

## Synoptical Survey of Extreme precipitation in North West of Iran

### A case study of Extreme precipitation in Uromieh Station

Parvin Ghafarian<sup>1\*</sup>, Amir.H Meshkatee<sup>1</sup>,<sup>b</sup> Majid Azadi<sup>2</sup>,<sup>c</sup> Majid M.Farahani<sup>3</sup> and fateme rahimzade<sup>2</sup>

<sup>a</sup>Department of Meteorology, Science and Research branch, Islamic Azad University, Tehran, Iran.

<sup>2</sup>Atmospheric Sciences and Meteorological Research Centre (ASMERC),

<sup>3</sup>Geophysics Institute, University Of Tehran, Iran.

#### Introduction

Precipitation systems have a main role in water supply, so identifying their characteristics such as understanding their formation, water resources and locating their activities are really important. The interaction of Sea Surface Temperature and precipitation in different regions of the Earth has been emphasized by many researchers. Studies show that high-latitude jet stream is an important factor in developing mid-latitude systems. The purpose of this research is to understand the synoptically structure of the extreme precipitation pattern in the North West of Iran and can be used as a diagnostic factor in the weather forecasting.

#### Materials and Methods

Precipitation data source are obtained from I.R of Iran Meteorological Organization. For investigating synoptically pattern and anomaly for extreme precipitation in the North-West of Iran, mean sea level pressure, 500-hpa geopotential height, 300-hpa jet stream from data analysis of National Centers for Environmental Prediction / National Center for Atmospheric Research (NCEP / NCAR) are considered by using advanced very high resolution radiometer (AVHRR) data for analyzing sea surface temperature. Some parameters such as Mean sea level pressure and 500-hpa geo-potential height with their anomaly, 300-hpa level of jet stream and water temperature were investigated and analyzed.

---

\* Corresponding Author: 09122344108

Email: p\_ghafarian@hotmail.com

## Results and Discussion

The results indicate the interaction between tropical and polar jet streams caused cyclogenesis in the North East of the Mediterranean Sea and also they determined that the anomaly of mean sea level pressure, 500-hpa geo-potential height and sea surface temperature can be used as a tool for predicting extreme precipitation. In the case with heavy precipitation, Mean sea level pressure and 500-hpa geo-potential height, respectively 10 mb and 140 meters are less than the average. In the light precipitation case, these records are 5 and 60 respectively. Anomaly of sea surface temperature in extreme precipitation shows that the Mediterranean Sea, Black Sea, Oman Sea and Indian Ocean are much warmer than average, which causes more evaporation and proper injection of moisture to the region.

## Conclusion

To determine the structure of synoptically pattern of extreme precipitation in North West of Iran, some meteorological parameters such as mean sea level pressure, 500-hpa geo-potential height, 300-hpa jet stream and sea surface temperature, caused heavy rainfall in March in North West of Iran, are studied in this case study. Since the fluctuations are more revealed in maximum and minimum precipitation conditions, the extreme conditions are investigated. 14<sup>th</sup> March 2009 and 4<sup>th</sup> March 2005 are chosen as a maximum and minimum precipitation respectively. The data of NCEP / NCAR were the base for reviewing synoptically parameters and the AVHRR data were used to monitor the sea level temperature. The results show that the interaction between tropical and polar jet streams are generating cyclogenesis in the North East of the Mediterranean Sea and also they determined that the anomaly of mean sea level pressure, 500-hpa geo-potential height and sea surface temperature can be used as a tool for predicting extreme precipitation.

**Key words:** Synoptic pattern, Extreme precipitation, Sea surface temperature, Jet stream