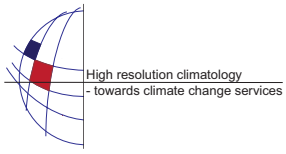
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-397, 2010
10th EMS / 8th ECAC


# Dynamic-enforced Statistical Downscaling of Global Seasonal Prediction of Precipitation for Regional Hydrological Applications

Y. Liu (1), D. Rostkier-Edelstein (2), A. Givati (3), W. Wu (1), G. Descombes (1), M. Ge (1), T. Warner (1), and S. Swerdlin (1)

(1) National Center for Atmospheric Research, Research Application Lab, Boulder, United States (yliu@ucar.edu), (2) Israel Institute for Biological Research, Ness-Ziona, Israel, (3) Israeli Hydrological Service, Israel

Major weather centers, such as National Center for Environment Prediction (NCEP) and ECMWF, produce inter-seasonal weather predictions 6 - 9 months ahead. However, the products from these centers have ∼200 km grid sizes, which are too coarse for regional applications. For hydrological applications, such as flood forecasting, watershed control, and water resource planning, detailed spatial and temporal distributions of precipitations are very critical. Existing precipitation downscaling approaches include statistical downscaling algorithms (SDA) and dynamical downscaling algorithms (DDA). SDAs are mostly based on regression using reanalysis and/or hindcasts and may apply for future forecast downscaling. SDAs impose three assumptions: a) the past regression relation is (static) valid for the future, b) there is no feedback of local physical forcing (terrain, coastlines and land-use/soil properties) in response to weather/climate changes and c) downscaling valid at the stations where long historical observations are available. DDAs, by which a regional climate model is embedded (nested) in a global seasonal model, overcome many of the shortcomings of a SDA. However, DDAs are computationally costly and data handling is complicated. In this paper, we present a dynamic-enforced statistical downscaling algorithm (DESDA) for effectively downscaling global-model seasonal forecasts. Four steps are involved with DESDA: 1) using the NCAR Four-Dimensional Data Assimilation (FDDA) modeling system, built upon the Weather Research and Forecasting (WRF) model, to produce 1 – 4 km gridded climatological precipitation-distribution analyses over the eastern Mediterranean region, driven by global analyses; 2) calibrating the gridded model precipitation with available precipitation measurements; 3) Applying an advanced KNN based regression downscaling approach based on the calibrated high-resolution gridded precipitation analysis, NCEP global analysis, and NCEP climate forecasting system (CFS) model 29 years of reforecasts for downscaling the CFS seasonal forecasts of precipitation anomalies; and 4) reconstructing precipitation amounts of the seasonal forecasts on the high-resolution WRF analysis grids. The algorithm and preliminary results will be presented.