Workflow Group: ACME Diagnostics

A flexible diagnostics package for ACME

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Motivation

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

- Customize run name
- Scroll through seasons
- Download figure (.svg, .png, or .pdf and netCDF file containing the data)
- Provenance
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
## Comparison of NCAR-AMWG and ACME Diagnostics

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<th>Field</th>
<th>PACKAGE</th>
<th>MODEL MEAN</th>
<th>OBS MEAN</th>
<th>Bias</th>
<th>RMSE</th>
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</table>
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
    o Customize table generation for individual user
    o Extend user defined diagnostics capability
  – Upgrade other diagnostics to plot set 5 output quality standards
    o (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)
    o 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