EGU22-12427
https://doi.org/10.5194/egusphere-egu22-12427
EGU General Assembly 2022

Precipitation classification and quantitative mapping using ground-based radar data, intended for drought monitoring in Cyprus

Eleni Loulli[1], Johannes Bühl[2], Silas Michaelides[1], Athanasios Loukas[3], and Diofantos G. Hadjimitsis[1]
[1]Cyprus University of Technology / ERATOSTHENES Centre of Excellence, Cyprus (eleni.loulli@cut.ac.cy, silas.michaelides@cut.ac.cy, d.hadjimitsis@cut.ac.cy)
[2]Leibniz Institute for Tropospheric Research (TROPOS), Germany (buehl@tropos.de)
[3]Aristotle University of Thessaloniki, Greece (agloukas@topo.auth.gr)

Drought is usually reported as the phenomenon of rainfall deficiency, compared to its long-term mean, that impacts a large area over a specific time period. It involves features in several dimensions, as it starts imperceptibly, advances slowly and cumulatively, and its consequences show up gradually. Researchers usually work with climatic indices and parameters for drought monitoring, but as this phenomenon is related to multiple characteristics, such methods are not enough to estimate the temporal and spatial drought elements.

Cyprus, located in the Southeast Mediterranean basin, faces climatic extremes due to the climate crisis, and particularly precipitation decrease. Due to its semi-arid to arid climate, Cyprus is significantly vulnerable to droughts. The island experiences frequent droughts that result in various problems to the environment, the economy, and the agricultural production.

Various sources in literature provide analysis and review of drought occurrence in Cyprus, but the applied methods are limited to in-situ monitoring, involving mainly precipitation and temperature parameters from meteorological stations. The dependence of drought monitoring solely on in-situ data constitutes a significant risk for decision makers and stakeholders, as in case of technical damages, or remote areas of interest, drought monitoring will be insufficient or even impossible. Remotely sensed data yield continuous, digital and spatially explicit information on earth's processes around the globe and present an essential tool in overcoming the aforementioned risk.

In the context of this study, observations from NASA's Global Precipitation Measurement (GPM) mission are used to calibrate the data from the two ground-based radars of the Department of Meteorology (DoM). The DPR (Dual-frequency Precipitation Radar) aboard of GPM is employed in order to derive the reflectivity and the respective precipitation rate at the ground with a spatial resolution of 5-25km for 120km wide swath. The ground-based radars scan in PPI mode with the radar holding an elevation angle constant and varying its azimuth angle and provide raw information with a spatial resolution of 0.1° and a radius of 150km. The radar stations are located in Rizoelia, Larnaca district and Nata, Paphos district.

This presentation will demonstrate the quantitative precipitation rate maps, as well as the

precipitation classification maps that are produced using the calibrated precipitation datasets. The results will contribute to the estimation of the precipitation budget and distribution over the area of Cyprus and thus, drought monitoring in the broader area.

The presented work is developed under the auspices of the activities of the 'ERATOSTHENES: Excellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment'- 'EXCELSIOR' project that has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 857510 and from the Government of the Republic of Cyprus through the Directorate General for the European Programmes, Coordination and Development.