Maps and Animations Offer New Opportunities for Studying the Global Water Cycle

The International Atomic Energy Agency/ World Meteorological Organization Global Network for Isotopes in Precipitation (IAEA/ WMO GNIP) data base includes more than 100,000 $\delta^{18}O, \delta^{2}H$, and ^{3}H measurements performed on monthly precipitation samples collected at 550 stations worldwide. Since 1961, the data base has served as a baseline reference for the distribution of water isotopes in modern precipitation. It is widely used in the fields of isotope hydrology, climatology, oceanography, and paleoclimatology.

Recently, a joint IAEA-University of Waterloo project was undertaken to produce colored contour maps of long-term weighted annual and monthly means of data from the GNIP data base and animations of the monthly maps, to aid in visualizing the spatial distribution of stable isotopes in precipitation and the dynamic annual cycle of global isotope climate. A Grid Analysis and Display System (GrADS)-compatible version of the stable isotope data set was developed to produce the maps and enhance integration with the expanding array of gridded climate-reanalysis data products.

Although collection and analysis of station-based data continues to form the foundation of the GNIP network, the new maps and station data set are a benchmark from the first 36 years of the network's operation. The new station data set includes amount-weighted monthly $\delta^{18}O, \delta^{2}H$ and deuterium excess $d(= \delta^{2}H - 8 \cdot \delta^{18}O)$ in a format allowing creation of an isotope overlay on gridded climate fields using GrADS software that is available free of charge on the Internet. The improved presentation and availability of this key data set is intended to foster increased use of water isotope tracers in climate studies, where they can assist in labeling air mass sources, analysis of rain-out mechanisms and continental moisture recycling, and other processes in the hydrological cycle.

Conversely, improved understanding of isotope processes can be gained by examining the spatial and temporal distribution of isotope fields with the climatological and physical data available from the various gridded reanalysis products, which are commonly more readily available and amenable for regional- or global-scale investigations than station-based observational data. Notable among these data sets are the U.S. National Center for Atmospheric Research/National Centers for Environmental Prediction (NCEP) (1948–1998), the European Centre for Medium-Range Weather Forecasts (ECMWF), and the U.S. NASA/Data Assimilation Office (DAO) re-analyses, which include model data for several atmospheric layers, and a wide variety of parameters relevant to water isotope cycling, such as precipitation amount, vapor pressure, temperature, wind, soil moisture, surface roughness, and potential evaporation.

Additional GNIP products are also being developed by the Isotope Hydrology Section of the International Atomic Energy Agency, and updates will be provided at: http://www.iaea.or.at/programmes/ripc/ih/. The maps, animations, and long-term mean data base can be accessed free of charge at: http://isohis.iaea.org. An electronic supplement to this news item containing more details about GNIP products and color animations is available at the *Eos* Electronic Supplement on the AGU Web site: http://www.agu.org/eos_elec/20082e.html.

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