EUROPEAN GEOSCIENCES UNION, General Assembly 2011
Vienna, Austria, 3 – 8 April 2011

Comparison of satellite precipitation extremes from TRMM 3B42 Products with high-resolution gridded data set (E-OBS dataset) over Mediterranean region

P. T. Nastos[1], J. Kapsomenakis[2], K. C. Douvis[2]

[1]Laboratory of Climatology and Atmospheric Environment, Faculty of Geology and Geoenviroment, National and Kapodistrian University of Athens.
[2]Research Center of Atmospheric Physics and Climatology, Academy of Athens

Aim of the study

The objective of this study is to compare and analyze satellite precipitation extremes of Tropical Rain Measurement Mission level 3 output (TRMM 3B42) over Mediterranean region with the respective high resolution gridded precipitation datasets (0.25 0.25) based on the E-OBS project, for the period 1 January 1998 – 31 December 2010.

The Tropical Rainfall Measuring Mission (TRMM) is a joint U.S.-Japan satellite mission to monitor tropical and subtropical precipitation and to estimate its associated latent heating. The 3B42 datasets consist of 45% precipitation from passive microwave radiometers (i.e., TRMM-TMI, AQUA-AMSR, and DMSP-SSMIs), 40% from operational microwave sounding frequencies (i.e., NOAA-AMSUs), and 15% infrared measurements from geostationary satellites (i.e., GOES, METEOSAT/MSG).

The E-OBS data set (a European daily high-resolution gridded dataset of surface temperature and precipitation) was developed as part of the European Union Framework 6 ENSEMBLES project, with the aim being to use it for validation of RCMs and for climate change studies. The collection of data was primarily carried out by the Royal Netherlands Meteorological Institute (KNMI), which also hosts the European Climate Assessment and Data set (ECA&D). The ECA&D set of observing stations served as the starting point for the ENSEMBLES data set, and the ECA&D database infrastructure was also used for ENSEMBLES. The interpolation methods used were chosen after careful evaluation of a number of alternatives.

The indices used in the analysis can be divided in three categories: percentile, absolute and duration indices. The percentile indices concern: very wet days (the number of days with daily precipitation amount above the 95th percentile from the examined period) and extremely wet days (the number of days with daily precipitation amount above the 99th percentile from the examined period). The absolute threshold indices concern: number of heavy precipitation days (number of days with daily precipitation amount above 10mm), number of very heavy precipitation days (number of days with daily precipitation amount above 20mm) and simple daily intensity index (daily precipitation amount on wet days in a period per number of wet days in the period). The duration indices concern consecutive dry days (the largest number of consecutive days with daily precipitation amount below 1 mm) and consecutive wet days (the largest number of consecutive days with daily precipitation amount above 1 mm).

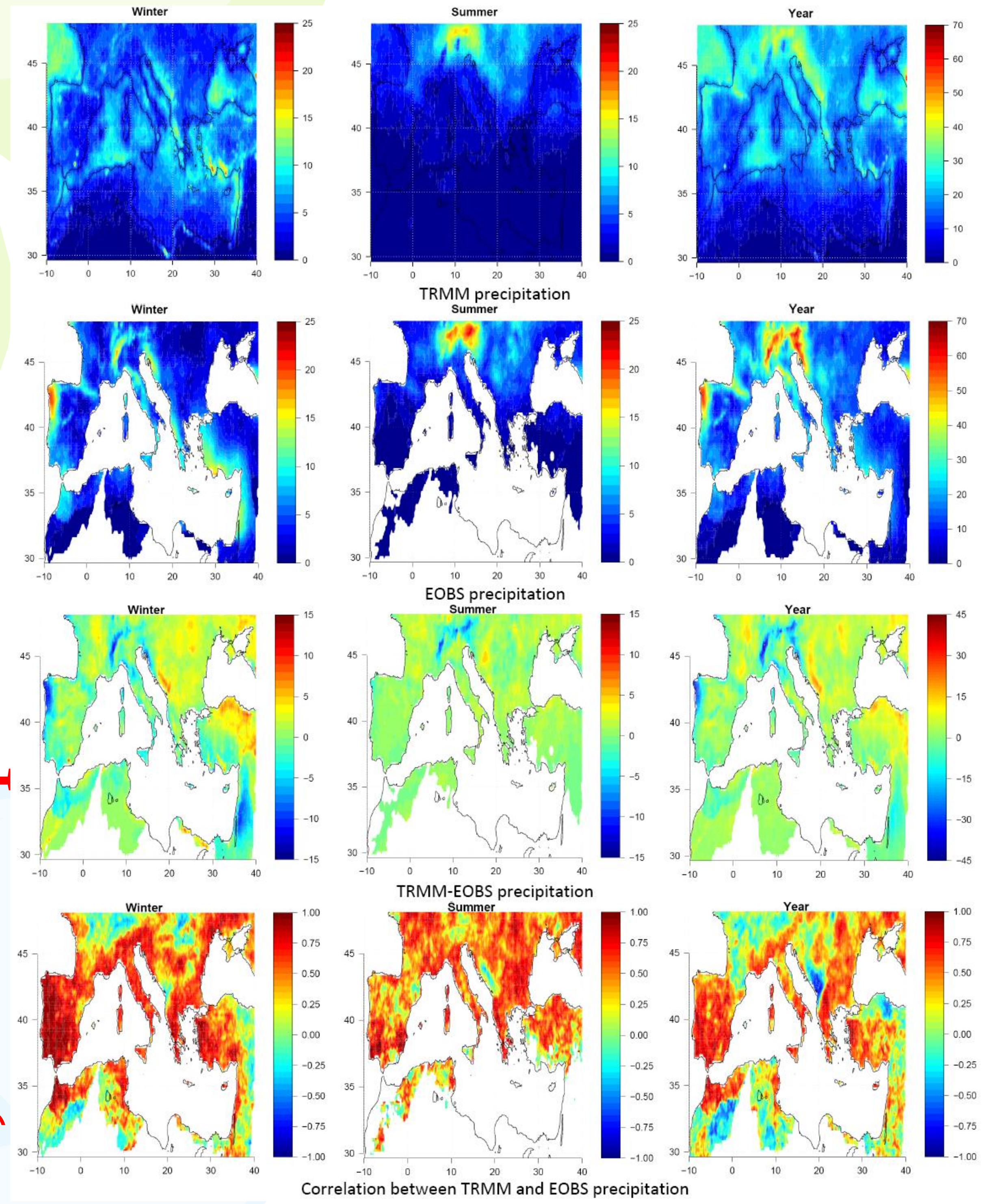

Figure 3. Number of heavy precipitation days for winter, summer and year, concerning TRMM and EOBS precipitation datasets.

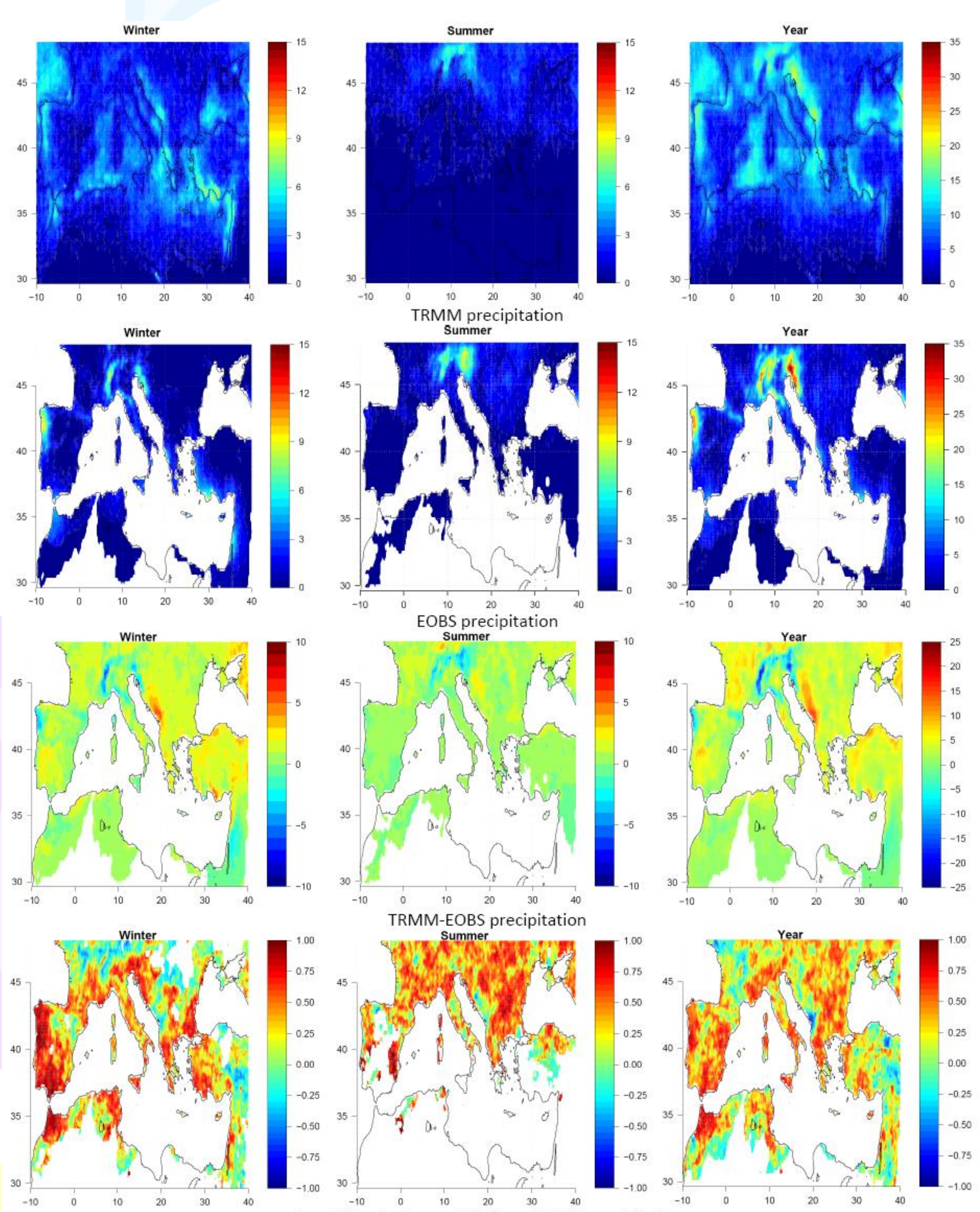

Figure 4. Number of very heavy precipitation days for winter, summer and year, concerning TRMM and EOBS precipitation datasets.

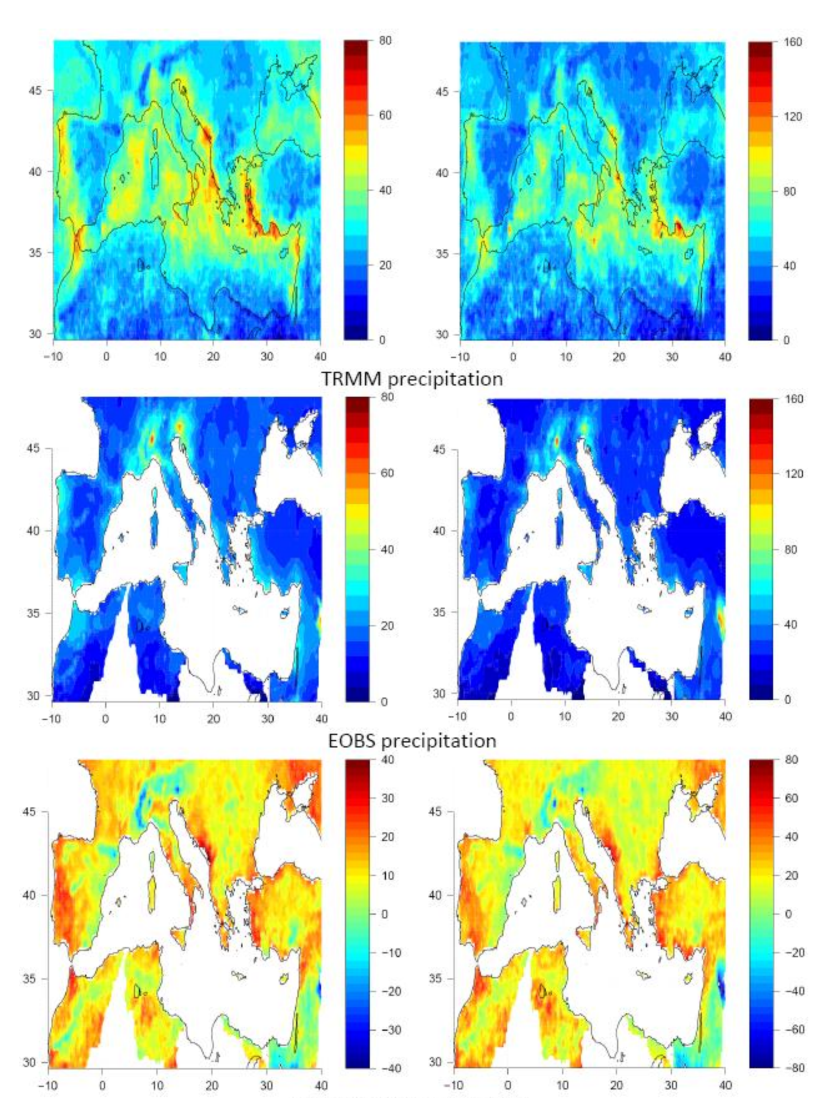

Figure 6. The thresholds of very wet days (left graphs) and extremely wet days (right graphs) concerning TRMM and EOBS precipitation datasets.

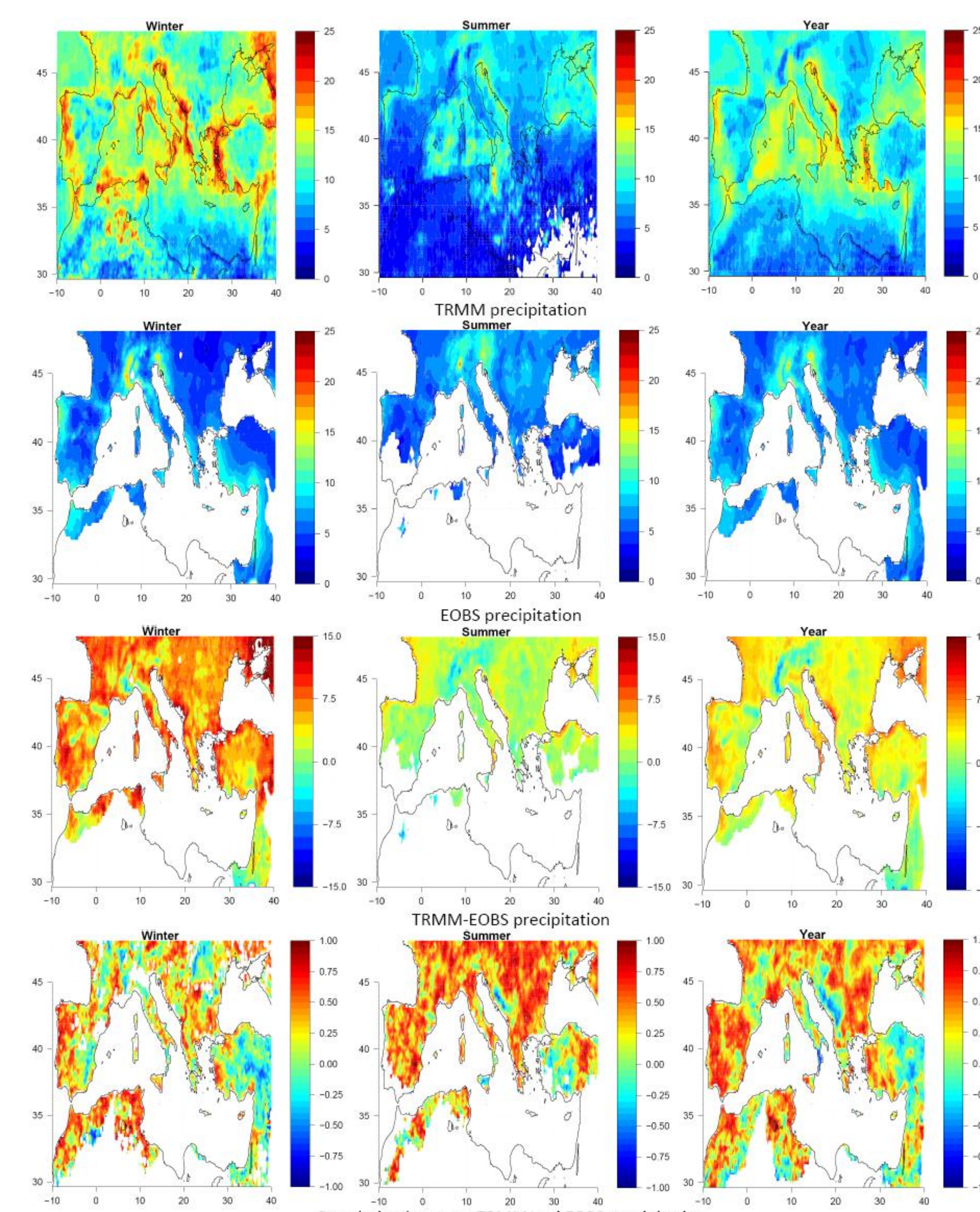

Figure 5. Simple daily indensity index (SDII) for winter, summer and year, concerning TRMM and EOBS precipitation datasets.

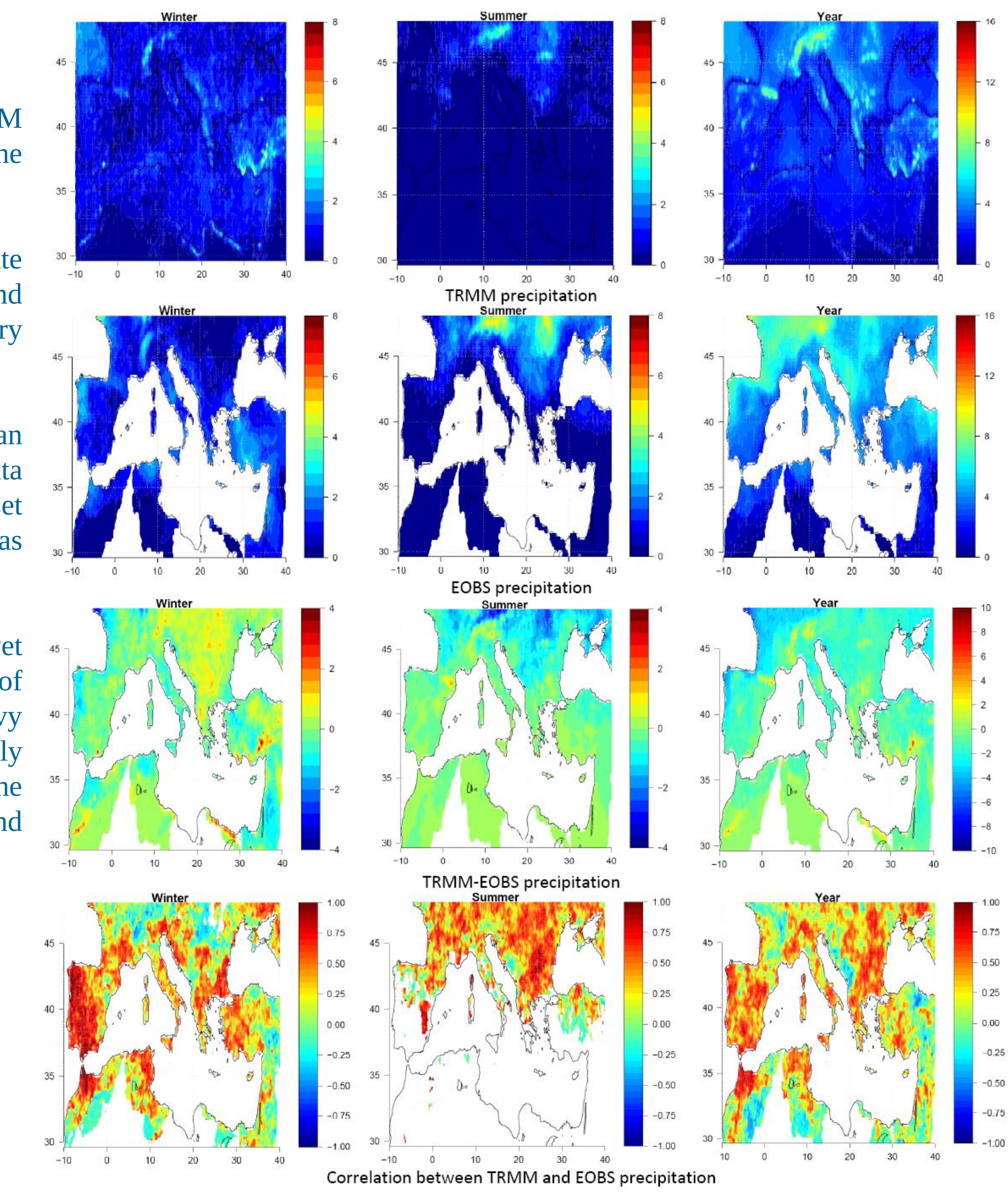

Figure 1. Number of very wet days for winter, summer and year, concerning TRMM and EOBS precipitation datasets.

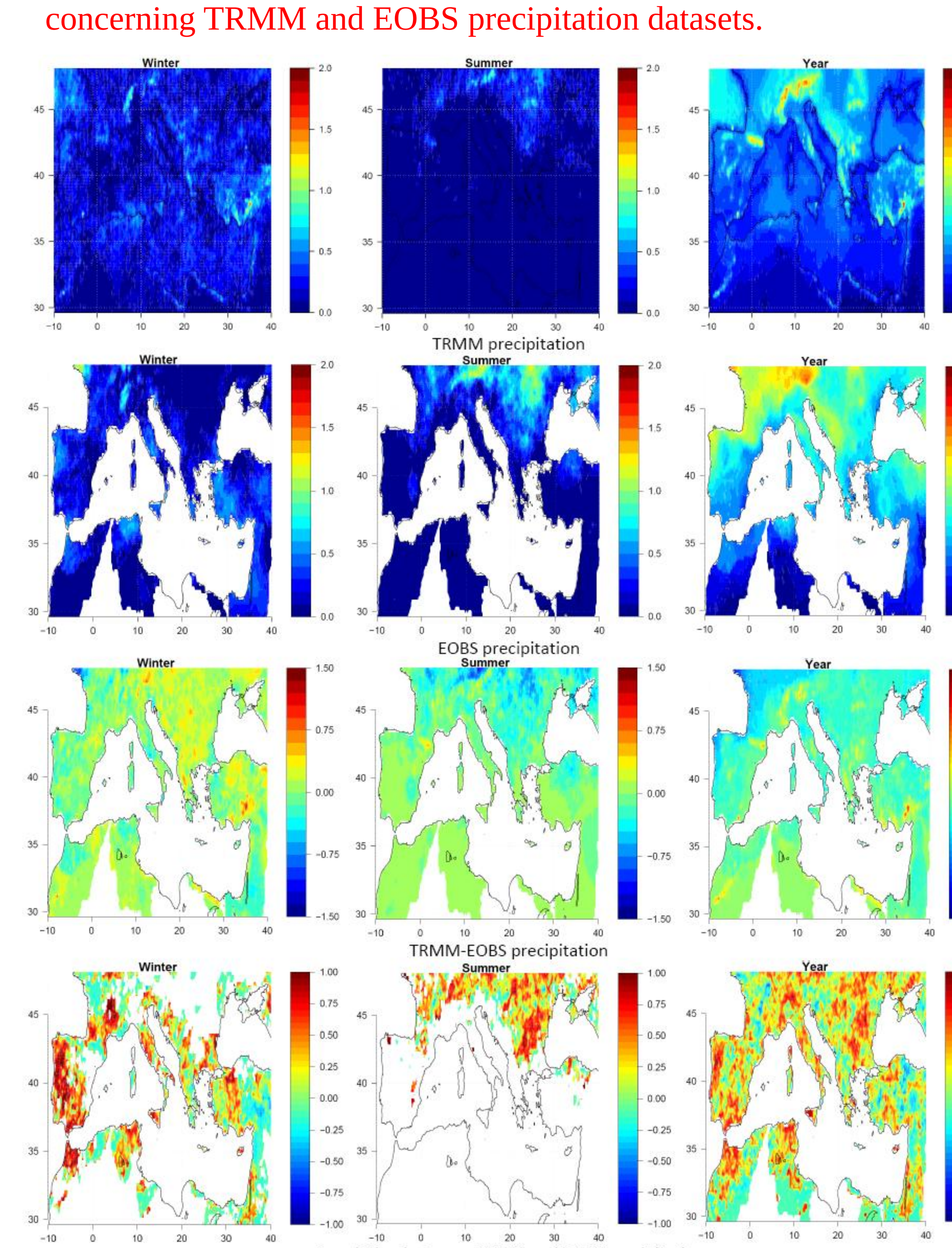

Figure 2. Number of extremely wet days for winter, summer and year, concerning TRMM and EOBS precipitation datasets.

Conclusions

The spatial variation of the differences between the TRMM and EOBS datasets along with the spatial variation of the correlation coefficients are presented and analyzed. Results show considerable regional differences of precipitation indices over the Mediterranean Region. More specifically, TRMM overestimates the simple daily intensity index (SDII) in the majority of the Mediterranean, presenting small correlation with EOBS precipitation datasets, as well. Besides, the number of extremely wet days derived from TRMM, appear less correlation with EOBS datasets than the other extreme indices examined.

Contact e-mail: nastos@geol.uoa.gr