Using the Jupyter Notebook as a Tool for analyzing the EUMETSAT HSAF snow products

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Snow cover is an essential climate variable directly affecting the Earth’s energy balance, therefore estimating the snow parameters play an important role in hydrological, land surface, meteorological and climate models. Remote sensing provides a good understanding of snow cover monitoring thus several satellite snow products have been developed and disseminated so far. In this study, Jupyter Notebook as an open source interactive satellite snow products retrieval, visualization and analysis tool has been developed by using Python language. Jupyter Notebook allows easy and straightforward data analysis with the possibility of live interaction and requires little programming knowledge.

The developed tool provides the capabilities of downloading the satellite snow products, georeferencing them and performing spatial analysis like zonal statistics. In this study EUMETSAT HSAF snow products, namely H10 (Snow detection), H13 (Snow Water Equivalent) and H34 (Snow cover) are used. The tool allows user to upload their own region in ESRI shapefile format for spatial and temporal analysis and the uploaded region can be visualized on interactive map via custom interactive widget like ipyleaflet. The cloud percentage for the snow cover product can be selected and daily snow covered area or snow water equivalent change for the uploaded region can be calculated for the selected period. With this tool, it is aimed to retrieve the satellite snow products easily and perform spatial and temporal analysis of snow cover for the area of interest without getting lost in data formats. Therefore, users with little or no knowledge about programming can interact easily with EUMETSAT HSAF snow products. Furthermore, with the high extensibility of Jupyter Notebook, it can also be improved or modified in accordance with the need of the end users.