Comparative evaluation of H SAF, ERA5-Land, and IMERG precipitation products for dry-spell climatology in Poland

Satellite and reanalysis-based precipitation products are widely validated for rainfall magnitudes, but their ability to detect dry spells (consecutive days with precipitation < 1 mm) remains largely underexplored despite the fact that it constitutes one of the crucial elements of both drought operational monitoring (e.g. for agriculture) and seasonal or multiannual analyses. This study provides a framework to evaluate four precipitation products: H SAF H64 and H61, ERA5-Land, and IMERG Late Run against a dense network of meteorological stations from IMGW-PIB across Poland. Daily total precipitation collected from selected sources will be compared with meteorological stations and converted to dry/wet events (using a 1 mm total daily precipitation threshold). Four annual dry-spell metrics are derived: maximum length, count, mean length, and median length. To evaluate dry-day discrimination independently of a fixed threshold, Receiver Operating Characteristic (ROC) analysis will be applied to the continuous precipitation fields; the Area Under the Curve (AUC) will serve as the evaluation score. All analyses will be stratified by climatological regions of Poland and seasons to capture spatially and temporally varying error structures

This study will provide the region-specific analysis of different, widely used precipitation sources for dry-spell monitoring in Poland. By combining distribution-based comparisons with ROC analysis, we aim to identify which product best reproduces observed dry-spell regimes, hence guiding end-users in drought monitoring, agriculture, and water management.