

### **Agricultural Land Monitoring application**

Rural Support Service (RSS) of the Republic of Latvia employs satellite data in daily practice not only for classification of agricultural crops and monitoring purposes, including identifying areas where a pond or building has been excavated to exclude the possibility of receiving area-based payments for such fields, but also for mapping flood-affected and burnt areas in grassland fires. Image below represents the detected area of grassland fire.



RSS already has the following functionality implemented:

- Convenient access to the latest Sentinel-2 cloud-free composite image mosaics and Sentinel-1 data, ensuring up-to-date and readily available satellite imagery.
- Normalized Burn Ratio (NBR) calculations using Sentinel-2 images taken before and after a grass fire, enabling change detection and generating burned area masks for specific regions as needed. These masks are then converted into vector format. Currently, the masks undergo manual analysis and manual adjustments to eliminate false positive responses caused by cloud shadows, melting snow moisture, and soil erosion.
- Delineation workflow for flooded agricultural lands (after heavy rains, melting snow) using both Sentinel-2 and Sentinel-1 data. The processing workflow includes calculation of water index using multispectral values, radar backscatter values and thresholding to create a water area mask. Water masks are generated at the start and end of specific time periods of interest and are compared to extract the flooded areas by identifying the changes between the two time points. Currently, the process is not tailored to effectively handle the processing of large-scale areas.
- Test workflows in Google Earth Engine (GEE) for faster acquisition of the results.

Improvements: During the course of the project RSS is planning to make the following improvements to the service:

- Implement automation in the production of burned area masks across extensive areas, incorporating enhanced functionality to minimise false positives.
- Usage of the combined advantages of Sentinel-2 and Sentinel-1 data for accurate delineation of flooded areas.
- Implement automation in the production of flooded area masks.
- To provide a service to any end user with the flexibility to define the specific conditions for processing Sentinel-1 and Sentinel-2 data algorithms according to their requirements.

### **Benefits of the achieved results**

Both burnt and flooded agricultural land maps ensure objective and consistent assessments of agricultural lands affected by those risk factors. By employing standardised image processing techniques and analysis, the maps generated provide reliable and comparable information across different locations and time periods. The satellite or aerial imagery captures the actual conditions on the ground, providing a reliable record of the affected areas. This objectivity can help mitigate disputes and provide a basis for objective analysis and decision-making. As new satellite images become available over time, it becomes possible to track changes in the extent and severity of flooding, monitor water recession, and assess the recovery progress of affected agricultural lands. These timely updates support ongoing monitoring efforts and adaptive management strategies. **This complies with CAP recognizing need for risk management through insurance or support for the farmers through different development and financial assistance programmes.**

### Information content:

- 1) burnt area map delineating agricultural lands affected by grassland fires,
- 2) flooded agricultural land map.

Both maps will be prepared in raster and vector format.