Geophysical Research Abstracts,
Vol. 11, EGU2009-924, 2009
EGU General Assembly 2009

Downscaling of Middle East Rainfall using a Support Vector Machine and Hidden Markov Model

R Samuels (1,2), AW Robertson (3), A Khalil (2), U Lall (2,3)

(1) Tel Aviv University, Department of Geophysics and Planetary Sciences, Israel, (2) Columbia University, Department of Earth and Environmental Engineering, USA, (3) International Research Institute for Climate and Society (IRI), Columbia University, New York, USA

A support vector machine (SVM) is combined with a non-homogeneous hidden Markov model (NHMM) to downscale daily station rainfall sequences over Israel from global atmospheric reanalysis data. The selected reanalysis fields are those which can be extracted from general circulation models, making this SVM-NHMM potentially useful for downscaling climate predictions. For the October–March wet season, seasonal-averaged rainfall variability was captured with an anomaly correlation skill of 0.89 over the period 1980 to 2000, using a model trained on a previous period. The frequency of 7-day dry spells and the length of the longest dry spell per season were also reproduced well with correlations of 0.82 and 0.71, respectively. The SVM-NHMM approach is shown to outperform the PCA-NHMM approach used in previous studies, in which principal component analysis (PCA) is used for data reduction in place of the SVM. The NHMM hidden states generated correspond to synoptic systems prevalent in the region including the Cyprus low, a low pressure system centered over Cyprus and Turkey.