Comparative analysis of TMPA and IMERG precipitation datasets in the arid environment of El- Qaa Plain, Sinai

Mona Morsy\textsuperscript{1,2,3}, Thomas Scholten\textsuperscript{2}, Silas Michaelides\textsuperscript{4,5}, Erik Borg\textsuperscript{6,7}, Youssef Sherief\textsuperscript{8,9}, and Peter Dietrich\textsuperscript{2,3}

\textsuperscript{1}Geology Department, Faculty of Science, Suez Canal University, Ismailia, Egypt (monaahmad1985s@yahoo.com)
\textsuperscript{2}Geosciences Department, Faculty of Science, Tübingen University, Tübingen, Germany.
\textsuperscript{3}Department of Monitoring and Exploration Technologies, Helmholtz Center for Environmental Research, Leipzig, Germany.
\textsuperscript{4}Cyprus University of Technology, Limassol, Cyprus.
\textsuperscript{5}ERATOSTHENES Centre of Excellence, Limassol, Cyprus.
\textsuperscript{6}German Aerospace Center, German Remote Sensing Data Center, National Ground Segment, Germany.
\textsuperscript{7}University of Applied Sciences, Neubrandenburg, Geoinformatics and Geodesy.
\textsuperscript{8}Geography Department, Faculty of Arts and Social Sciences, Sultan Qaboos University, Oman.
\textsuperscript{9}Zagazig University, Egypt.

The replenishment of aquifers depends mainly on precipitation rates, which is of vital importance for determining water budgets in arid and semi-arid regions. El-Qaa Plain in Sinai Peninsula is such a region which experiences a constant population growth. The local water budget equilibrium is negatively affected by relatively frequent light rain events. This study compares the 22 performance of two sets of satellite-based data of precipitation and in situ rainfall measurements. The 23 dates selected refer to rainfall events between 2015 and 2018. For this purpose, 0.1° and 0.25° spatial resolution TMPA (TRMM Multi-satellite Precipitation Analysis) and IMERG (Integrated Multi-25 satellitE Retrievals for GPM) data were retrieved and analyzed, employing appropriate statistical 26 metrics. The best-performing data set was determined as the data source capable to most accurately bridge gaps in the limited rain gauge records, embracing both frequent light-intensity rain events 28 and rarer heavy-intensity events. With light-intensity events the corresponding satellite-based data 29 sets differ the least and correlate more, while the greatest differences and weakest correlations are 30 noted for the heavy-intensity events. The satellite-based records best match those of the rain gauges 31 during light-intensity events, when compared to the heaviest ones. IMERG data exhibit a superior 32 performance than TMPA, in all rainfall intensities.