Automatization of a Spectroradiometer Measurement System for Satellite Image Validation

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Accurate measurement data is vital to understand and assess the state and changes in the environment. Spectroscopy, mainly made by satellite instruments, is a well established field of research acquiring knowledge of spectral reflectance of Earth's surface utilized in several environmental applications. However, the validation of satellite data for accurate research purposes is hampered due to atmospheric and vegetation effects, coarse image resolution, and the lack of regionally extensive *in situ* measurements. This is especially true in remote polar regions.

In project NorSEN (Nordkalotten Satellite Evaluation co-operation Network) an Analytical Spectral Devices (ASD) Field Spec Pro JR spectroradiometer was mounted on a 30-meter-high mast in Sodankylä northern Finland in 2006 [1]. Mast data is providing additional information to reduce the gap between remotely sensed and ground based measurements. The measurement lens installed at the end of a turning pole enables spectral measurements between 350–2500 nm from two different locations – a forest and a forest opening.

Measurement system has suffered several long measurement breaks due to device flaws and till now the measurement procedure has been very complicated. During summer 2012 the system has been automatized by Veli-Pekka Halme and measurements can now be executed by using a single computer and a scheduled script. At the moment, spectral measurements are executed automatically every half an hour between 6–12 UTC. Measurements will be used to validate satellite data retrieval algorithms and e.g. in snow research. Every component of the measurement equipment is controlled via its own Python module which hides the technical details of the communication. Thus, the end user will be able to write a new client software without a need to know, how the devices are controlled. Measurements are taken during months with high enough solar elevation angle. To avoid problems introduced by low temperatures, high winds, and clouds, weather thresholds are set. Nevertheless, the upcoming winter will test the tolerance of the automatization in extreme conditions, and the work to develop a system to gain high-quality and homogenous spectral data will be continued.

References

[1] T. Sukuvaara, J. Pulliainen, E. Kyrö, H. Suokanerva, P. Heikkinen, and J. Suomalainen, "Reflectance spectroradiometer measurement system in 30 meter mast for validating satellite images," IGARSS: 2007 IEEE International Geoscience and Remote Sensing Symposium, pp. 2885–2889, 2007.