Integration of EUMETSAT Land Surface Analysis data for use in agrometeorological service by the Polish Institute of Meteorology and Water Management

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The agrometeo.imgw.pl platform, operated by the Polish Institute of Meteorology and Water Management (IMGW-PIB), serves as a vital tool for farmers, agricultural advisors and researchers, offering targeted agrometeorological data and analyses. Central to the platform's capabilities is the integration of high-resolution satellite data from EUMETSAT's Land Surface Analysis Satellite Application Facility (LSA SAF). These data provide crucial insights into land surface conditions, which are essential for managing agricultural resources effectively and adapting to environmental changes.

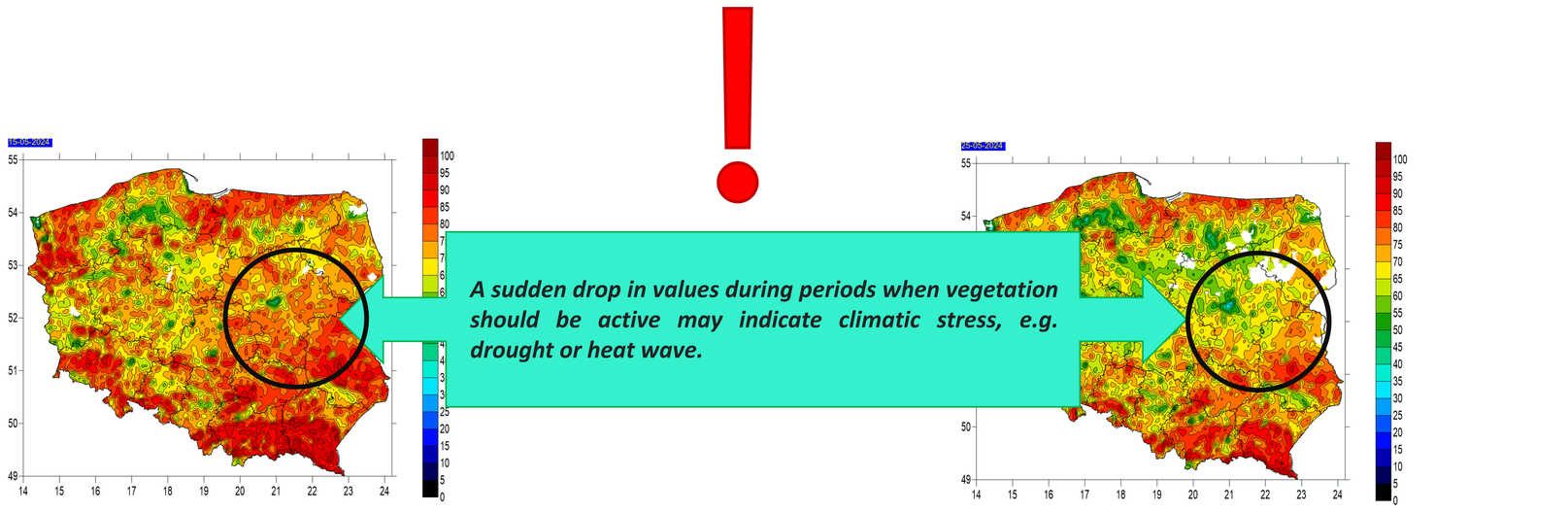
The LSA SAF data utilized by agrometeo.imgw.pl include key parameters such as evapotranspiration, soil moisture, and vegetation indices like FAPAR (Fraction of Absorbed Photosynthetically Active Radiation) and LAI (Leaf Area Index). Thanks to LSA SAF's high temporal and spatial resolution, agrometeo.imgw.pl enables users to monitor the impact of atmospheric conditions on vegetation health in real-time.

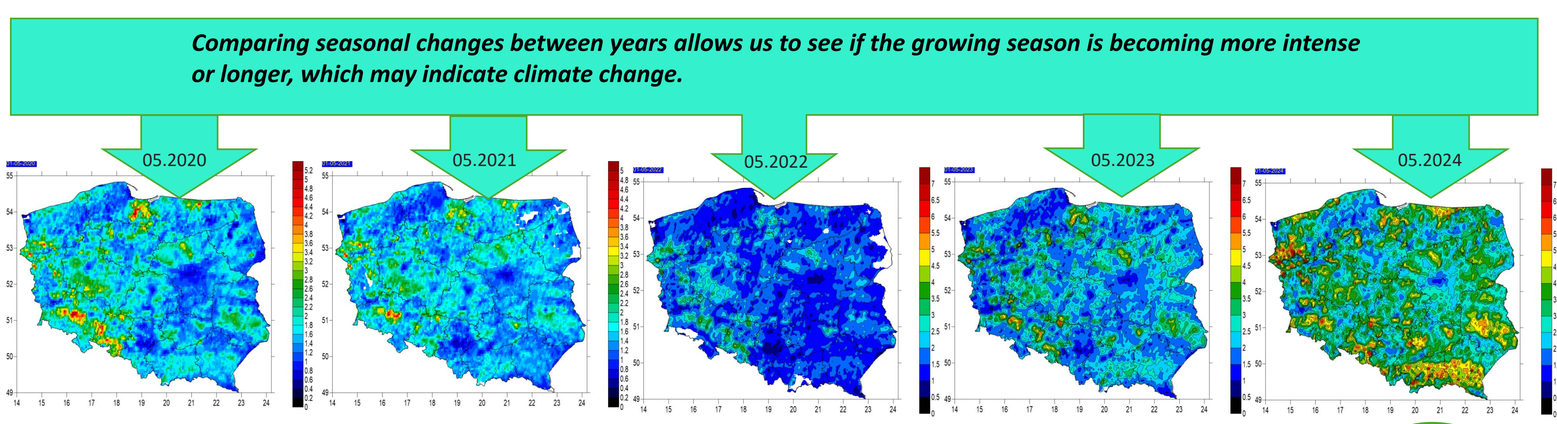
Plant Health Analysis (LAI and FAPAR)

LSA SAF data, such as FAPAR (Fraction of Absorbed Photosynthetically Active Radiation) and LAI (Leaf Area Index), enables detailed analysis of plant health.

FAPAR measures the amount of photosynthetically active radiation absorbed by plants and is used in the photosynthesis process. High FAPAR values indicate effective conversion of light into energy, reflecting the healthy state of plants and their growth potential.

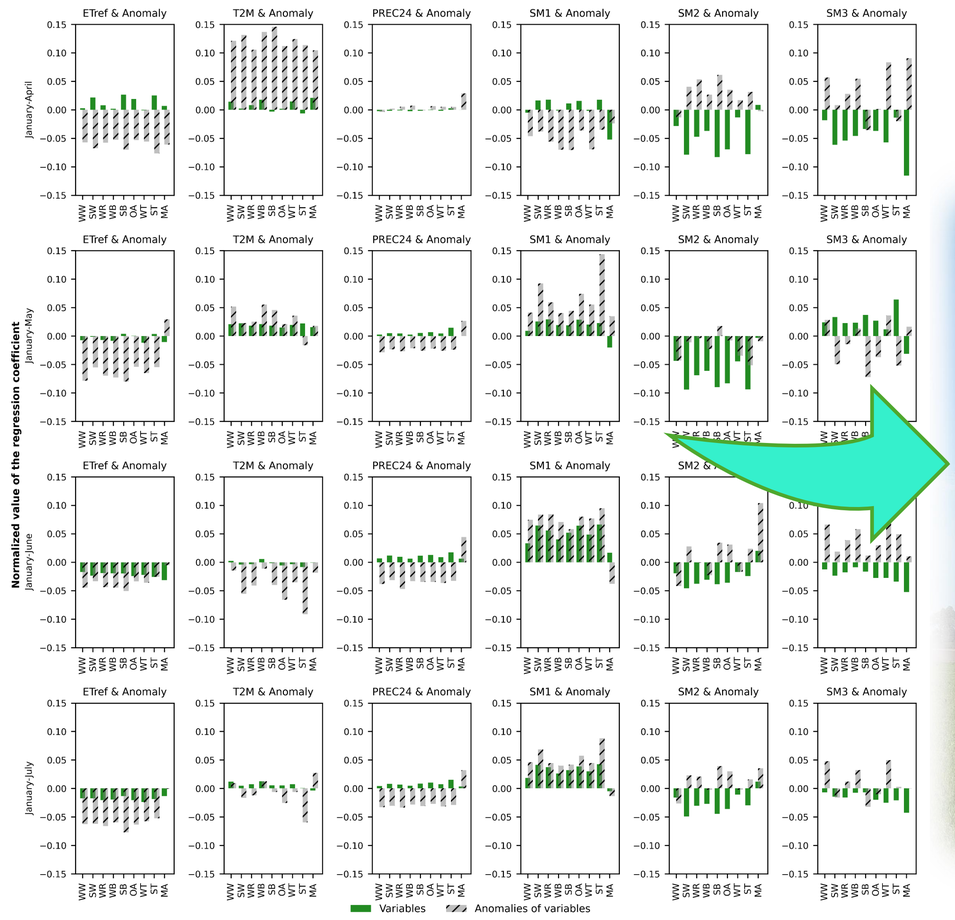
LAI, on the other hand, indicates the ratio of total leaf area to ground area, defining the plants' ability to utilize sunlight. Plants with higher LAI values can utilize light more efficiently, which translates into potentially higher yields. Sudden drops in LAI can signal environmental stresses such as drought or plant diseases. This can be used to monitor and detect such problems early.

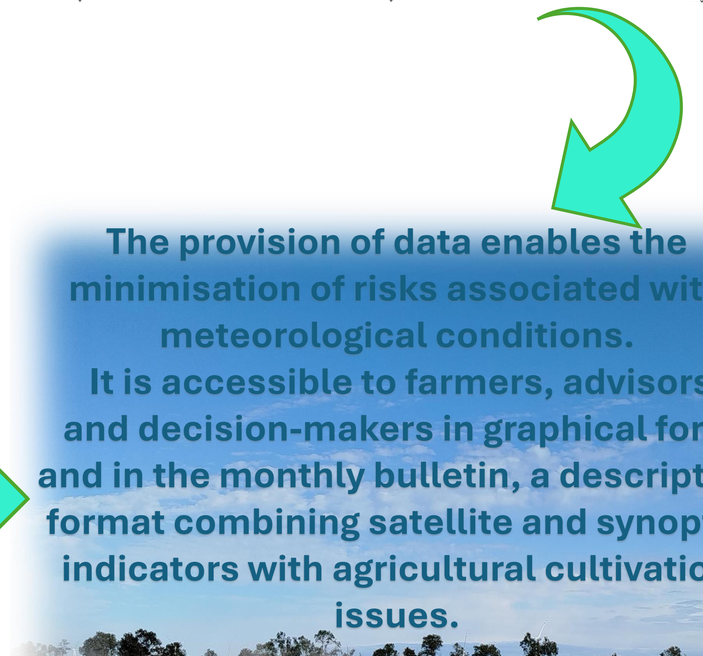




Crop Yield Forecasting and Management

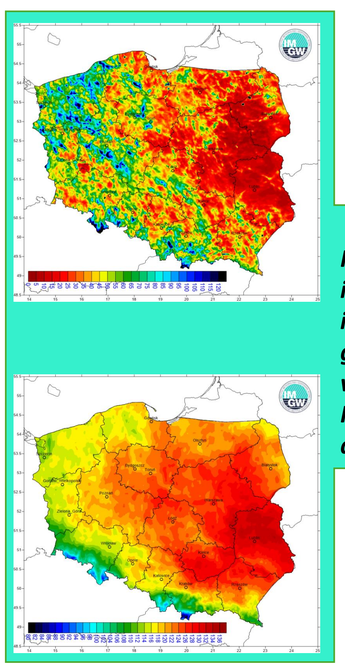
Yield forecasts are based on analyzing meteorological indicators and plant health parameters, enabling more accurate determination of optimal sowing and harvesting times. Reference evapotranspiration (ETref) has a critical role of in crop yield prediction, particularly during late spring and early summer (May and June). Negative ETref anomalies in these months are closely associated with lower crop yields, as they signal reduced water availability, which can hinder plant growth by limiting water uptake. Conversely, periods with positive or near-normal ETref values in these months correlate with improved water availability, supporting healthier plant development and higher yields. With this information, farmers can minimize risks associated with weather conditions and maximize production efficiency.





Drought Monitoring

The LSA SAF data on the agrometeo.imgw.pl platform allows for real-time monitoring of soil moisture levels by combining evapotranspiration data with precipitation records. Evapotranspiration, the combined loss of water from the soil and plant transpiration, serves as a crucial indicator of soil water availability. High-resolution evapotranspiration data enables quick detection of moisture deficits, essential for effective irrigation planning and drought risk reduction. The values of the climatic water balance (KBW) determined on the basis of these data are therefore a reflection of the multi-aspect information about the environment contained in the factors shaping the amount of atmospheric precipitation and evaporation in a given area. The KBW is used to assess the degree of water deficits and excesses for the needs of climatological and hydrological analyses, as well as in the operational activities of agrometeorological services.



In agrometeorology, it is most often assumed that in monthly periods, values lower than -50 mm indicate the occurrence of drought, while in the growing season considered as a whole, values lower than 150 mm indicate drought. Such KWB values may also indicate the need to irrigate a given crop.