

Comparison of Different Reanalysis Products for Predicting Extreme Precipitation in the Southern Coast of the Caspian Sea

Authors : Parvin Ghafarian, Mohammadreza Mohammadpur Panchah, Mehri Fallahi

Abstract : Synoptic patterns from surface up to tropopause are very important for forecasting the weather and atmospheric conditions. There are many tools to prepare and analyze these maps. Reanalysis data and the outputs of numerical weather prediction models, satellite images, meteorological radar, and weather station data are used in world forecasting centers to predict the weather. The forecasting extreme precipitating on the southern coast of the Caspian Sea (CS) is the main issue due to complex topography. Also, there are different types of climate in these areas. In this research, we used two reanalysis data such as ECMWF Reanalysis 5th Generation Description (ERA5) and National Centers for Environmental Prediction /National Center for Atmospheric Research (NCEP/NCAR) for verification of the numerical model. ERA5 is the latest version of ECMWF. The temporal resolution of ERA5 is hourly, and the NCEP/NCAR is every six hours. Some atmospheric parameters such as mean sea level pressure, geopotential height, relative humidity, wind speed and direction, sea surface temperature, etc. were selected and analyzed. Some different type of precipitation (rain and snow) was selected. The results showed that the NCEP/NCAR has more ability to demonstrate the intensity of the atmospheric system. The ERA5 is suitable for extract the value of parameters for specific point. Also, ERA5 is appropriate to analyze the snowfall events over CS (snow cover and snow depth). Sea surface temperature has the main role to generate instability over CS, especially when the cold air pass from the CS. Sea surface temperature of NCEP/NCAR product has low resolution near coast. However, both data were able to detect meteorological synoptic patterns that led to heavy rainfall over CS. However, due to the time lag, they are not suitable for forecast centers. The application of these two data is for research and verification of meteorological models. Finally, ERA5 has a better resolution, respect to NCEP/NCAR reanalysis data, but NCEP/NCAR data is available from 1948 and appropriate for long term research.

Keywords : synoptic patterns, heavy precipitation, reanalysis data, snow

Conference Title : ICSMSM 2020 : International Conference on Synoptic Meteorology and Synoptic Method

Conference Location : Dublin, Ireland

Conference Dates : March 19-20, 2020