
 - Upgrade other diagnostics to plot set 5 output quality standards
 - (e.g., Text position, size, legends, colormaps, etc.)
 - Fully functional Taylor diagram (plot set 14)
- Intermediate to long term vision
 - Integrate with Community Diagnostics Package (CDP)
 - Access other diagnostics from the climate community
 - (e.g., PMP, ARM Diagnostics, CMVTools, etc.)
 - Parallelization of diagnostics – MPI & SPARK
 - Integrate with ESGF server-side computing