

# OPERATIONAL CLIMATE SERVICES: A DIALOGUE ON PRACTICAL ACTION

## A Drought Early warning and Outlook system over I. R. of Iran (DOES)

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### **Abstract:**

In the recent years, because of the increasing of the climatic extreme events, demands for reliable seasonal precipitation forecasts and drought early warning and predictions have been increased, especially in water resources and agricultural sectors. In this regards and for improving the accuracy of seasonal precipitation forecasts and drought early warnings, the outputs of MRI-CGCM3 seasonal forecast model including gridded precipitation and 20 parameter and climate indices has been used to station scale post processing of the model precipitation over 71 synoptic weather stations of Iran over the period of 2001-2007. The outputs of MRI-CGCM3 are available to registered National Meteorological and Hydrological Services (NMHSs) on the website of the Tokyo Climate Center of the Japan Meteorological Agency (JMA/TCC). Model variables and indices which were used in the post-processing were WIO rain, Z2030, Z5060, WIO SST, T850, T2m, SST, NINOWEST SST, WNP RAIN, NINO3 SST, Z3040, H500, SLP, SAMOI RAIN, MC RAIN, DL RAIN, THMD, THTR and total precipitation. The skill of multivariate post-processing was evaluated using Mean Square Skill Score, Mean Bias Error, relative error and categorical skill score over the training and evaluation periods. Categorical skill score is determined by computing the skill of post processed and raw model data in forecasting five precipitation category of above normal, above normal to normal, normal, normal to below normal and below normal. Post-processed precipitation outputs were entered to the SPI software to calculate SPI drought index over 71 weather stations of Iran. Post processed precipitations and SPI drought indices are compared with observed precipitations and drought indices for checking the capability of statistical post processing method used on the model outputs. Then the accuracy of the post processing method is computed over all stations for precipitation and drought indices.

Recent study has three main results including: firstly, post processing of the model outputs is a substantial need to improving the numerical models. The second point confirms that implementation of post processing can significantly increase the accuracy of station scale precipitation forecasts. Finally, post processing method used in this research can highly improve the accuracy of drought prediction and early warning. Results showed that capability of model to predict the drought indices has been increased from 66.7% up to 78.5% after post processing. This project is a basic research toward using numerical seasonal forecasting model in Iran.

Development of a method for drought early warning system is very useful for agriculture and water resource management. According to the goals of the GFCS, this project can be improved by utilizing other GPCPs from different dynamical seasonal forecast models.

**Keywords:** Seasonal forecasting, MRI-CGCM3, SPI index, Early warning, Post processing.