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**Assessing the Applicability of CHELSA (Climatologies at
High Resolution for the Earth's Land Surface Areas) data for
Monthly Precipitation**

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Motivation

- ✓ Observational data are often **short-lived**, with **inappropriate** spatial distribution, **inadequate** data **and low density** relative to the area under study. So availability of **reliable data** with dense and **long-term** spatial coverage is important and it can be used in the study fields of hydrology and climatology.
- ✓ Reanalysis products (e.g. ERA-40, ERA-Interim and NCEP-NCAR) with high spatial accuracy has been developed as surrogate data In recent years.
- ✓ In some parts of the world specially south east of Asia observational network data is not sufficient, and for most studies particularly at main basins high punctual data is often necessary.

Today's, the development of climate forecasting and modeling projects provide almost adequate access to climate data such as :

Reanalysis data

- **NCEP/NCAR , NCEP/DOE**
- **ECMWF** (ERA-15, ERA-40, ERA-Interim)
- **CHELSA** (Climatologies at high resolution for the earth's land surface areas)
- **JRA-25**

Satellite-base

- **TRMM** (Tropical Rainfall Measuring Mission)
- **APHRODITE** (Asian Precipitation- Highly-Resolved Observational Data Integration Towards Evaluation)
- **PERSIANN** (Precipitation Estimation from Remote Sensing Information using Artificial Neural Network)
- **CMORPH** (CPC Morphing Technique)

The centers provide data that has a low error rate in comparison with observation data in different parts of the world.

In this study, CHELSA (climatologies at high resolution for the earth's land surface areas) precipitation database is validated as one of the ECMWF products .



Climatologies at high resolution for the earth's land surface areas

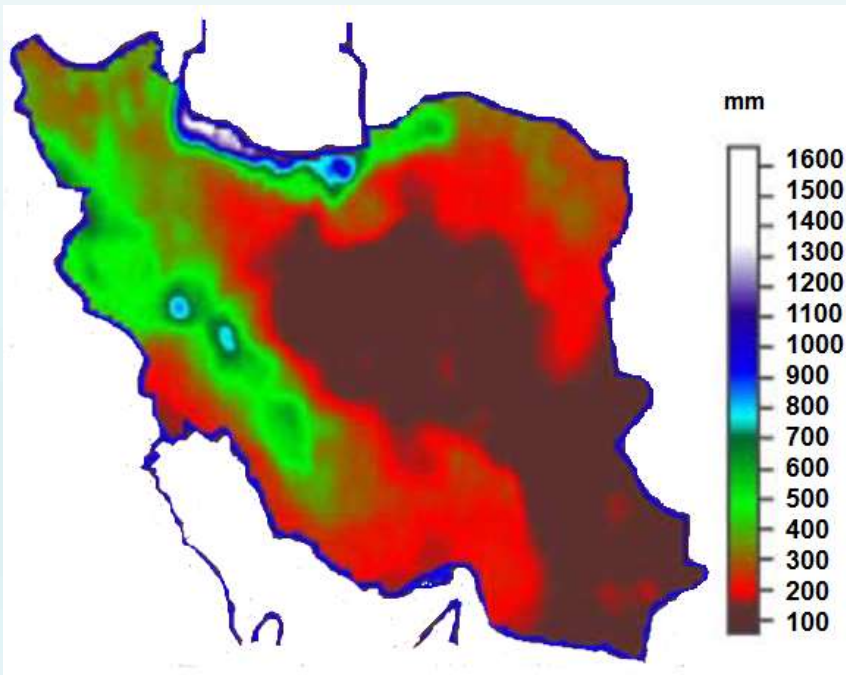
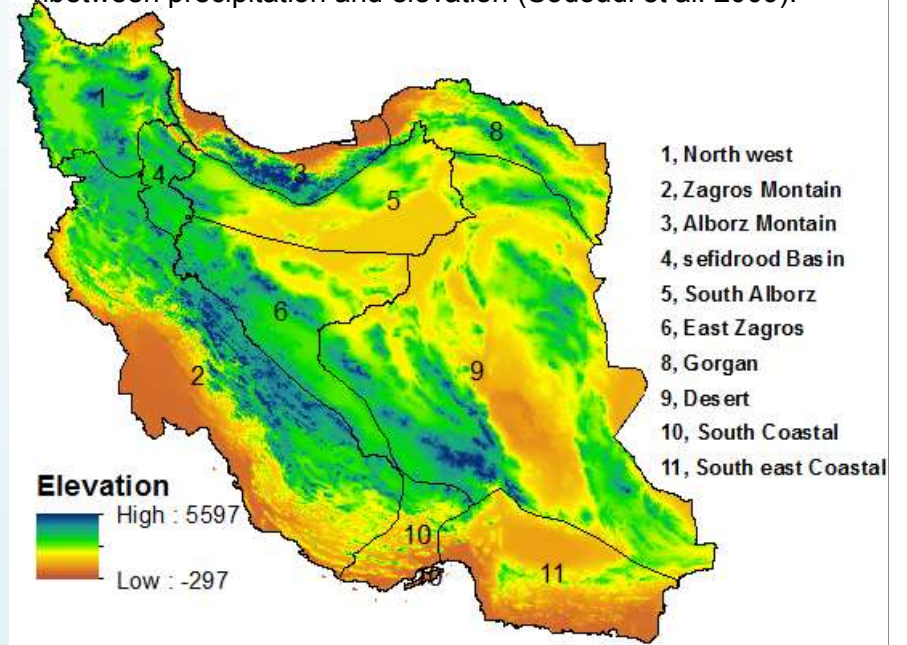
CHELSA Specifications:

- High resolution (30 arcsec, ~1 km)
- Precipitation, Temperature & Bioclim-Variables
- Monthly coverage 1979 -2013
- Incorporation of topoclimate(e.g. orographic rainfall, condensation levels & wind fields)
- Downscaled ERA-interim model
- Avoidance of spatial regression approaches and related problems

(Weigand et al., 2016)



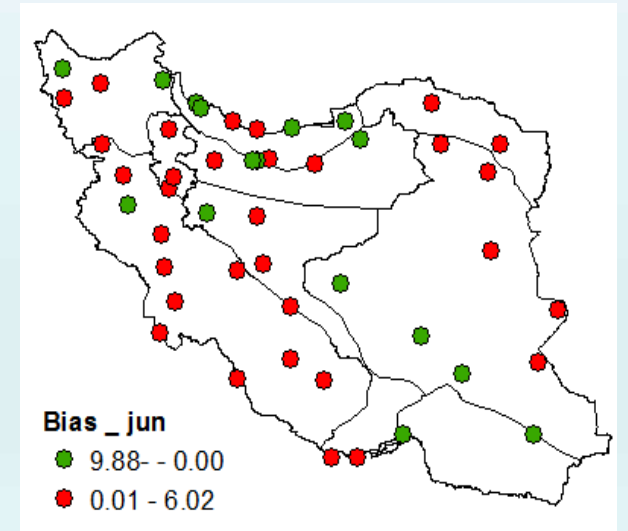
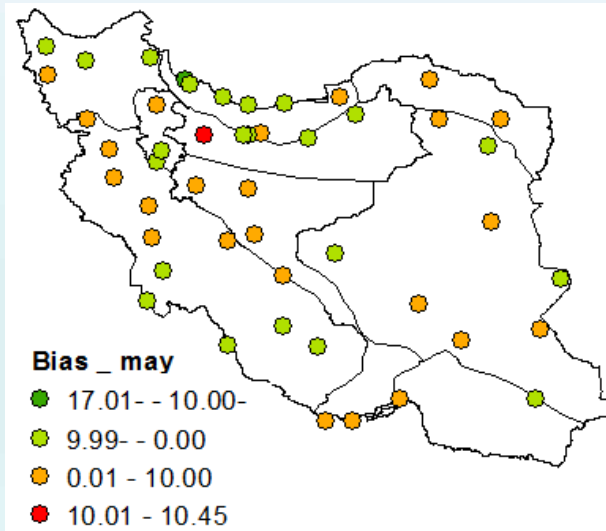
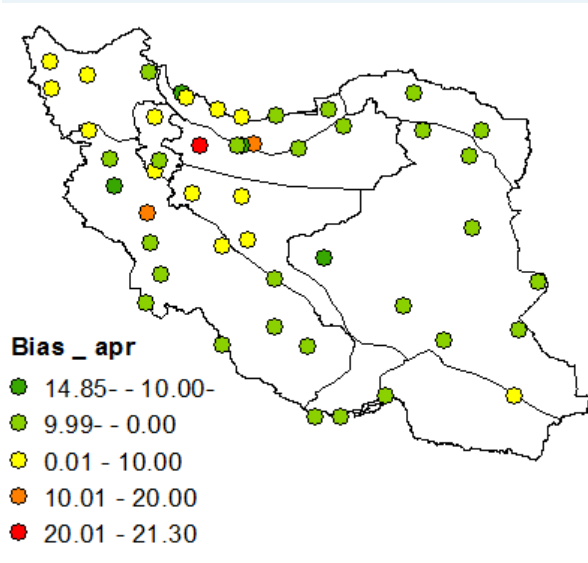
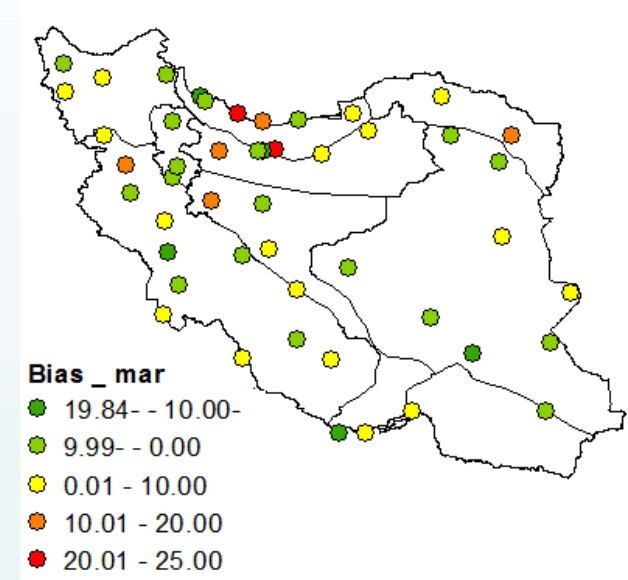
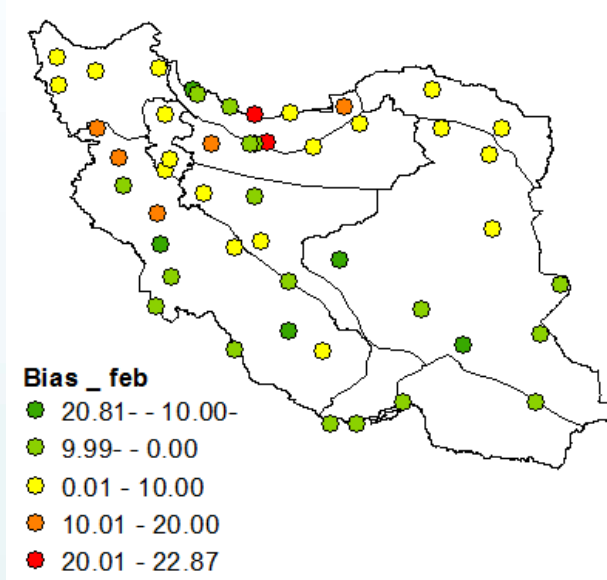
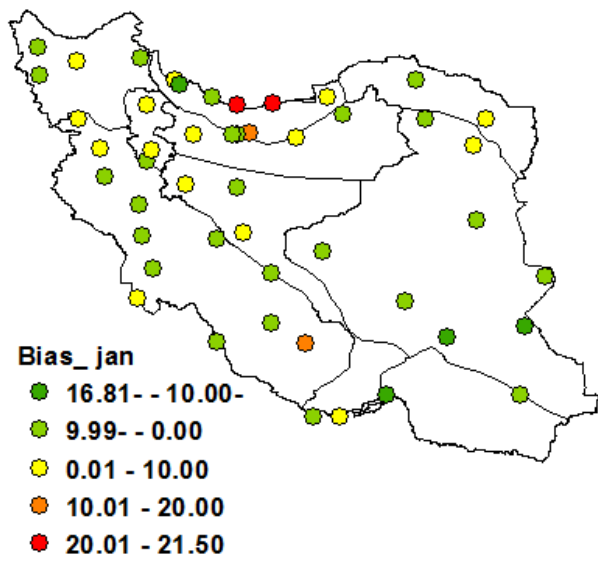
This classification has been carried out due to the correlation between precipitation and elevation (Sodoudi et al. 2009).



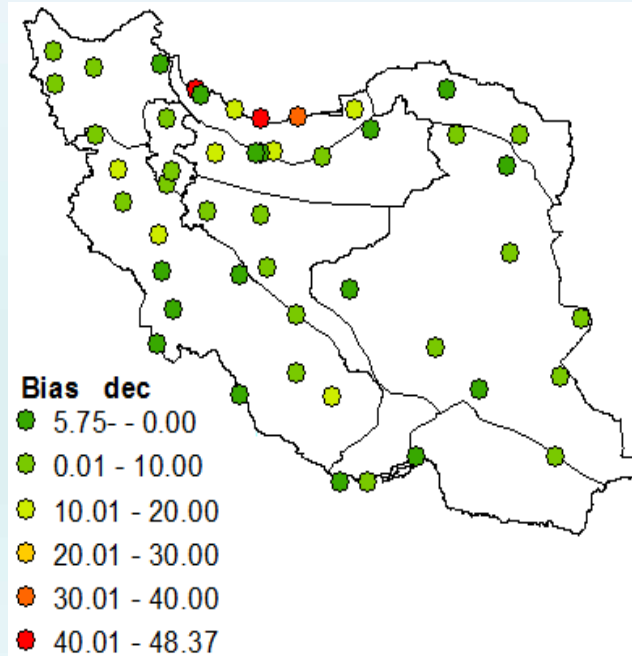
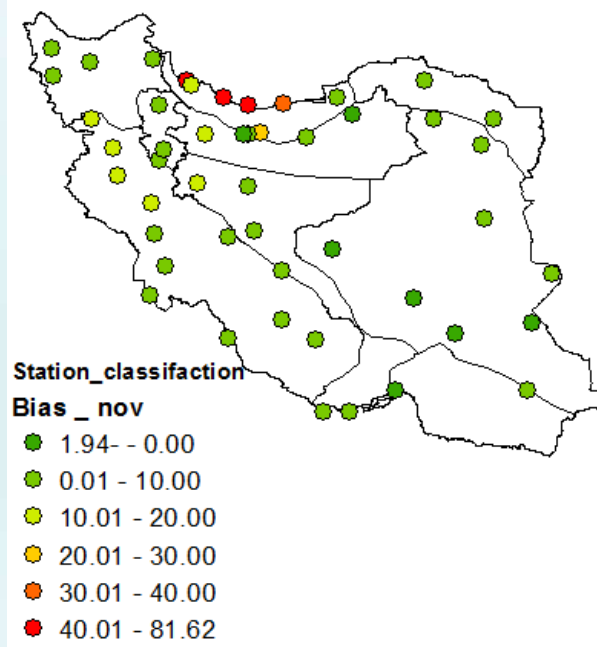
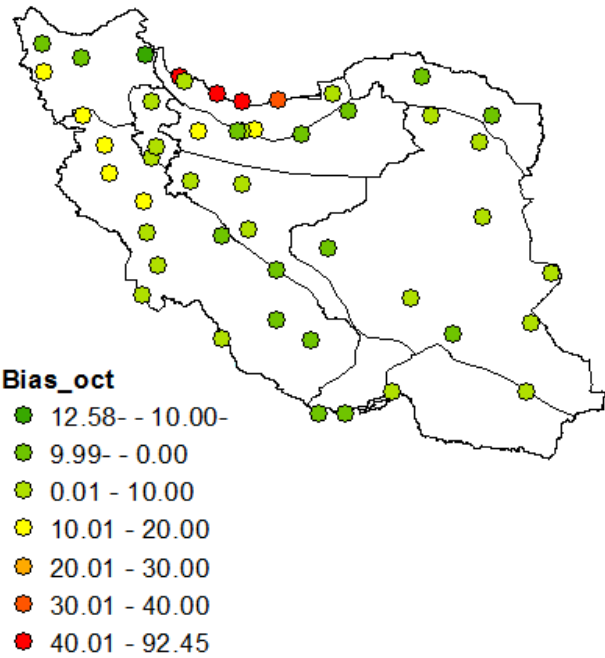
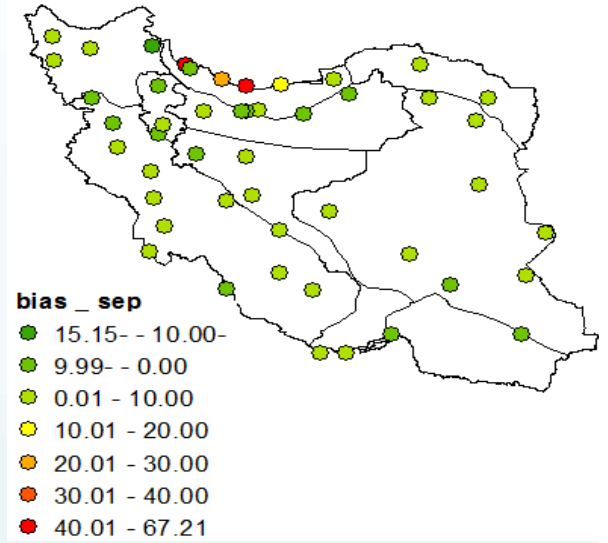
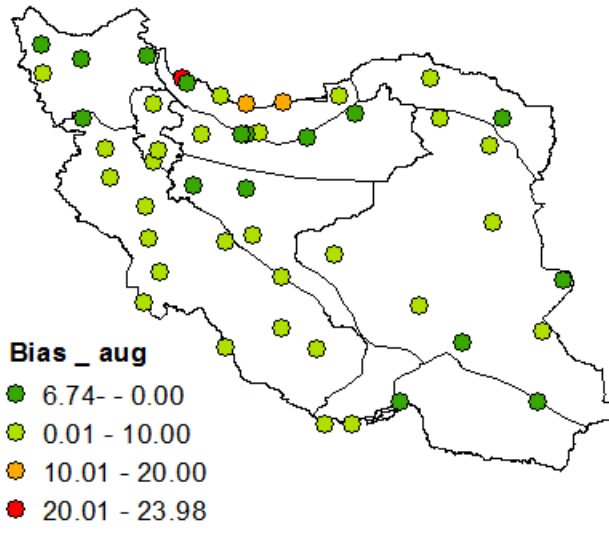
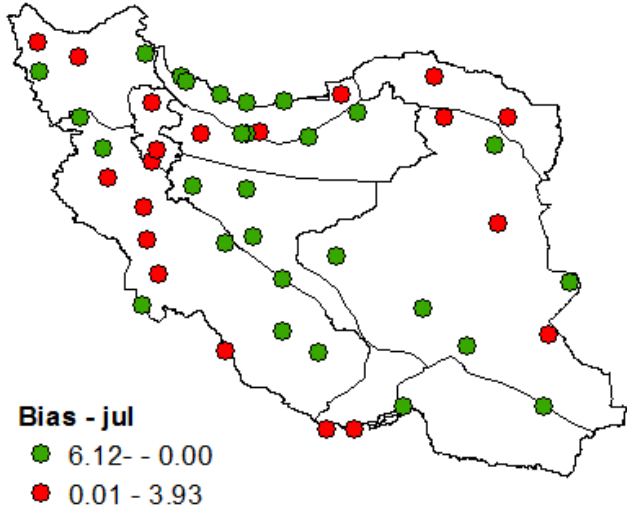
Mean annual precipitation in Iran (Sodoudi et al., 2009)

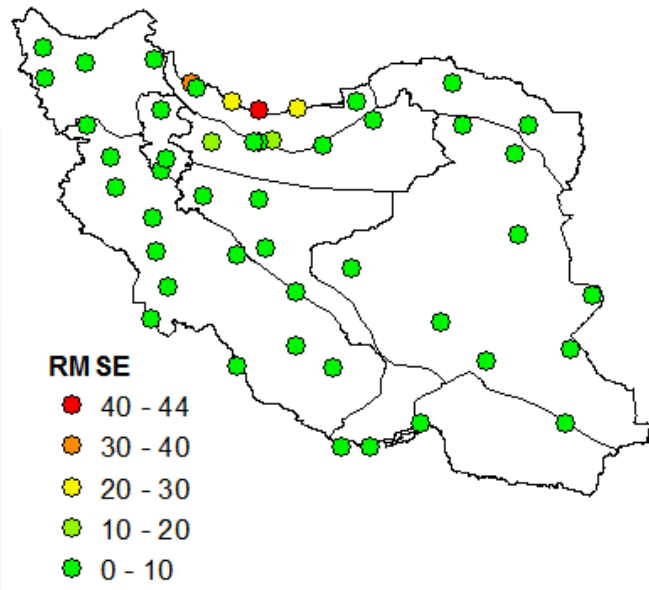
Sub region classification of Iran

- Due to the complexity of topographic regions, high altitudes and vast deserts worldwide, climatic observational data (precipitation) from these areas is very rare or not available.



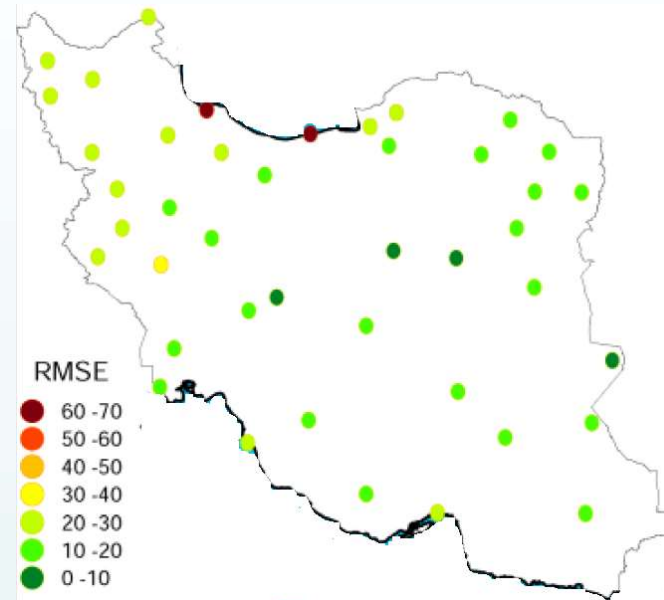
mm/Month





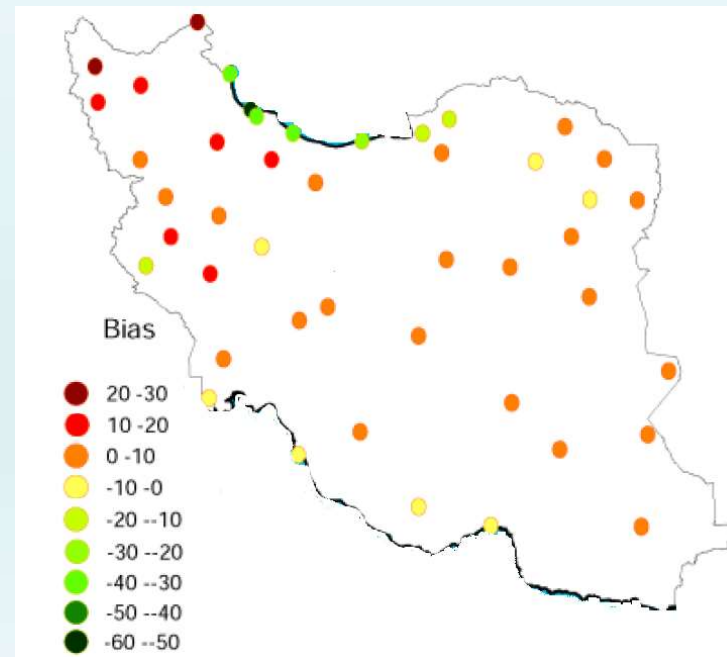
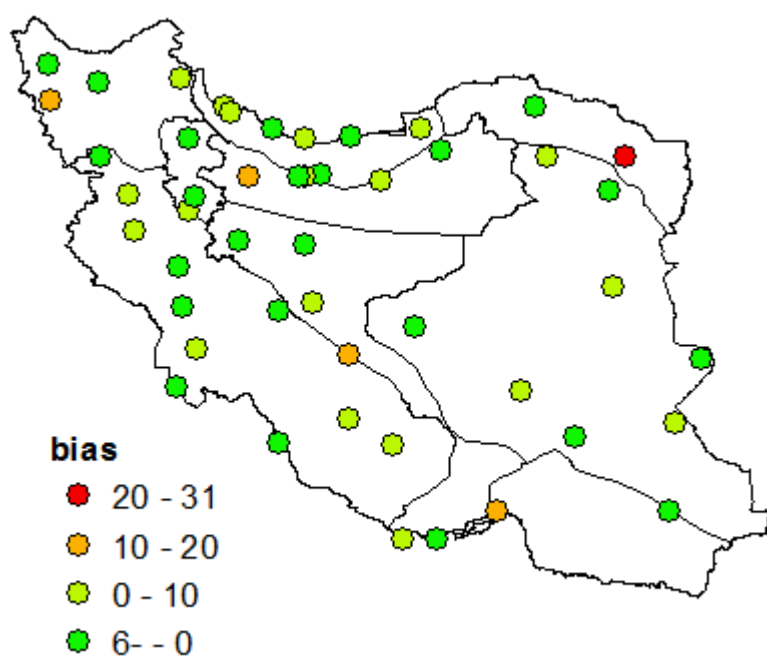
CHELSA

Resolution (30 arcsec, ~1 km)



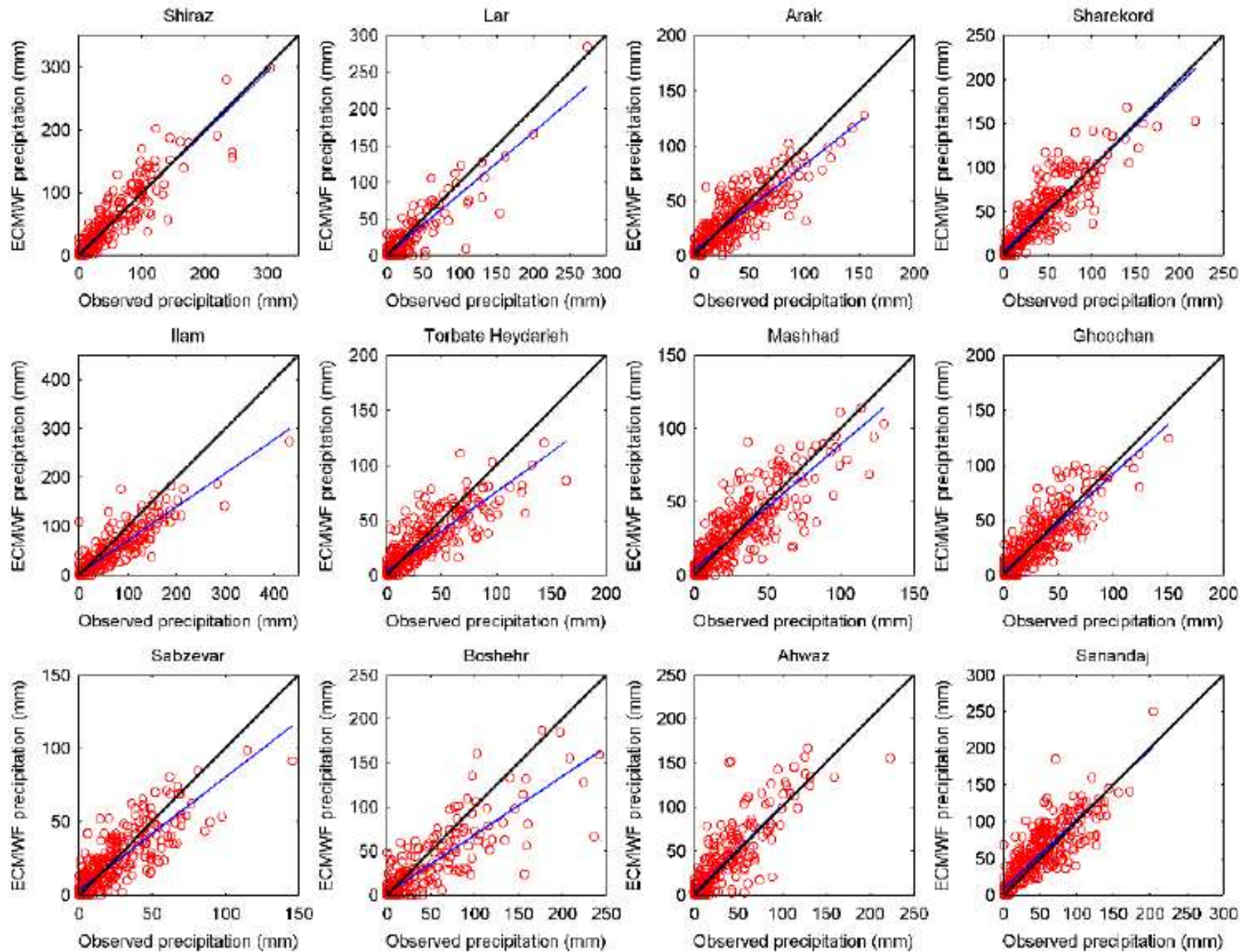
ERA-Interim

Resolution (0.125 °, ~900 km)



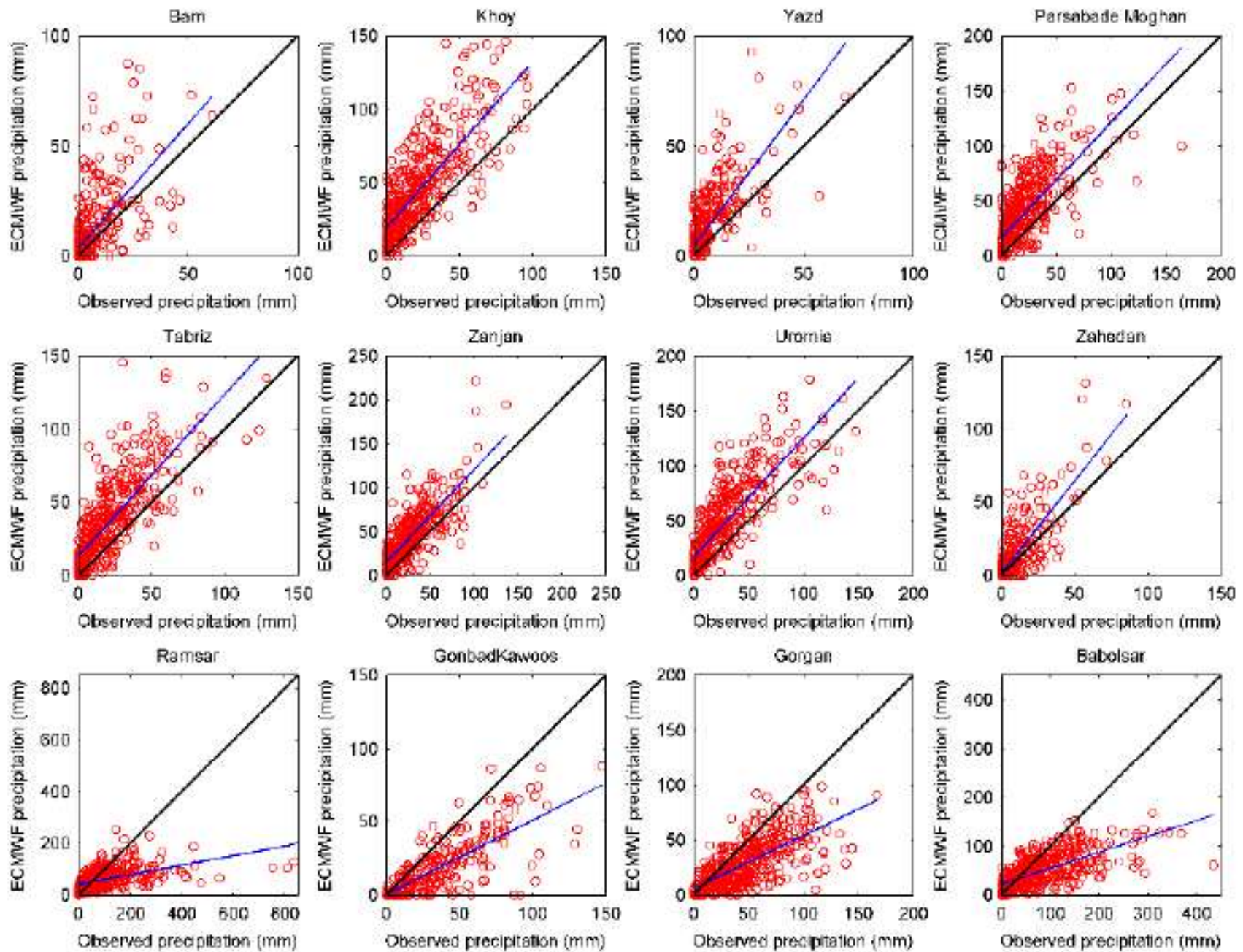
(Raziei, T and Sotoudeh, F . 2017)

EF High



(Raziei, T and Sotoudeh, F . 2017)

EF low



(Raziei, T and Sotoudeh, F . 2017)

Summary

- **Precipitation forecast is one of the most important products that provided data of this region by numerical weather prediction models.**
- **Validation of high-resolution climate data shows by improving of Monthly and annual resolution, bias decreases and this data can apply in environmental and ecological studies.**
- **CHELSA precipitation database can be use as surrogate data in considerate case.**

Thank you for your time!

Questions?



Referencec

1. Raziei, T and Sotoudeh, F . 2017. Investigation of the accuracy of the European Center for Medium Range Weather Forecasts (ECMWF) in forecasting observed precipitation in different climates of Iran. *Journal of the Earth and Space Physics*, Vol. 43, No. 1, Spring 2017, P. 10 (in Persian).
2. Sodoudi, S., Noorian, A., Geb, M., and E. Reimer. 2009. Daily precipitation forecast of ECMWF verified over Iran. *Theoretical and Applied Climatology*. DOI: 10.1007/s00704-009-0118-9.
3. Weigand, A., Böhner, J., Conrad, O., Kessler, M., Kreft, H., Linder, H.P., Prado, J., Soria-Auza , R.W., Zimmermann, N.E., and Karger, D.N. 2016. *Testing a new climate model (CHELSA) in Brazil*.