

3.5.6.4 Special Bureau for Hydrology

The Special Bureau for Hydrology provides internet access to data sets of water storage load variations for all land areas of the world. The web site contains results from two numerical models. The NCEP (National Center for Environmental Prediction) reanalysis model is a fixed data-assimilating global numerical model, designed mainly for atmospheric studies. It has been run for a period exceeding 50 years, starting in 1948. The hydrologic part of this model is primitive, and reflects a combination of an imposed (non data-assimilating) hydrologic cycle, and some interaction with the atmosphere and climate. The NCEP hydrologic time series and load variations are probably representative of real Earth variations, but probably not accurate in detail. Notably, they lack the level of interannual variability expected in the real hydrologic cycle. In addition, there are evident flaws over Antarctica and Greenland, and we interpret these in part to be a combination of sea ice and land ice. While sea ice is not significant geodetically, because it is part of the oceans, its appearance in the gridded files means that we must exclude Antarctica and Greenland from geodetic calculations. Nevertheless, the NCEP results are valuable for their global coverage and long duration. The web site includes daily NCEP water storage in Gaussian grid (T62) form for 1979–2001. In addition NCEP CDAS-1 monthly results are available for 1993–1998 for a 1 x 1 degree grid format, and there are daily excitations for polar motion and length of day for 1948–2001, as well.

The other model results are from ECMWF (European Center for Medium Range Weather Forecasting), a data-assimilating reanalysis model, similar to NCEP, also with a surface hydrologic cycle. We find that it appears more realistic than NCEP, showing greater interannual variability. In addition, its seasonal cycle resembles long-term average results based on local budget (Precipitation, Evaporation, Runoff) calculations. The web site includes 2.5 degree gridded values at daily intervals for the period 1979–1993.

At the moment there is no test on a global scale of the accuracy of either NCEP or ECMWF results. Estimates from both NCEP and ECMWF models are derived from atmospheric general circulation models, and lack primary data (such as river discharge and actual precipitation) to constrain their results. We are communicating with other data centres (notably NASA) and have acquired a new data-assimilating hydrologic model gridded time series. The assimilated data in the NASA model is largely from remote sensing, and not primary observations of precipitation or river discharge. We are currently processing and analyzing a 15 year series 1979–1993 from the NASA GSFC land surface model (LSM), sampled

every 3 hours on a 2 x 2.5 degree grid. In addition, we plan to process the newly released 50-year (1950–1999) monthly terrestrial water budget (soil moisture and snow) data provided by Willmott's group at the University of Delaware. The LSM and Willmott gridded data will be available on the SBH homepage in similar formats as those of the NCEP and ECMWF data.

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