Multi-source assessment of uncertainty over the tropical oceans

Rajani Kumar Pradhan and Yannis Markonis

Czech University of Life Science Prague

Czech Republic

Introduction

- ➢The tropical oceans receive a substantial volume of precipitation and evapotranspiration, have a greater impact on Earth's energy and water balance.
- ➢Yet, considerable studies have been focused on the Earth's terrestrial precipitation, whereas very little attention has been given to the oceanic region.
- ➢In this context, we comprehensively examine the uncertainties of different precipitation estimates over the tropical oceans.

Study region

- ➢This study is focused on the tropical oceans, covering an extent of 30°N - S in both the hemisphere (Fig.1).

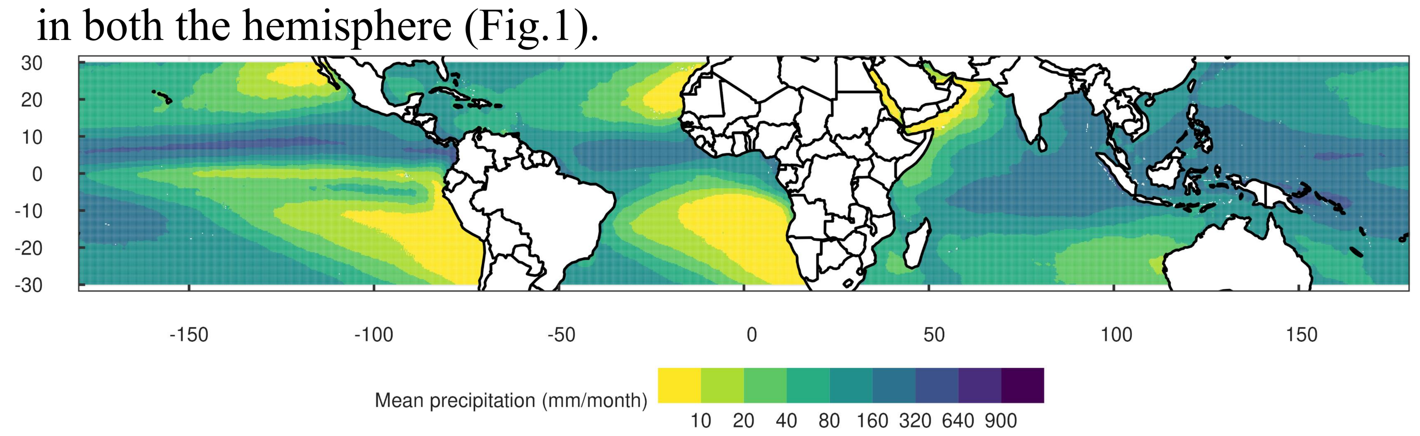

Fig.1 Spatial distribution of mean monthly precipitation (mm) of four-member ensemble for the period of 2001 – 2020.

Data and Methods

- ➢A time span of two decades, from 2001 to 2020, was considered for this study.
- ➢This study made use of four high-resolution precipitation data sets (Table.1).
- ➢Considering the different spatial-temporal resolutions, all the estimates were resampled to a common 0.25° × 0.25° and monthly time scale.
- ➢The measure of spread (i.e., range) among the datasets was considered as the measure of uncertainty.

Table.1 Summary of the datasets used in this study.

Name	Spatial scale	Record length	Reference
IMERG	0.1° × 0.1°	2000 – 2022	Huffman et al. (2019)
CMORPH	0.25° × 0.25°	1998 – 2021	Joyce et al. (2004)
ERA5	0.25° × 0.25°	1959 – 2022	Hersbach et al. (2020)
MSWEP	0.1° × 0.1°	1979 – 2022	Beck et al. (2019)

Key insights

The regions with high-precipitation exhibit the highest uncertainties among the precipitation estimates, while the regions with low- precipitation exhibit the lowest uncertainties. However, when considering the relative range, the pattern is opposite.

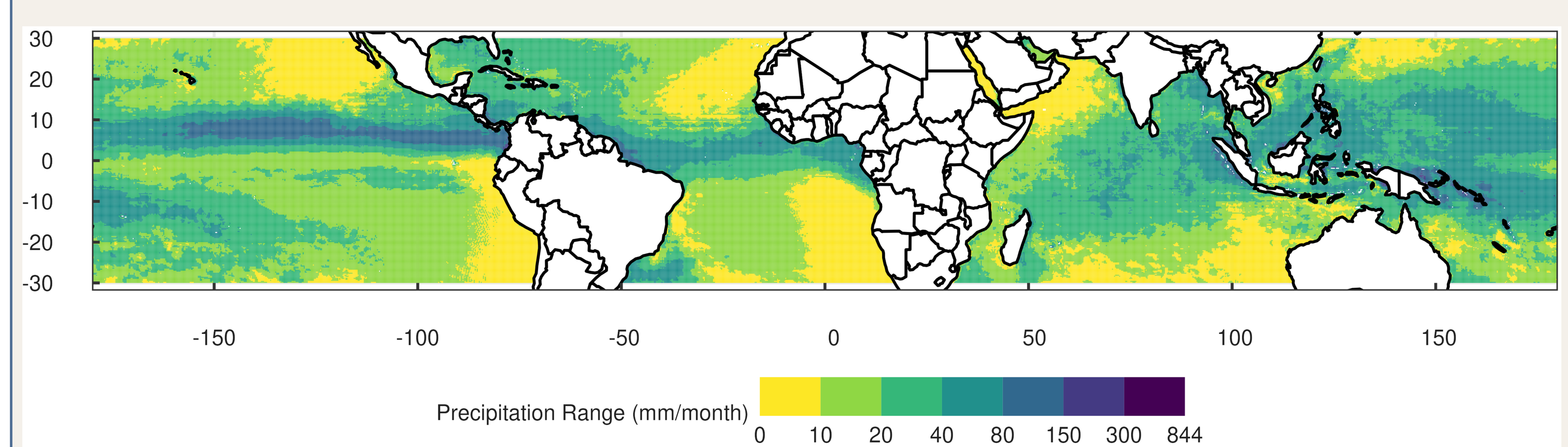

Fig.4 Spatial distribution of range (mm/month) among the data sets for the period of 2001 – 2020.

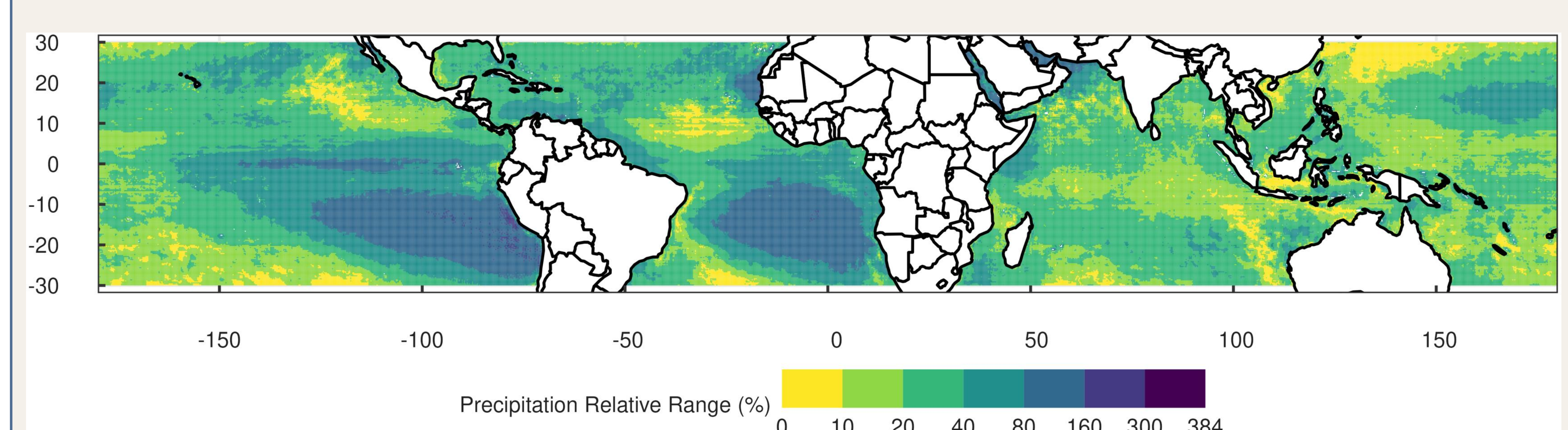

Fig.5 Spatial distribution of relative range (%) among the data sets for the period of 2001 – 2020.

Results

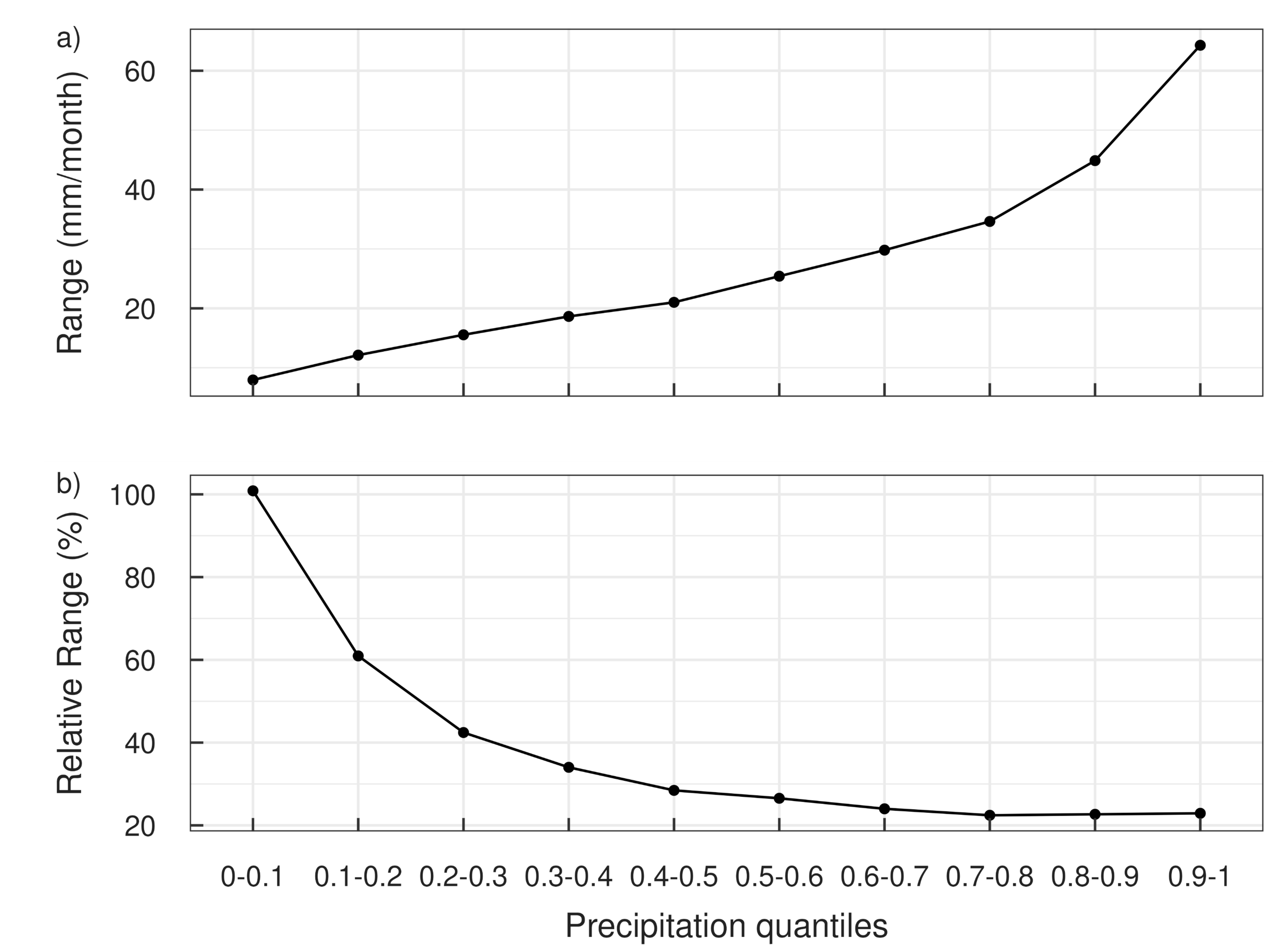

Fig.2 a) Range and , b) Relative range (i.e., range divided by the ensemble mean precipitation) for different precipitation quantiles.

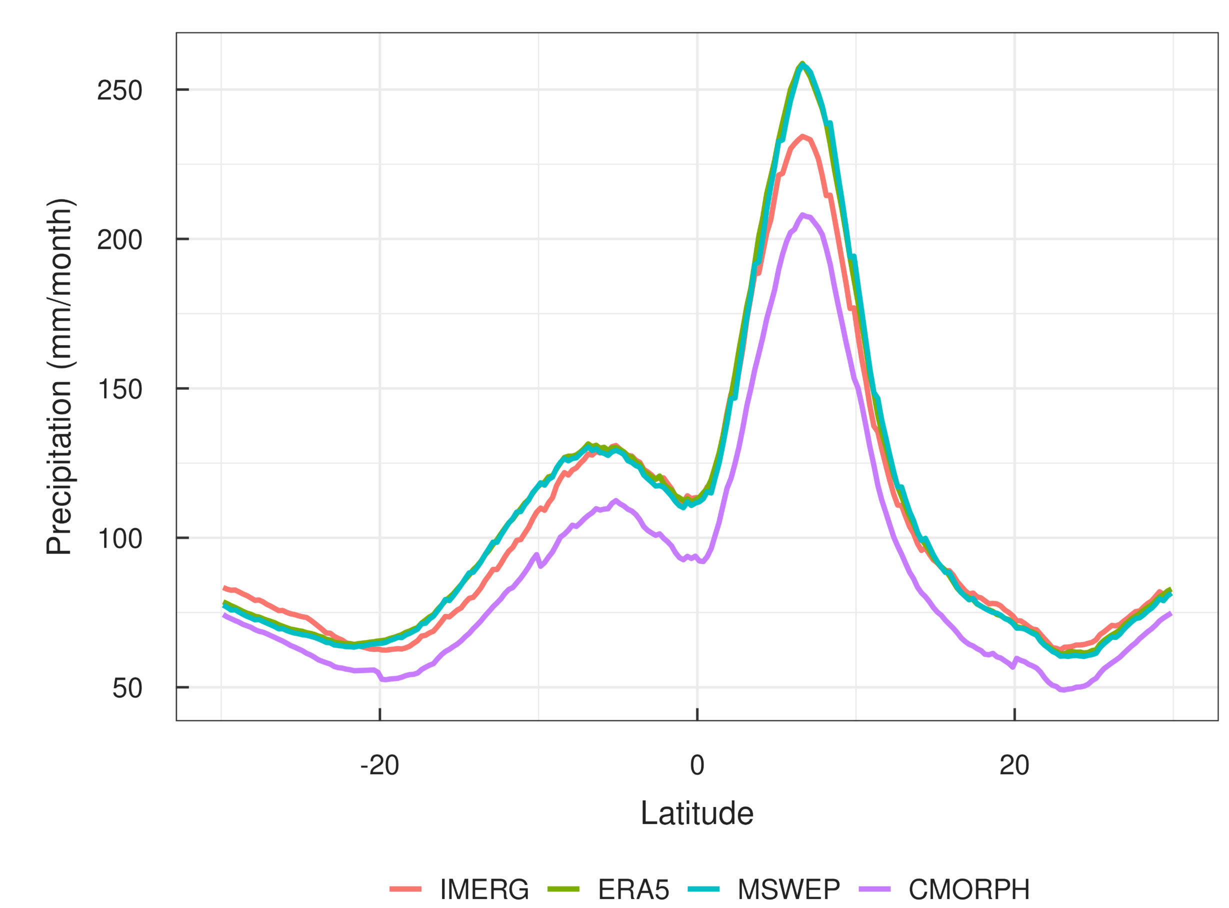

Fig.3 Zonal distributions of mean monthly precipitation over the tropical oceans for the period of 2001 – 2020.

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Work in progress!
We're glad to hear suggestions

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Contact
Rajani Kumar Pradhan
Czech University of Life Sciences Prague
pradhan@fzp.czu.cz