Near Real Time Processing Chain for Suomi NPP Satellite Data

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Since 2009, the EURAC satellite receiving station, located at Corno del Renon, in a free obstacle site at 2260 m a.s.l., has been acquiring data from Aqua and Terra NASA satellites equipped with Moderate Resolution Imaging Spectroradiometer (MODIS) sensors. The experience gained with this local ground segmenthas given the opportunity of adapting and modifying the processing chain for MODIS data to the Suomi NPP, the natural successor to Terra and Aqua satellites.

The processing chain, initially implemented by mean of a proprietary system supplied by Seaspace and Advanced Computer System, was further developed by EURAC's Institute for Applied Remote Sensing engineers. Several algorithms have been developed using MODIS and Visible Infrared Imaging Radiometer Suite (VIIRS) data to produce Snow Cover, Particulate Matter estimation and Meteo maps. These products are implemented on a common processor structure based on the use of configuration files and a generic processor. Data and products have then automatically delivered to the customers such as the Autonomous Province of Bolzano-Civil Protection office.

For the processing phase we defined two goals: i) the adaptation and implementation of the products already available for MODIS (and possibly new ones) to VIIRS, that is one of the sensors onboard Suomi NPP; ii) the use of an open source processing chain in order to process NPP data in Near Real Time, exploiting the knowledge we acquired on parallel computing.

In order to achieve the second goal, the S-NPP data received and ingested are sent as input to RT-STPS (Real-time Software Telemetry Processing System) software developed by the NASA Direct Readout Laboratory 1 (DRL) that gives as output RDR files (Raw Data Record) for VIIRS, ATMS (Advanced Technology Micorwave Sounder) and CrIS (Cross-track Infrared Sounder)sensors. RDR are then transferred to a server equipped with CSPP2 (Community Satellite Processing Package) software developed by the University of Wisconsin. CSPP subdivides the input file in granules, making possible the use of parallel computing, and produces SDR (Science Data Record) and some EDR (Environmental Data Record) products. The integration with the EDRs not yet available with CSPP is realized with the use of SPAs (Science Processing Algorithm) stand-alone version by DRL.

The important result of this system consists in the possibility of processing data acquired by the EURAC antenna with open source software and delivering the SDRs, EDRs and higher level products developed internally by EURAC in near real time using a Data Exchange Server. By means of the parallelized CSPP, SDR data are currently available after about 7 minutes since the production of RDR, while we are currently implementing a strategy to get the best possible processing time for the EDRs products that are in principle not parallelizable.

1. http://directreadout.sci.gsfc.nasa.gov/
2. http://cimss.ssec.wisc.edu/cspp/