SEVIRI PrePro: A Software Tool for the Pre-processing of SEVIRI Operationally Distributed Products

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1. INTRODUCTION

The Spinning Enhanced Visible and Infrared Imager (SEVIRI) is a geostationary orbit multispectral sensor on-board the MSG series of platforms, allowing the acquisition of spectral information covering the optical to infrared parts of the electromagnetic spectrum every 15 minutes. A number of SEVIRI data products are currently available to the user’s community via EUMETSAT.

Here an open access stand-alone software tool developed in Java programming language is presented which allows performing basic, yet of key importance, pre-processing steps to all the SEVIRI operationally distributed products. The tool, named SEVIRI PrePro, makes use of the present day multithread processors, being able to process fast very large datasets, making it also suitable to be used in High Performance Computing (HPC) environment.

The practical usefulness of SEVIRI PrePro is also demonstrated here using as example the SEVIRI evaporations (ET) operational product. In particular we demonstrate how the product robust validation can be conducted using our tool, provided that concurrent reference observations are available from ground measurements. For this purpose we used in-situ data acquired at different European ecosystems from the CARBOEurope ground observational network during year 2011.

2. SOFTWARE Tool Development

The tool has been developed in Java, as a stand-alone application with or without GUI and also as an add-on in BEAM VISAT open access image processing platform.

Figure 2 describes the workflow and the options a user has in using SEVIRI PrePro toolbox. Key capabilities of the toolbox include: reprojection, clip and extract pixel values from SEVIRI images (either raw images or any operational product).

Figures 3-5 present the GUI for SEVIRI PrePro toolbox implementation. A short description of the interface is presented below:

**Step 1:** Select the folders containing SEVIRI (HDF5) images and the folder where the reprojected results are stored. All the output images are stored in BEAM DIMAP format.

**Step 2:** The user must select a folder containing static LSA-SAF (available to registered users) co-ordinate transformation files. These are used to translate to WGS84. These are provided for four regions. The user must select the relevant one.

**Step 3:** There is an option to subset the SEVIRI product or use all of it (a very slow process). If clipping is selected this can be done by drawing a ‘shapfile’ (shape) containing the countries. The user can select the relevant country.

**Step 4:** There is an option to extract pixel values by point (e.g. in case where coordinates of a location are known to user).

Since the co-ordinate transformation is fixed it is done in the start of the run and is preloaded. This speeds up processing. The pixel extraction is done for nearest pixels less than 3km distance from the user-provided points.

Pixel extraction is also supported as a Command Line Interface (CLI) tool for batch processing in multiple computers in parallel.

3. SEVIRI PrePro Demo: CASE STUDY

Since the co-ordinate transformation is fixed it is done in the start of the run and is preloaded. This speeds up processing. The pixel extraction is done for nearest pixels less than 3km distance from the user-provided points.

Whole product reprojection is computer power expensive process in practice. We use the internal BEAM method to re-project the images after attaching programmatically pixel geocoding. It is advantageous to use country specific reprojection via shapefiles.

Countries should be provided in their 2 character denotions (e.g. BE for Belgium) as multi-polygons via the shapfile. The tool uses JAVAFX and parallel collections for speedup. Therefore Java 8 is required.

4. FUTURE WORK

- We presented herein a simple, yet very powerful software tool for the pre-processing of geostationary orbit satellite data acquired from SEVIRI (both raw and operational products).
- Our work is significant to the SEVIRI users’ community and also very timely given that, to our knowledge, no similar tool is freely available at present.
- Thus, this tool kit distribution is anticipated to make a significant contribution to a large number of practical applications requiring use of SEVIRI data products, allowing their wider dissemination to prospective users, e.g. weather forecasting, climate monitoring.

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