

Web-Based Reanalysis Intercomparison Tools (WRIT) to allow easy analysis and comparison of reanalyses and other datasets.

<http://www.esrl.noaa.gov/psd/data/writ/>

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# Purpose of WRIT Tools

- Allow users to compare reanalyses, observations.
- Users avoid having to download data.
- Users don't need to be concerned about differing variable names, units, file structures, spatial resolution, coordinate names, longitude ranges.
- Users don't need to learn new software.
- Plots can provide quick check of ideas.
- New datasets can easily be added.

# WRIT Tools Available

1. **WRIT Monthly/Seasonal Plots**: Maps and vertical Cross-sections. Means, anomalies and climatologies. Differences between reanalyses or between reanalysis and observational grids.
2. **WRIT Month Time Series**: Plot time series of means and anomalies. Plot differences between reanalyses or between reanalysis and observational time-series. Display statistics
3. **WRIT Trajectory Tool**: Use 4-times daily 3D winds to calculate forward/backward trajectories.

# Reanalyses Available Via WRIT

Reanalysis	Year Range at PSD	Levels/Output Resolution at PSD*
NCEP/NCAR R1	1948-present	17/2.5x2.5
NCEP/DOE R2	1979-Jun 2012	17/2.5x2.5
MERRA	1979-2012	31/1.25x1.25
20 <sup>th</sup> Century Reanalysis	1871-2010	24/2.0x2.0
ERA Interim	1979-2011	30/1.5x1.5
NCEP CFSR	1979-Mar 2011	37/2.5x2.5

1. Pressure level: Heights, temperature, winds, relative humidity (RH), specific humidity, vertical velocity
2. Single level: 2m Air temperature, sea level pressure (SLP), 10m winds, precipitation

\*Some single level spatial resolutions slightly higher.

# Observational Datasets

Dataset	Date Range	Variables/resolution
U Of Delaware V3	1900-2010	Precip/Temp 0.5deg
GHCN CAMS	1948-Jul 2012	Temp 0.5deg
CRU 3.01	1901-2009	Precip/Temp 0.5deg
GPCP	1979-Jun 2011	Precip 2.5deg
NOAA Reconstructed precipitation	1948-Jul 2012	Precip 1x1deg

May add others such as GPCC, MLOST...

# Webpage Code Backend

- NCL – it easily handles different NetCDF formats, areas and plotting.
- Perl and HTML forms with some JavaScript.
- Use tables to relate variables, levels.
- Have “database” of file names and structures.
- Code handles longitude ranges, differing levels, resolution, units....
- Tried OPeNDAP to avoid storing files locally. It ‘failed’ (far too slow, need aggregated files).



**Help**

We would greatly appreciate feedback/comments on the page. Mail to Cathy Smith at (cathy.smith@noaa.gov).

**WRIT Monthly Map Tool**

**Help**

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[Datasets and variables](#)

**Other WRIT Tools**

[WRIT Monthly Timeseries Tool](#)

**Background Information**

[Reanalyses.org](#)  
[Referencing Plots](#)

**Related Plot/Analysis**

[Plot monthly composites NCEP R1 and observational 20CR](#)  
[Plot monthly composites: 20CR](#)  
[Plot monthly correlations NCEP R1](#)  
[Extract Monthly Time-Series](#)  
[All PSD interactive climate web tools](#)

## Web-based Reanalysis Intercomparison Tool: Monthly Maps

Please email us or post comments to the [Reanalyses.org](http://Reanalyses.org) wiki page with any issues, suggestions or comments.

Plot monthly maps or vertical cross-sections from different reanalysis datasets as well as differences between reanalyses. Means, anomalies and climatologies are available.

NCEP/NCAR R1  CFSR

Zonal Wind  1000mb

e.g. 1972. For seasons that span a year (e.g. DJF), please enter year of the LAST month.

1983 1998 1995 1994 1988

OR

Enter year range (limit 50 years)  
1st Year of range to last year of range

Jan  Jan

e.g. 1972. For seasons that span a year (e.g. DJF),

OR

Enter year range (limit 50 years)  
1st year range to last year of range

Mean  Anomaly  Long Term Mean (climatology)

Map  Height/Latitude  Height/Longitude

All

Lowest lat: (-90 to 90)  Highest lat:   
 Western-most longitude (0 to 360):  Eastern-most longitude:

Northern Hemisphere Polar Stereographic

Lower level  Upper level

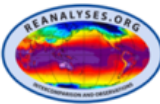
Color  Shaded

100   No  Yes

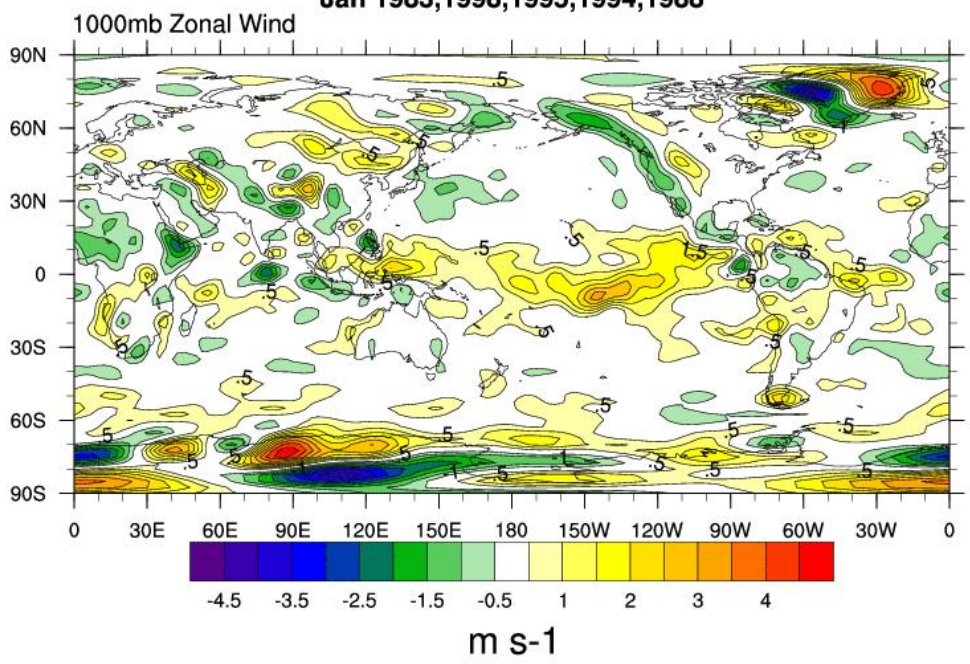
No  Yes

Interval:  Range: low  high

GIF  Google Earth



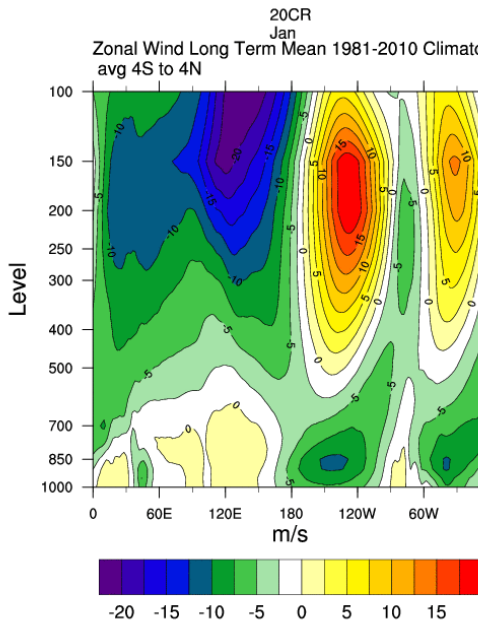
NCEP/NCAR R1 - NCEP CFSR Jan 1983,1998,1995,1994,1988



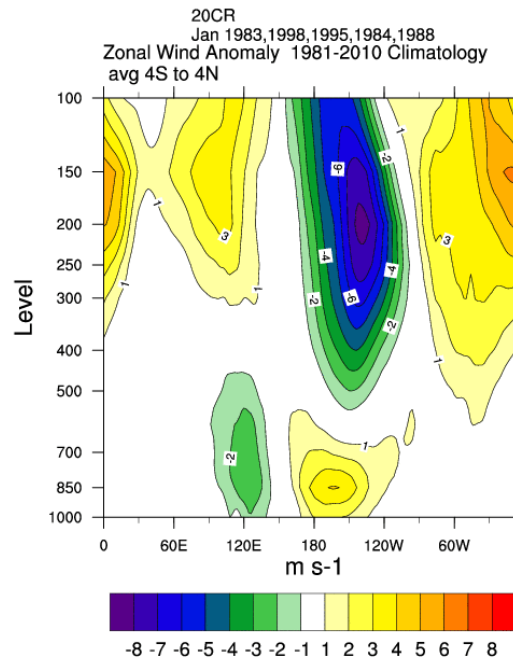


# More Examples: Vertical Cross-Sections (Longitude x Height)

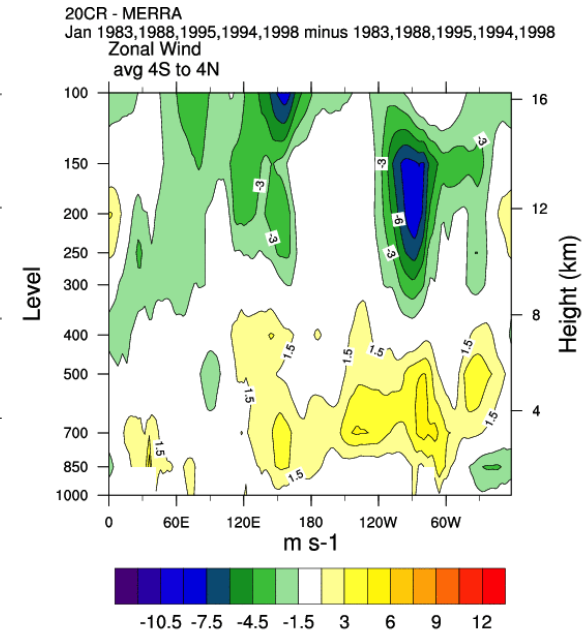
*Zonal Wind Climatology*



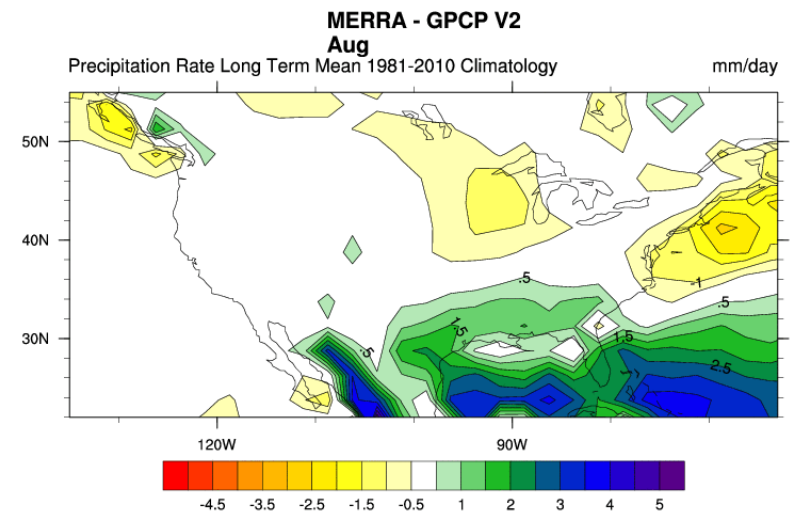
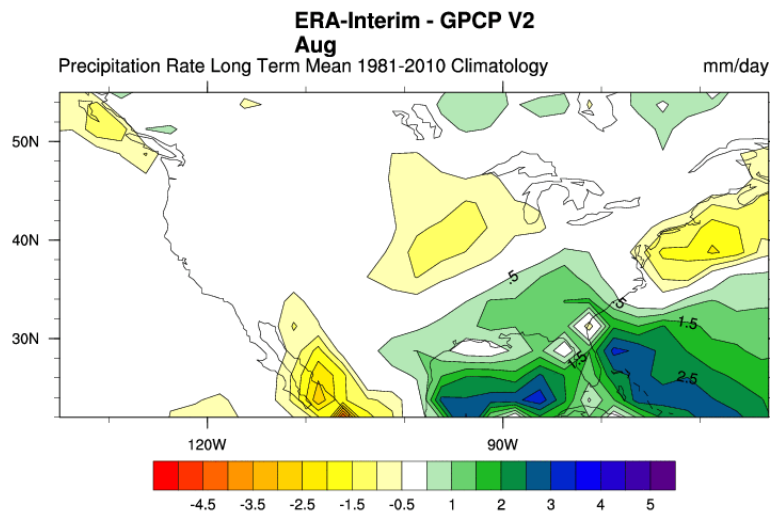
*Zonal wind Anomaly (El Nino)*



*20CR-Merra: El Nino*



# More Examples: Difference from Observations



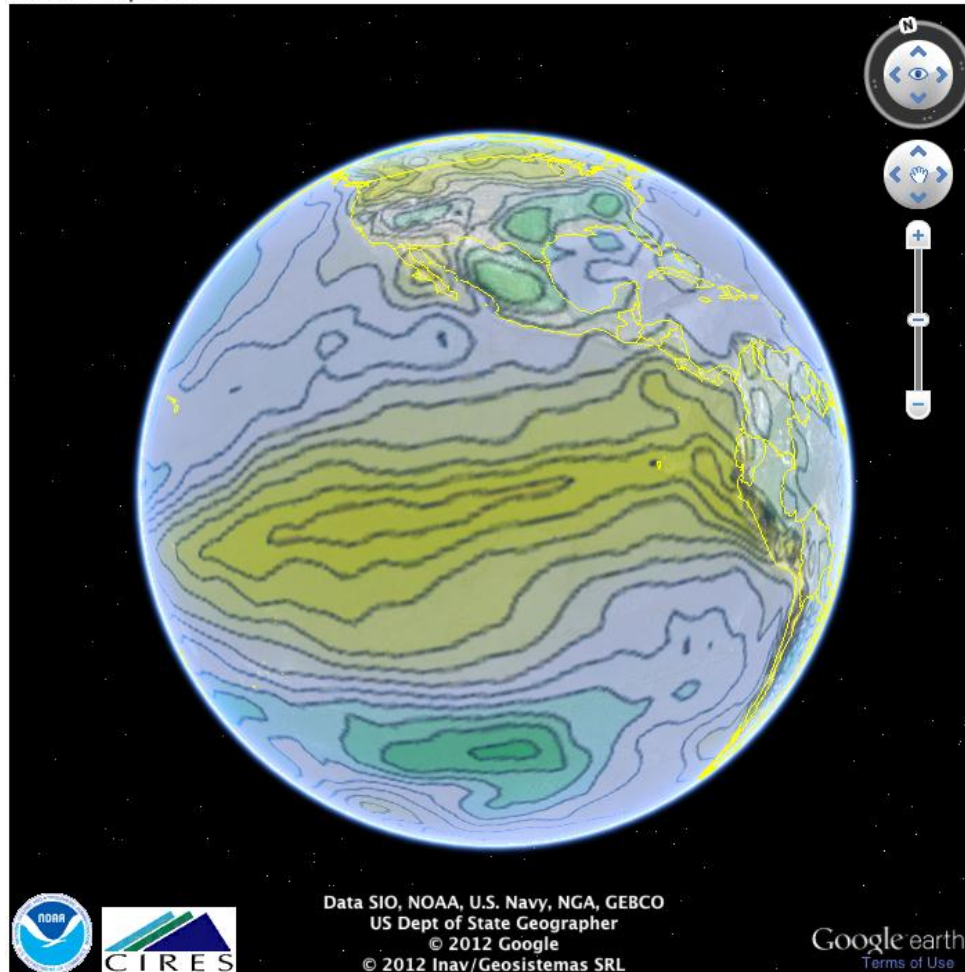
# Google Earth/KML

## NOAA/ESRL PSD: Web-based Reanalysis Intercomparison

### Tool: Jan 1983 2m T

NOAA/ESRL PSD: Web-base Reanalyses Comparison Tool: Maps

2m Air Temperature



Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
US Dept of State Geographer  
© 2012 Google  
© 2012 Inav/Geosistemas SRL

Google earth  
Terms of Use

Links

**Help**

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**WRIT Monthly Timeseries Tool****Help**[Instructions](#)[Datasets and variables](#)**Other WRIT Tools**[WRIT Monthly Mapping Tool](#)**Background Information**[Reanalyses.org](#)[Referencing Plots](#)**Related Plot/Analysis**

Plot monthly composites NCEP R1 and observational  
Plot monthly composites: 20CR

Plot monthly correlations NCEP R1

[Extract Monthly Time-Series](#)

All PSD interactive climate web tools

## Web-based Reanalysis Intercomparison Tool: Monthly/Seasonal Time Series

The page is a prototype. We hope to add more features to the page as well as additional analysis webpages.  
Please email with any problems

Plot monthly time series from different reanalysis datasets as well as differences between reanalyses.

**Dataset 1?** 20th Century Reanalysis V2  **Optional: subtract or additionally plot Dataset 2?** ERA-Interim

**Which variable for D1?** Air Temperature  **Level for D1?** 925mb

**Which variable for D2?** Air Temperature  **Level for D2?** 925mb (useful for correlations or scatter plots)

**Start Year?** 1948  **End Year?** 2010

**Time Averaging?**  None  Seasonal (1 value/year) **First Month Season?** Mar **Last Month?** Mar

**Variable statistic?**  Mean  Anomaly

Dataset 1 Climo range 1981 to 2010 Dataset 2 Climo range 1981 to 2010

 **Grid Point/Region 1:**

Lowest lat: (-90 to 90) 25 Highest lat: 55

Western-most longitude (0 to 360): 230 Eastern-most longitude: 300

 **Grid Point/Region 2:**

Lowest lat: (-90 to 90) 25 Highest lat: 55

Western-most longitude (0 to 360): 230 Eastern-most longitude: 300

**Output Type?**  Timeseries  TimeSeries Difference Plot  Distribution  Cross or Auto Correlation  Scatter Plot

**Y Axis**  Same  Different

**Plot Type?**  Line  Bar

**Running Mean Smoothing?**  No  Yes Number months (seasons)? 1

**Override default Y axis Bounds?** Low to High: 0 to 0 **Override default 2nd Y axis Bounds?** Low to High: 0 to 0

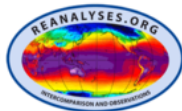
**Override default Plot Year Range?** Low to High: 0 to 0

Create Plot

Reset Options

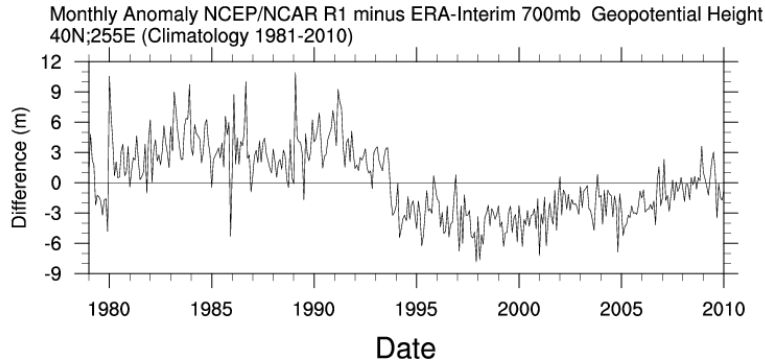


(Report Bugs)

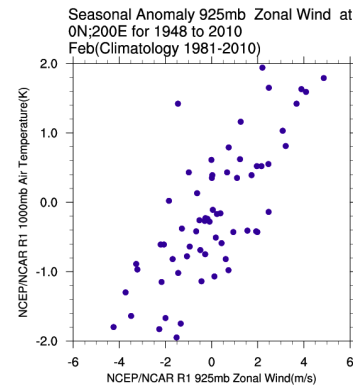


# WRIT Time Series: Examples

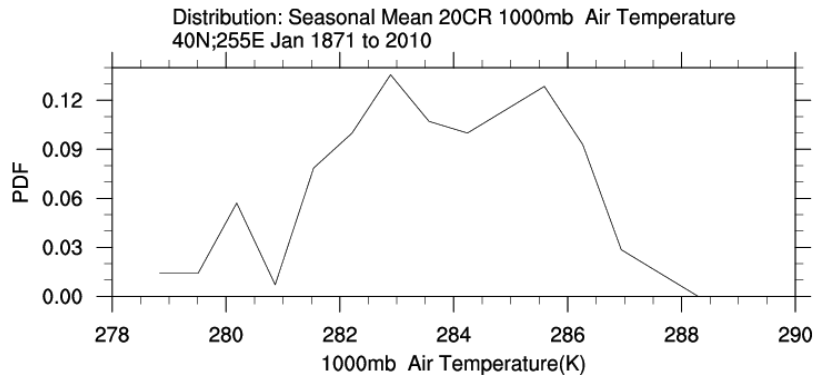
*Time series Difference: 2 Reanalyses*



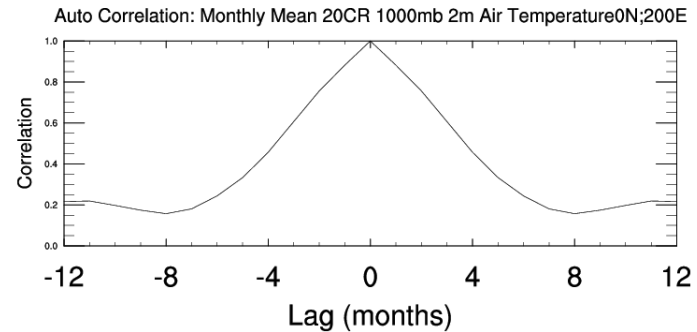
*Scatter Plot: U925 vs. T1000mb Tropical Pacific*



*Distribution: 20CR Jan 1000mb Air Temperature*



*Autocorrelation 2m T: 20CR Tropical Pacific*



**Help**

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**WRIT Trajectory Tool****Help**

[Instructions](#)  
[Datasets and variables](#)

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[Plot hourly composites 20CR](#)  
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## Web-based Trajectory Tool

Plot a trajectory: **This page is BETA and in progress! Results are not guaranteed.** The code used to calculate the trajectories is kindly supplied by the University of Melbourne and details are on their [Parcel Trajectory Software Home Page](#).

**Dataset 1?**

**Enter start date to end date (YYYY MM DD HH to YYYY MM DD HH). For backwards, end date should be higher than start. You are currently limited to 60 time steps or about 15 days. HH should be 00,06,12, or 18**

YYYY  MM  DD  HH

To

YYYY  MM  DD  HH

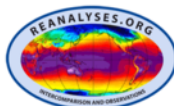
Enter latitude/longitude and level: Lat (-90 to 90)  Lon (-180 to 360)  Level (mb)

**Plot Options**

Markers drawn for every 6 hours: No  Yes



(Report Bugs)

**Trajectory model and caveats:**

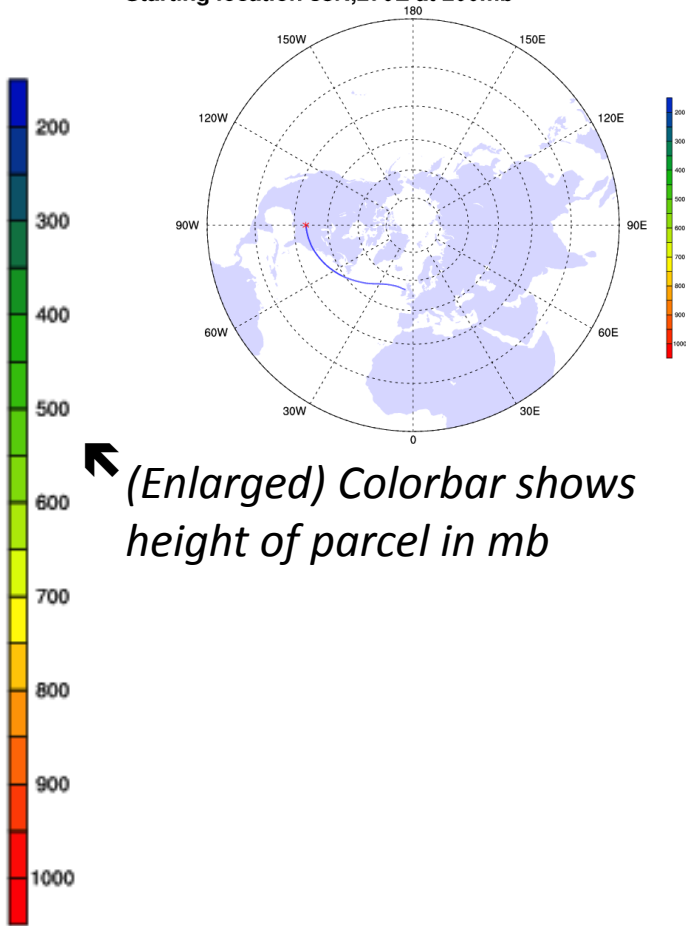
Levels used are from 1000mb to 100mb. Input winds are available 4times daily(0,6,12 and 18z). The trajectory model does not know about the surface and calculations can result in air moving down through the surface. Interpolated model output is used below the surface.

Referencing Trajectory Code: The parcel trajectory software (traj3d) was obtained from the University of Melbourne Parcel Trajectory Software web page (<http://www.cycstats.org/trajectories/trajhome.htm>). A discussion of the algorithm is given by Noone and Simmonds (1999) and Barras and Simmonds (2009). Noone, D., and I. Simmonds, 1999: A three-dimensional spherical trajectory algorithm. Research Activities in Atmospheric and Oceanic Modelling, Report No. 28, WMO/TD-No. 942. H. Ritchie, Ed., World Meteorological Organization, 3.26-3.27. Barras, V., and I. Simmonds, 2009: Observation and modeling of stable water isotopes as diagnostics of rainfall dynamics over southeastern Australia Journal of Geophysical Research, 114, D23308, doi:10.1029/2009JD012132, 2009.

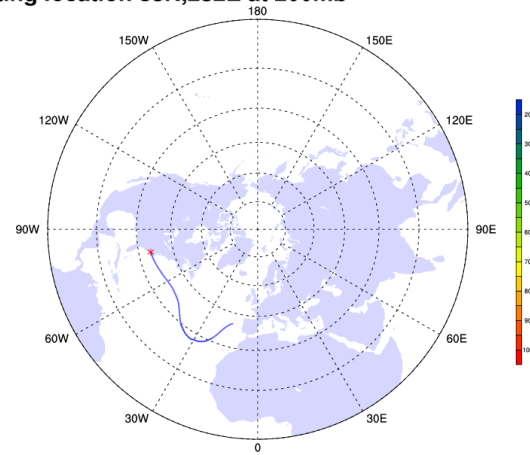
If you use plots or data from the page, we would also appreciate a reference: "Image provided by the NOAA-ESRL Physical Sciences Division, Boulder Colorado from their Web site at <http://www.esrl.noaa.gov/psd/>". Finally, you should reference the dataset that is used in the plot.

# Trajectories From 3 Different Reanalyses

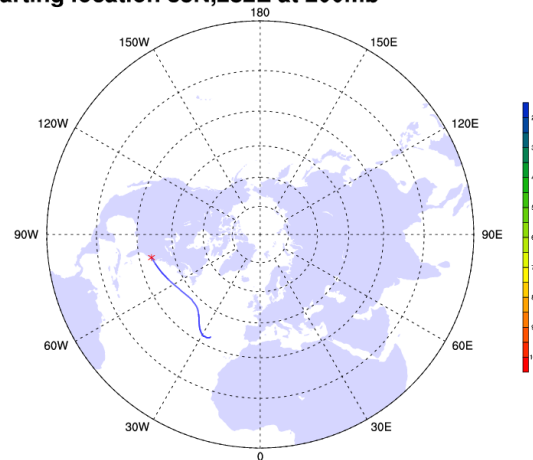
Forward Trajectory from the NCEP/NCAR Reanalysis I,  
Date: 2000/2/1/0 to 2000/2/3/0  
Starting location 35N,270E at 200mb



Forward Trajectory from the 20th Century Reanalysis V2,  
Date: 2000/2/1/0 to 2000/2/3/0  
Starting location 35N,282E at 200mb



Forward Trajectory from the NCEP/DOE Reanalysis,  
Date: 2000/2/1/0 to 2000/2/3/0  
Starting location 35N,282E at 200mb



# Reanalysis Trajectories

Forward Trajectory from the 20th Century Reanalysis V2

Date: 2000/2/1/0 to 2000/2/3/0

Starting location 35N,282E at 200mb





# Issues and Future Plans

- Issues:

1. Speed.
2. General plot improvements.
3. Testing/QC.

- Future Plans

1. Add more variables/datasets/timeseries/statistics.
2. Add “index timeseries” to plotting pages (e.g. PNA)
3. Add different time scales (daily...).
4. Spatial correlations.
5. Revisit OPeNDAP.