Geophysical Research Abstracts
Vol. 17, EGU2015-9907, 2015
EGU General Assembly 2015

Monitoring and seasonal forecasting of meteorological droughts

Emanuel Dutra (1), Will Pozzi (2), Fredrik Wetterhall (1), Francesca Di Giuseppe (1), Linus Magnusson (1), Gustavo Naumann (3), Paulo Barbosa (3), Jurgen Vogt (3), and Florian Pappenberger (1)

(1) ECMWF, Reading, United Kingdom (emanuel.dutra@ecmwf.int), (2) Group on Earth Observations, Geneva, Switzerland, (3) Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy

Near-real time drought monitoring can provide decision makers valuable information for use in several areas, such as water resources management, or international aid. Unfortunately, a major constraint in current drought outlooks is the lack of reliable monitoring capability for observed precipitation globally in near-real time. Furthermore, drought monitoring systems requires a long record of past observations to provide mean climatological conditions. We address these constraints by developing a novel drought monitoring approach in which monthly mean precipitation is derived from short-range using ECMWF probabilistic forecasts and then merged with the long term precipitation climatology of the Global Precipitation Climatology Centre (GPCC) dataset. Merging the two makes available a real-time global precipitation product out of which the Standardized Precipitation Index (SPI) can be estimated and used for global or regional drought monitoring work. This approach provides stability in that bypasses problems of latency (lags) in having local rain-gauge measurements available in real time or lags in satellite precipitation products. Seasonal drought forecasts can also be prepared using the common methodology and based upon two data sources used to provide initial conditions (GPCC and the ECMWF ERA-Interim reanalysis (ERAI) combined with either the current ECMWF seasonal forecast or a climatology based upon ensemble forecasts. Verification of the forecasts as a function of lead time revealed a reduced impact on skill for: (i) long lead times using different initial conditions, and (ii) short lead times using different precipitation forecasts. The memory effect of initial conditions was found to be 1 month lead time for the SPI-3, 3 to 4 months for the SPI-6 and 5 months for the SPI-12. Results show that dynamical forecasts of precipitation provide added value, a skill similar to or better than climatological forecasts. In some cases, particularly for long SPI time scales, it is very difficult to improve on the use of climatological forecasts. However, results presented regionally and globally pinpoint several regions in the world where drought onset forecasting is feasible and skilful.