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Hyperspectral Soil Mapper (HYSOMA) software interface: Review and future plans

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With the upcoming launch of the next generation of hyperspectral satellites that will routinely deliver high spectral resolution images for the entire globe (e.g. EnMAP, HISUI, HyspIRI, HypXIM, PRISMA), an increasing demand for the availability/accessibility of hyperspectral soil products is coming from the geoscience community. Indeed, many robust methods for the prediction of soil properties based on imaging spectroscopy already exist and have been successfully used for a wide range of soil mapping airborne applications. Nevertheless, these methods require expert know-how and fine-tuning, which makes them used sparingly. More developments are needed toward easy-to-access soil toolboxes as a major step toward the operational use of hyperspectral soil products for Earth's surface processes monitoring and modelling, to allow non-experienced users to obtain new information based on non-expensive software packages where repeatability of the results is an important prerequisite.

In this frame, based on the EU-FP7 EUFAR (European Facility for Airborne Research) project and EnMAP satellite science program, higher performing soil algorithms were developed at the GFZ German Research Center for Geosciences as demonstrators for end-to-end processing chains with harmonized quality measures. The algorithms were built-in into the HYSOMA (Hyperspectral SOil MApper) software interface, providing an experimental platform for soil mapping applications of hyperspectral imagery that gives the choice of multiple algorithms for each soil parameter. The software interface focuses on fully automatic generation of semi-quantitative soil maps such as soil moisture, soil organic matter, iron oxide, clay content, and carbonate content. Additionally, a field calibration option calculates fully quantitative soil maps provided ground truth soil data are available. Implemented soil algorithms have been tested and validated using extensive in-situ ground truth data sets. The source of the HYSOMA code was developed as standalone IDL software to allow easy implementation in the hyperspectral and non-hyperspectral communities. Indeed, within the hyperspectral community, IDL language is very widely used, and for non-expert users that do not have an ENVI license, such software can be executed as a binary version using the free IDL virtual machine under various operating systems. Based on the growing interest of users in the software interface, the experimental software was adapted for public release version in 2012, and since then $\sim$80 users of hyperspectral soil products downloaded the soil algorithms at www.gfz-potsdam.de/hysoma. The software interface was distributed for free as IDL plug-ins under the IDL-virtual machine. Up-to-now distribution of HYSOMA was based on a close source license model, for non-commercial and educational purposes.

Currently, the HYSOMA is being under further development in the context of the EnMAP satellite mission, for extension and implementation in the EnMAP Box as EnSoMAP (EnMAP SOil MAPper). The EnMAP Box is a freely available, platform-independent software distributed under an open source license. In the presentation we will focus on an update of the HYSOMA software interface status and upcoming implementation in the EnMAP Box. Scientific software validation, associated publication record and users responses as well as software management and transition to open source will be discussed.