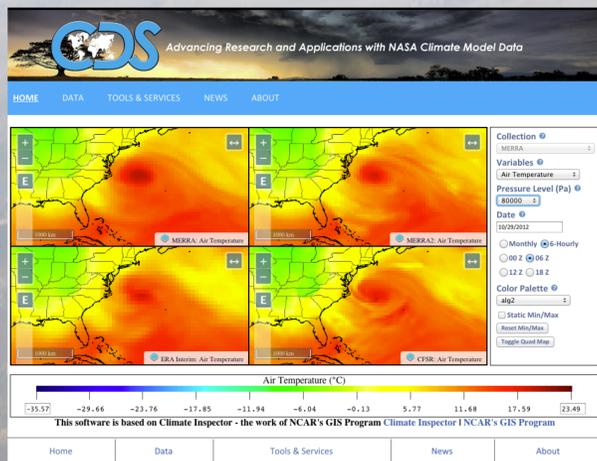


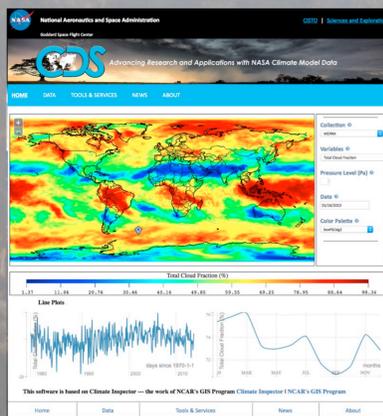
CREATE-V

Based on code from UCAR's Climate Inspector, CDS is building a visualization tool for interdisciplinary and reanalysis scientists to support exploration of variables by reanalysis, date, and level. The tool uses TDS and OpenLayers and provides the ability to display images of commonly used monthly and 6-hourly variables from multiple reanalyses simultaneously.



Four reanalyses showing air temperature at 800 hPa during Hurricane Sandy, Oct 29, 2012

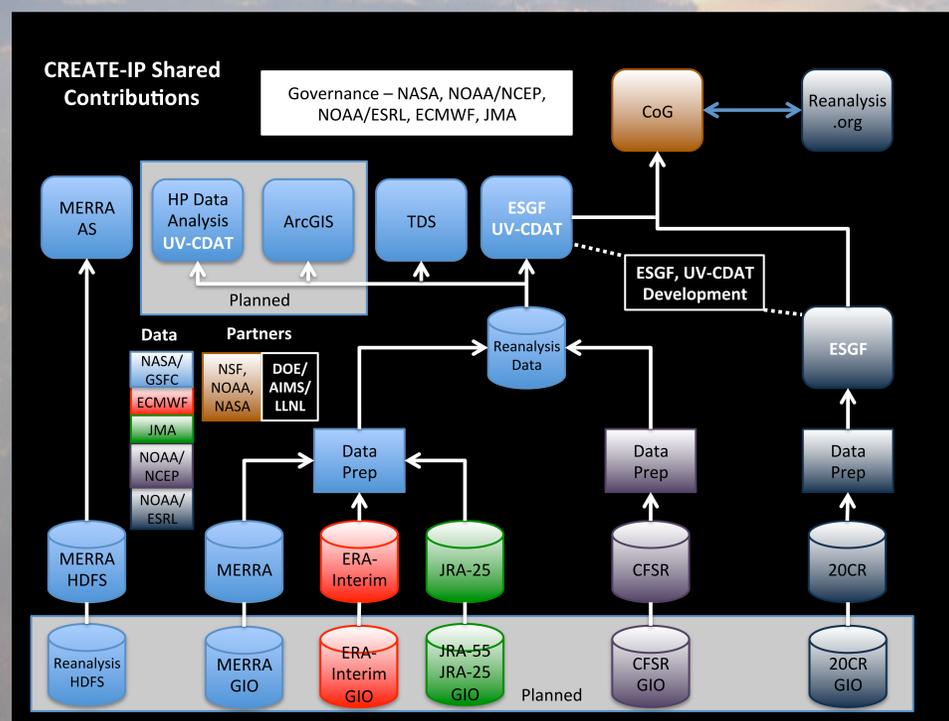
Selecting a location on the image will display the value of that variable. In the version to be released in early 2016, this will also produce an anomaly plot and the seasonal cycle. Additional features include full screen mode and a selection of color palettes.



ABSTRACT

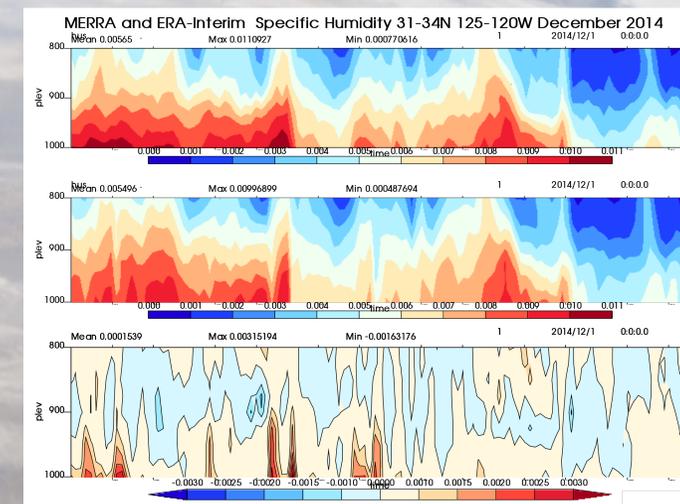
Scientists engaged in reanalyses—essentially re-forecasts of past weather using the latest forecast models—are interested in reproducing the success of the Coupled Model Intercomparison Project (CMIP5). They are studying reanalysis differences and uncertainties to improve reanalysis techniques. Reanalysis data also allows interdisciplinary scientists to compare their datasets (e.g., biodiversity, water planning, wind power) with 30 or more years of gridded climate data. These research efforts require large sets of monthly and hourly data, formatted identically to facilitate comparisons. NASA's Climate Model Data Services (CDS) is collaborating with the world's five major reanalysis projects to collect this data and present it through Distribution, Visualization, Analytics, and Knowledge services, resulting in the Collaborative REAnalysis Technical Environment (CREATE).

CREATE-IP Collaborations



UV-CDAT Remote Visualization

CDS has built a remote visualization system that provides authorized users access to the CREATE-IP data using UV-CDAT. The data is available via OpenDAP and ESGF (when it comes back online). Users can visualize the data using the local graphics card and send only the rendered image back to the user's system. This provides fast visualization across the continental U.S. and allows for the quality assessment of data residing at the Goddard Space Flight Center by a scientist in California.



Comparing two time slices of Specific Humidity over northern California from two reanalyses to assess data quality. The bottom plot shows the difference between the two (MERRA minus ERA-Interim).

The ability to remotely visualize the full CREATE-IP dataset will assist scientists in identifying differences in reanalysis algorithms and processing. For example, above we can see the December 2014 atmospheric river fading out more slowly in MERRA than it does in the ERA-Interim reanalysis.

Summary

CREATE will provide access to the full range of reanalysis datasets—including all relevant variables, innovations, and observations—through multiple distribution and visualization services. Access to the data will be provided through the CREATE-IP project space on ESGF/COG. Collaborations with existing reanalysis organizations include reanalysis.org and the European Copernicus Climate Change project. It is anticipated that this collection of data, services, and science collaborations will support future work in reanalysis intercomparison and interdisciplinary science.

For Additional Information

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Data

CDS has published monthly and selected 6-hourly data from the five major reanalysis projects (see chart on right). CDS plans to add monthly and 6-hourly data for new reanalyses in the new year (ERA-20C, CFSR 20CRv2c) as well as to develop processes to automate the publication of new data. Gridded innovations and observations, data used in each reanalysis model timestep, will also be processed and published to support reanalysis model improvements.

CDS has converted the data to the standard ESGF format of one variable per file using code (obs4MIPs.py) developed in house to streamline analytic workflows.

Reanalysis	Date Range	Currently Available
NASA/GMAO MERRA	1979-present	Monthly, selected 6-hr
NASA/GMAO MERRA-2	1980-present	Monthly, selected 6-hr
ECMWF ERA-Interim	1979-present	Monthly, selected 6-hr
NOAA/NCEP CFSR	1979-present	Monthly, selected 6-hr
NOAA/ESRL 20CR	1871-2010	ESGF only
JMA JRA-25	1958-2014	Monthly, selected 6-hr
JMA JRA-55	1958-present	Monthly, selected 6-hr

Variable	Long Name	Variable	Long Name	Variable	Long Name
clt	Cloud Area Fraction	psl	Sea Level Pressure	rsut	TOA Outgoing Shortwave
evpsbl	Evaporation	rlds	Surface Downwelling Longwave	ta	Air Temperature
hur	Relative Humidity	rius	Surface Upwelling Longwave	tro3	Ozone
hus	Specific Humidity	riut	TOA Outgoing Longwave	ua	Eastward Wind
pr	Precipitation	rsds	Surface Downwelling Shortwave	va	Northward Wind
prw	Precipitable Water	rsdt	TOA Incident Shortwave	wap	Omega
ps	Surface Pressure	rsus	Surface Upwelling Shortwave	zg	Geopotential Height

Above is a sample of monthly variables that are currently available. All clear-sky radiation variables are also included but not listed.

6-hourly Variables Currently Available

Current Variable	Current Long Name
hus	Specific Humidity
psl	Sea Level Pressure
ta	Air Temperature
ua	Eastward Wind
va	Northward Wind

6-hourly Variables Planned for 2016

Planned Variable	Planned Long Name
hur	Relative Humidity
pr	Precipitation
prw	Precipitable Water
ps	Surface Pressure
clt	Cloud Area Fraction
evpsbl	Evaporation
zg	Geopotential Height
tro3	Ozone