PREFERENCE FOR PRESENTATION

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Generating LST and TSEB-modelled ET_a representative datasets for the future Copernicus Sentinel Expansion Mission Land Surface Temperature Monitoring

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Within the ESA Sentinel User Preparation (SUP) project CHILL-Y (CHIME + LSTM + ROSE-L: Assessment of Yield Quantity and Quality) representative datasets of three upcoming Sentinel Expansion missions are created and synergistically used to demonstrate a novel service for improved yield quantity and yield quality assessment. As these missions are currently under development, it means that no measured data at the expected sensitivity and resolution is available yet. Therefore, corresponding satellite data is simulated, and representative data sets are generated.

To generate the representative Land Surface Temperature (LST) dataset for the Land Surface Temperature Monitoring (LSTM) mission, the Data Mining Sharpener (DMS) [1]—implemented within the ESA-funded Sen-ET workflow [2]—is used. The DMS thermally sharpens Sentinel-3 SLSTR LST data using cloud-free Sentinel-2 MSI imagery together with the Copernicus Digital Elevation Model. This sharpening approach increases the spatial resolution of the LST product from 1 km to 20 m, after which it is resampled to 30 m to match the expected native resolution of the LSTM mission. Additionally, all pixels with a viewing zenith angle (VZA) exceeding 30° are excluded to reflect the planned acquisition geometry of LSTM [3].

The resulting LSTM-representative LST dataset is subsequently used to model actual evapotranspiration (ETa) through the TSEB-PT (Two-Source Energy Balance – Priestley–Taylor) model, following the implementation approach of the Sen-ET workflow [2]. This work forms part of a framework under development that aims to use openEO to retrieve all required earth observation input datasets (i.e. Sentinel-3 LST, Sentinel-2 bands, Sentinel-2 derived biopars, DEM and WorldCover data) for operational application within TSEB-PT. The aim is to model ETa for 3 Sentinel-2 tiles (31UFS, 35VMF and 32UPC) for the years 2024 and 2025. For the tiles where ICOS tower data are available a comparison between modelled and observed latent heat flux will be performed.

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