Heavy and extreme precipitation events in the Sichuan Basin during the 2020 summer season in a set of kilometre-scale simulations

Laura Detjen, Julia Curio, Tinghai Ou
Department of Earth Sciences, University of Gothenburg, Gothenburg, Sweden
(Contact: gusdetla@student.gu.se)

– Supplementary material –

EGU General Assembly 2024
WCRP CORDEX FLAGSHIP PILOT STUDIES
UNIVERSITY OF GOTHENBURG

Contents

- S1 – June event
- S2 – July event
- S3 – Differences in observational datasets
- Data availability & useful links
- References

Poster PDF

S1 – June event: Precipitation

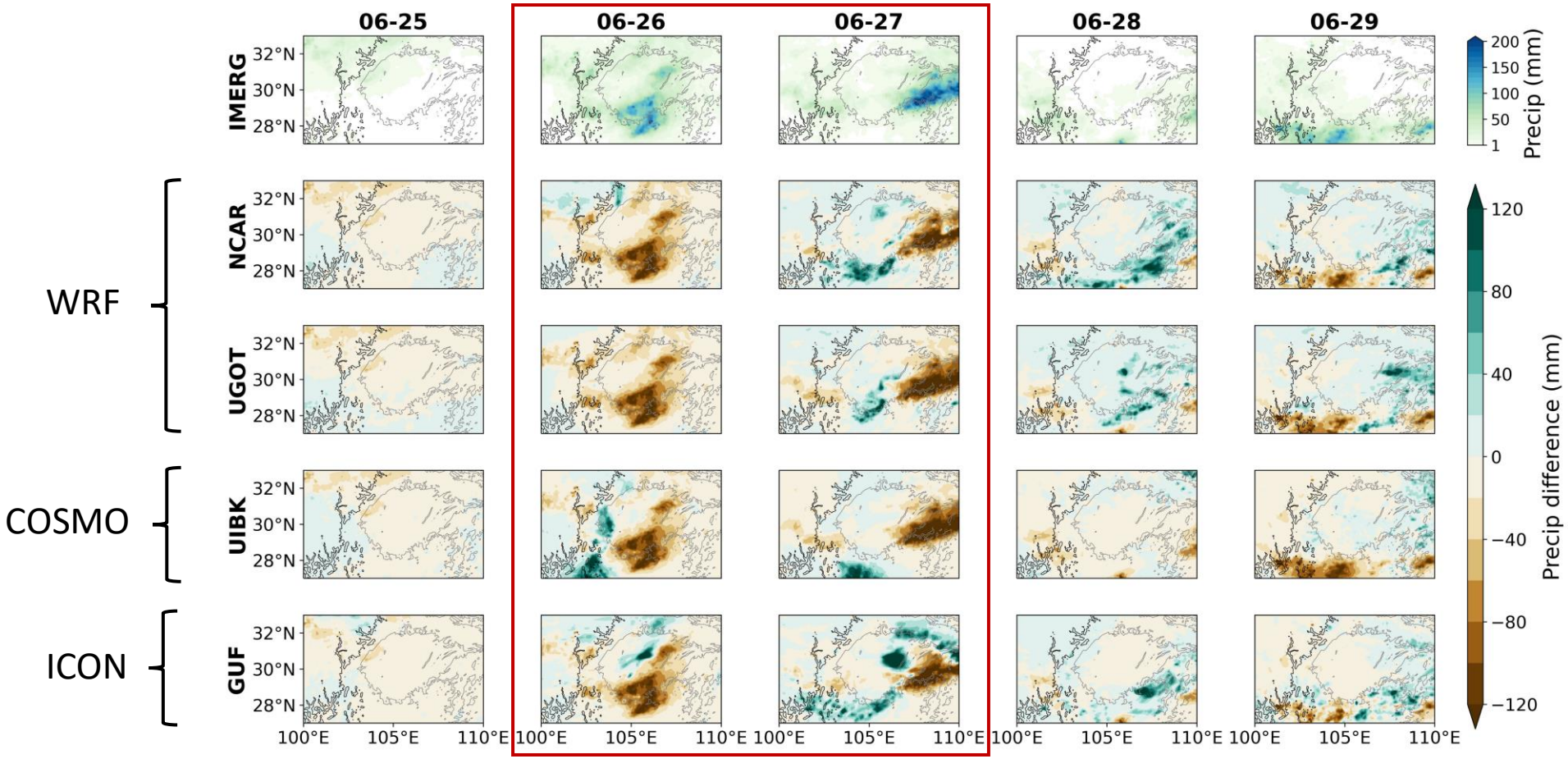

Figure S1.1. Daily accumulated precipitation of GPM IMERG *(first row)* and difference in daily accumulated precipitation of CPTP simulations and GPM IMERG *(rows 2-5)* for June 25-29, 2020. The black and grey lines mark the 3000 m and 700 m contour of the TP, respectively.

S1 – June event: Precipitation

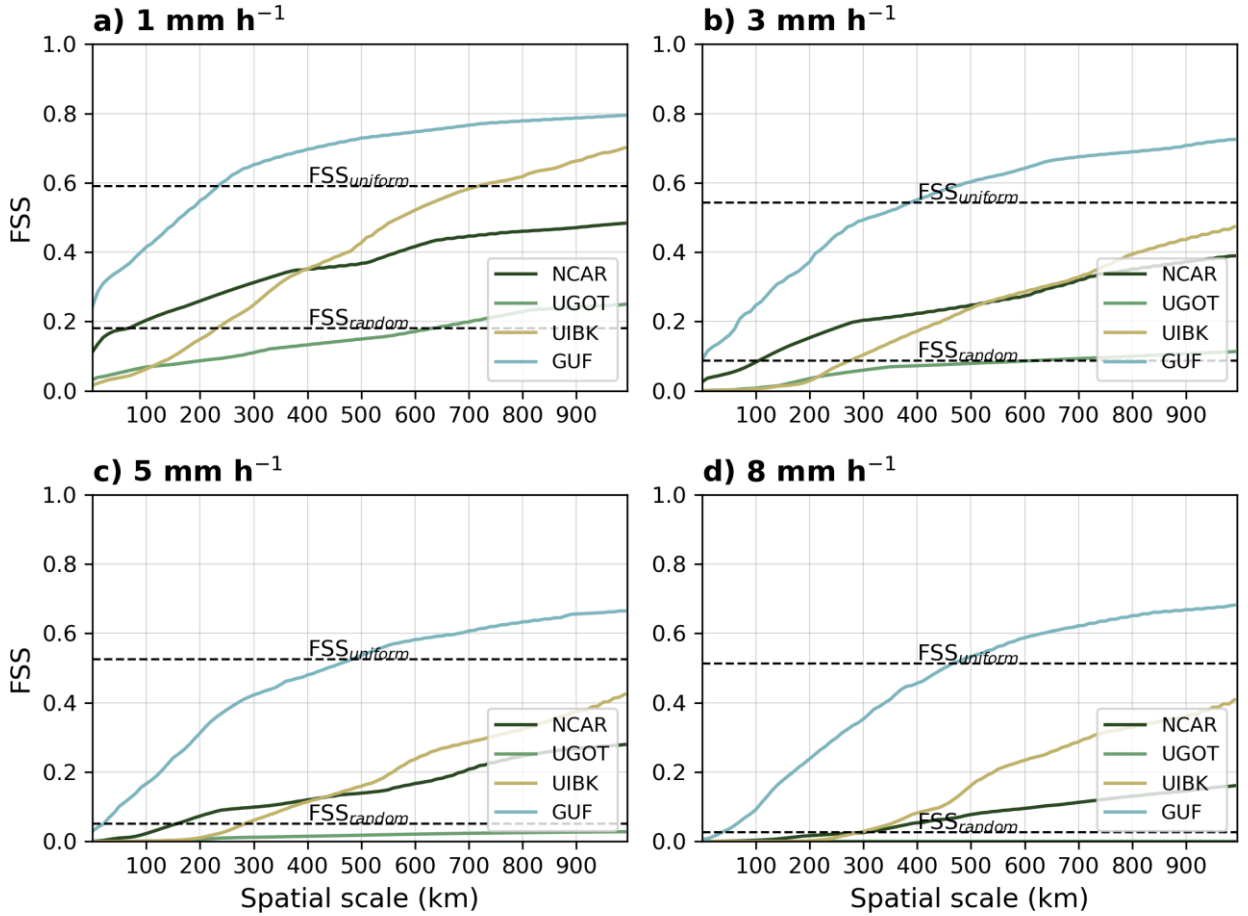

Figure S2.1. Median FSSs of hourly precipitation fields during June 26-27, 2020, with GPM IMERG as reference field compared to the CPTP simulations at different thresholds.

S1 – June event: Jet stream position

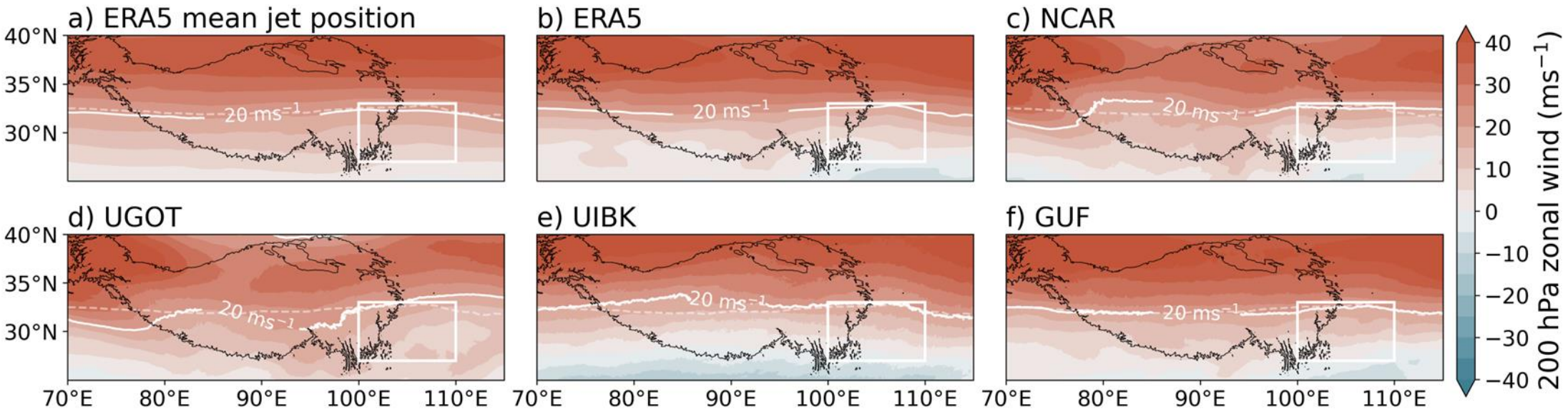

Figure S1.3. Mean zonal wind at 200 hPa during June 26-27, 2020, for (b) ERA5 and (c)-(f) the CPTP simulations. The white contour shows the 20 ms^{-1} zonal wind and the ERA5 mean jet stream position during June 2020 is shown in (a). The black line marks the 3000 m contour of the TP, and the white box indicates the study area. The dashed white line in (a), (c)-(f) indicates the jet position during the event as in (b) for comparison.

S1 – June event: Water vapour transport

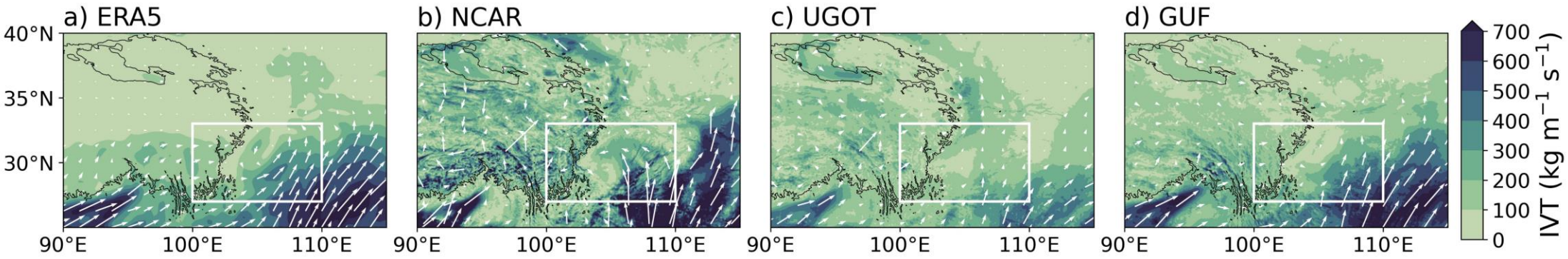

Figure S1.4. Total mean vertically integrated water vapour transport (IVT) during June 26-27, 2020 (kg $m^{-1}s^{-1}$) for (a) ERA5 and (b)-(d) CPTP simulations. The black line marks the 3000 m contour of the TP, and the white box indicates the study area. IVT = $\sqrt{qu^2 + qv^2}$, with u and v the zonal and meridional wind components, and q the relative humidity.

S2 – July event: Precipitation

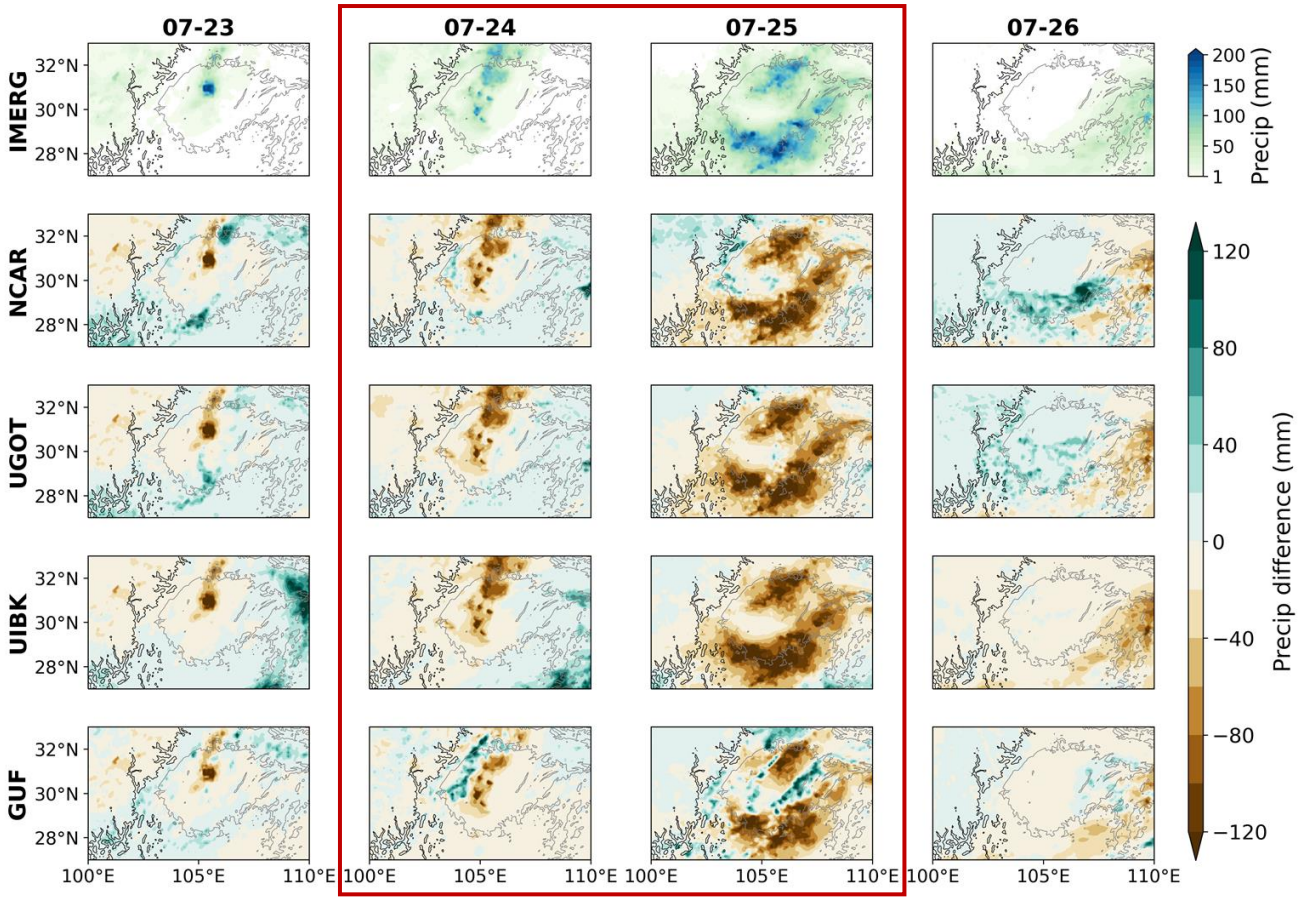

Figure S2.1. Daily accumulated precipitation of GPM IMERG *(first row)* and difference in daily accumulated precipitation of CPTP simulations and GPM IMERG *(rows 2-5)* for July 23-26, 2020. The black and grey lines mark the 3000 m and 700 m contour of the TP, respectively.

S2 – July event: Precipitation

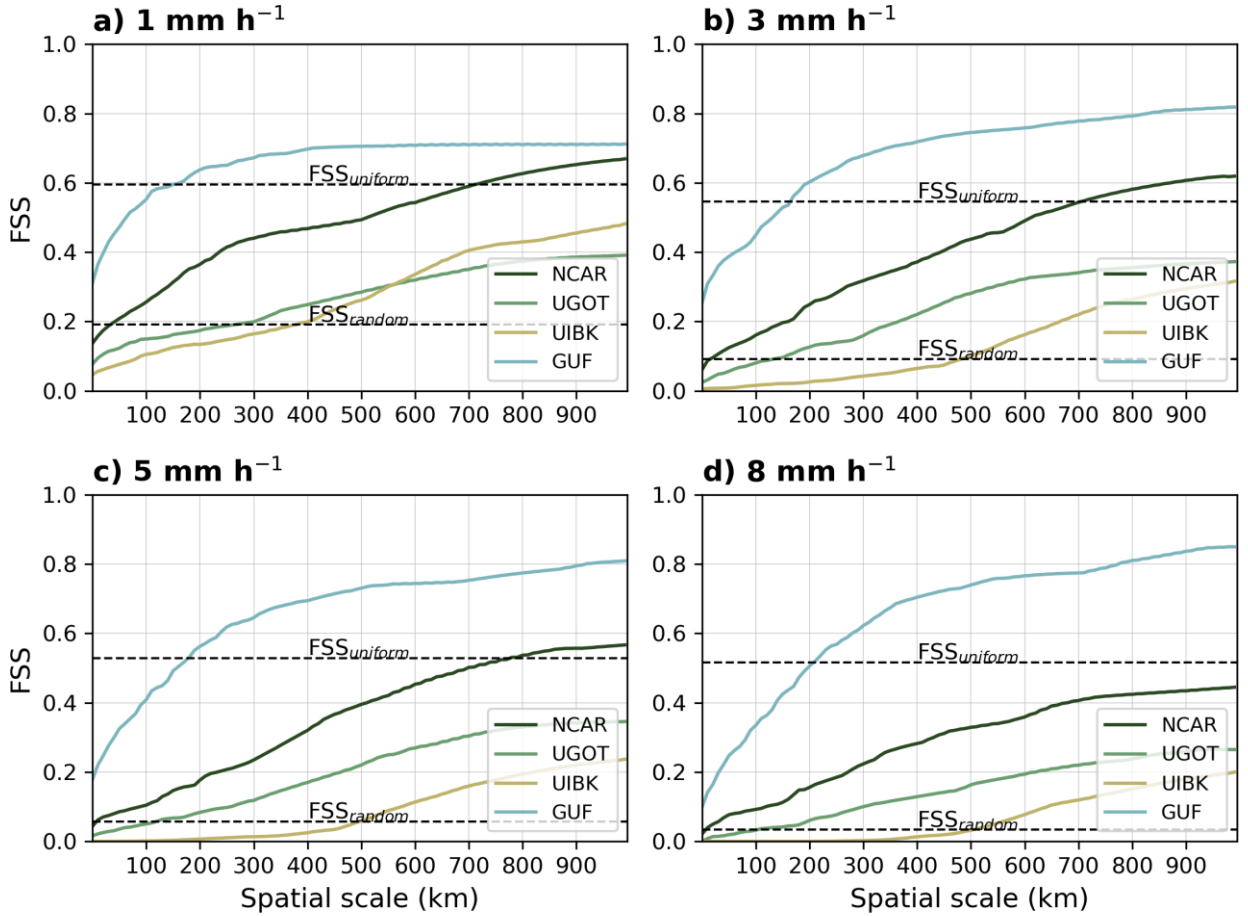

Figure S2.2. Median FSSs of hourly precipitation fields during July 24-25, 2020, with GPM IMERG as reference field compared to the CPTP simulations at different thresholds.

S2 – July event: Jet stream position

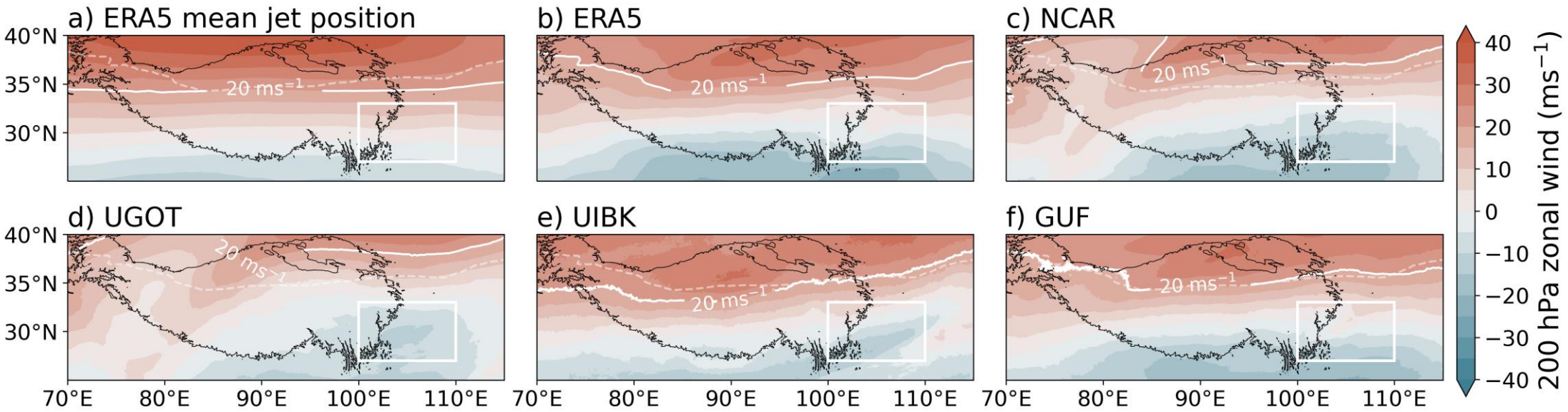

Figure S2.3. Mean zonal wind at 200 hPa during July 24-25, 2020, for (b) ERA5 and (c)-(f) the CPTP simulations. The white contour shows the 20 ms^{-1} zonal wind and the ERA5 mean jet stream position during July-August 2020 is shown in (a). The black line marks the 3000 m contour of the TP, and the white box indicates the study area. The dashed white line in (a), (c)-(f) indicates the jet position during the event as in (b) for comparison.

S2 – July event: Water vapour transport

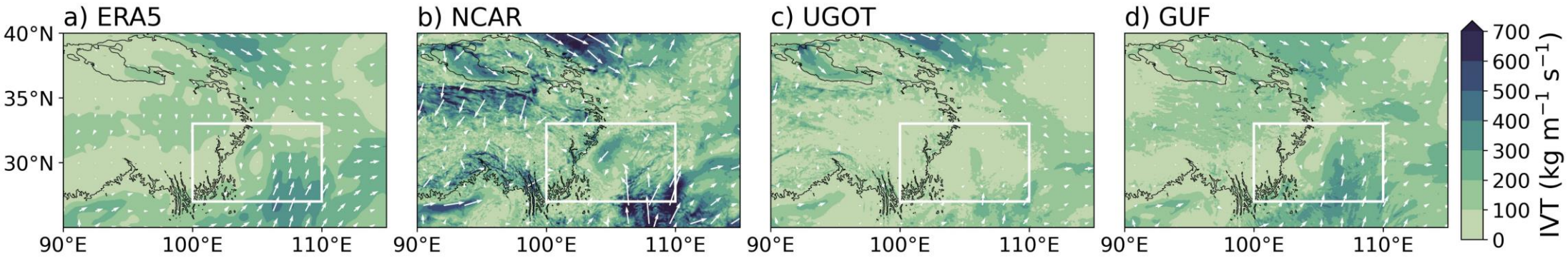

Figure S2.4. Total mean vertically integrated water vapour transport (IVT) during July 24-25, 2020 (kg $m^{-1}s^{-1}$) for (a) ERA5 and (b)-(d) CPTP simulations. The black line marks the 3000 m contour of the TP, and the white box indicates the study area. IVT = $\sqrt{qu^2 + qv^2}$, with u and v the zonal and meridional wind components, and q the relative humidity.

S3 – Differences in observational datasets

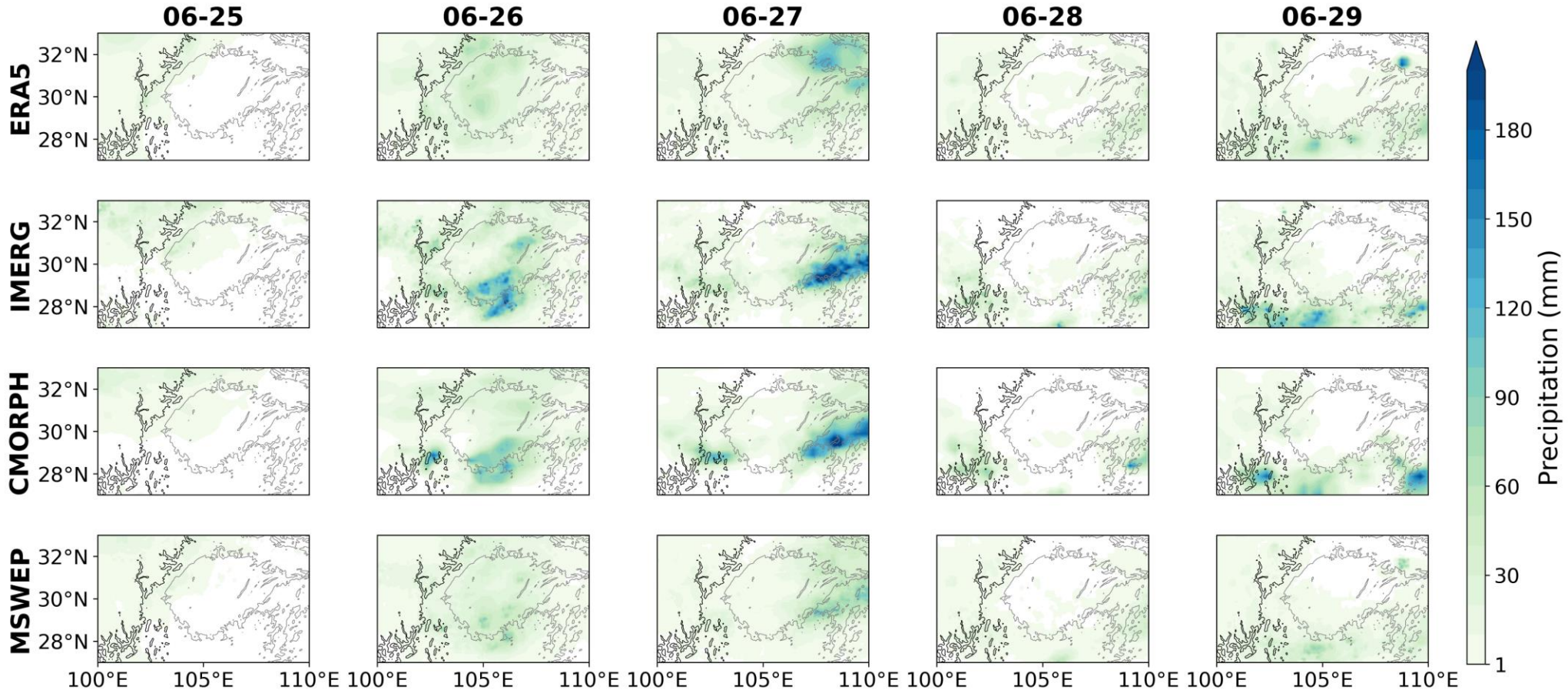

Figure S3.1. Daily accumulated precipitation for different observations (ERA5, GPM IMERG, CMORPH, MSWEP) during June 25-29, 2020. The black and grey lines mark the 3000 m and 700 m contour of the TP, respectively.

S3 – Differences in observational datasets

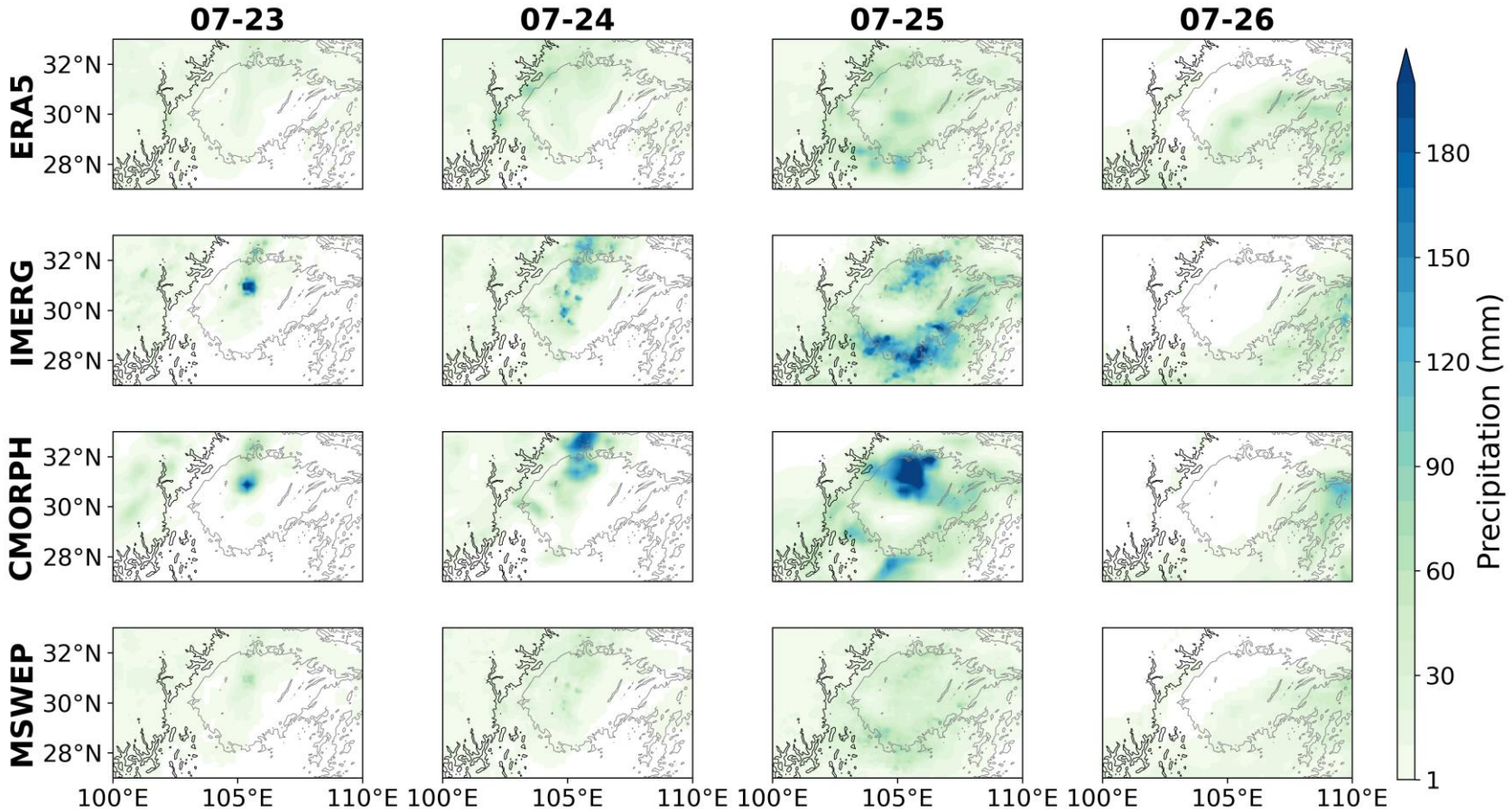

Figure S3.2. Daily accumulated precipitation for different observations (ERA5, GPM IMERG, CMORPH, MSWEP) during July 23-26, 2020. The black and grey lines mark the 3000 m and 700 m contour of the TP, respectively.

S3 – Differences in observational datasets

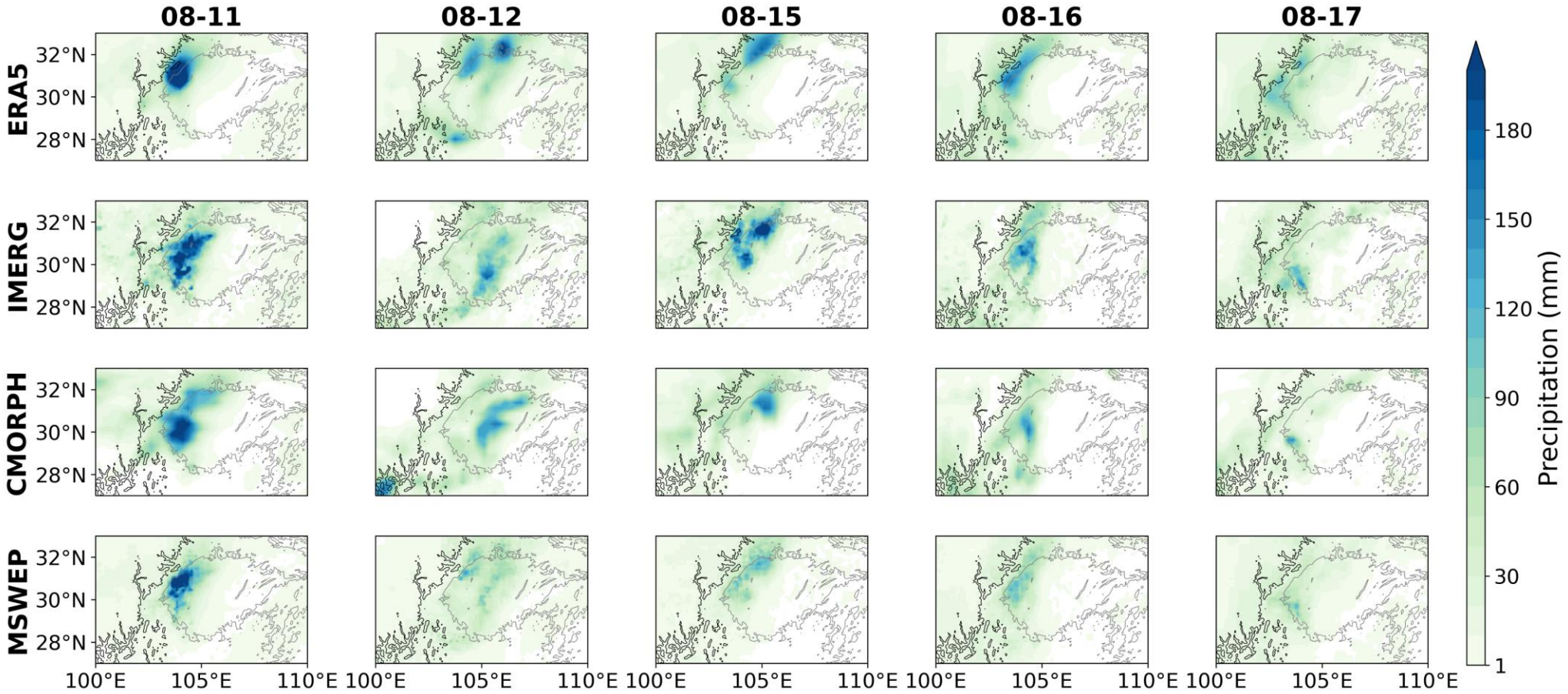

Figure S3.3. Daily accumulated precipitation for different observations (ERA5, GPM IMERG, CMORPH, MSWEP) during August 11-12 and 15-17, 2020. The black and grey lines mark the 3000 m and 700 m contour of the TP, respectively.

Data availability & useful links

- **ERA5** hourly data on both single and pressure levels, as well as ERA5 monthly averaged data on single levels is available at the Copernicus Climate Data Store: https://cds.climate.copernicus.eu/ (Hersbach et al., 2020)
- **GPM IMERG** L3 V06B (Huffman et al., 2019) is accessible at https://disc.gsfc.nasa.gov/datasets/GPM_3IMERGHH_06/summary
- **CMORPH** (Xie et al., 2019) can be downloaded at https://www.ncei.noaa.gov/data/cmorph-high-resolution-global-precipitation-estimates/access/
- **MSWEP** (Beck et al., 2019) is available on request at https://www.gloh2o.org/mswep/

- **CORDEX FPS CPTP** project website: http://rcg.gvc.gu.se/cordex_fps_cptp/

References

- Beck, H. E., Wood, E. F., Pan, M., Fisher, C. K., Miralles, D. G., Van Dijk, A. I. J. M., McVicar, T. R., & Adler, R. F. (2019). MSWEP V2 Global 3-Hourly 0.1° Precipitation: Methodology and Quantitative Assessment. Bulletin of the American Meteorological Society, 100(3), 473–500. https://doi.org/10.1175/BAMS-D-17-0138.1.
- Hersbach, H., Bell, B., Berrisford, P., Hirahara, S., Horányi, A., Muñoz-Sabater, J., Nicolas, J., Peubey, C., Radu, R., Schepers, D., Simmons, A., Soci, C., Abdalla, S., Abellan, X., Balsamo, G., Bechtold, P., Biavati, G., Bidlot, J., Bonavita, M., Chiara, G., Dahlgren, P., Dee, D., Diamantakis, M., Dragani, R., Flemming, J., Forbes, R., Fuentes, M., Geer, A., Haimberger, L., Healy, S., Hogan, R. J., Hólm, E., Janisková, M., Keeley, S., Laloyaux, P., Lopez, P., Lupu, C., Radnoti, G., Rosnay, P., Rozum, I., Vamborg, F., Villaume, S., & Thépaut, J. (2020). The ERA5 global reanalysis. Quarterly Journal of the Royal Meteorological Society, 146(730), 1999–2049. https://doi.org/10.1002/qj.3803.
- Huffman, G. J., Stocker, E. F., Bolvin, D. T., Nelkin, E. J., & Tan, J. (2019). GPM IMERG Final Precipitation L3 Half Hourly 0.1 degree x 0.1 degree V06, Greenbelt, MD, Goddard Earth Sciences Data and Information Services Center (GES DISC). Accessed: 2024-01-28. https://doi.org/10.5067/GPM/IMERG/3B-HH/06.
- Xie, P., Joyce, R., Wu, S., Yoo, S.-H., Yarosh, Y., Sun, F., & Lin, R. (2019). NOAA CDR Program (2019): NOAA Climate Data Record (CDR) of CPC Morphing Technique (CMORPH) High Resolution Global Precipitation Estimates, Version 1 [30 min]. NOAA National Centers for Environmental Information, Accessed: 2023-12-07. https://doi.org/10.25921/w9va-q159.

Feel free to contact the authors for questions or comments! ☺

Contact: gusdetla@student.gu.se

EGU General Assembly 2024

WCRP CORDEX FLAGSHIP PILOT STUDIES

UNIVERSITY OF GOTHENBURG