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An open source procedure to assess the quality of the OpenStreetMap road network

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OpenStreetMap road network quality

OpenStreetMap (OSM) is the largest, most complete and most up-to-date geospatial database of the world. One of the most frequently occurring elements within this database is the road network, whose quality is crucial for a number of applications such as routing and navigation.

Several methods have been proposed for the **assessment of OSM road network quality** based on the comparison with corresponding authoritative datasets. However, these methods are often tightly coupled to the characteristics of the authoritative dataset involved in the comparison and this makes it hard to replicate or extend them. This study presents an **automated procedure** for the comparison of OSM and authoritative road network datasets, based on spatial analysis and driven by the choice of parameters made by the user (Brovelli et al. 2015; Brovelli et al. 2016a). The procedure returns measures of the **positional accuracy** and **completeness** of the OSM road network.

The GRASS-based procedure

The procedure consists of a set of three independent modules for the open source **GRASS GIS** software, written in **Python** and available with a graphical user interface. The modules and their main roles are:

➢ **v.osm.precomp**: preparation and **preliminary comparison** of the OSM and reference road network datasets, computation of global statistics, and evaluation of their geometrical similarity.

➢ **v.osm.preproc**: **geometric preprocessing** of the OSM road network dataset, which only extracts its subset of roads having a correspondence in the reference dataset.

➢ **v.osm.acc**: evaluation of **positional accuracy** of the OSM road network dataset using a **grid-based approach**. For each grid cell, the module can: 1) compute the maximum deviation of the OSM dataset from the reference dataset; and 2) evaluate the positional accuracy of the OSM dataset against one or more thresholds specified by the user.

The procedure was applied in two research works to assess the quality of the OSM road networks of: **Coimbra, Portugal** through comparison against the dataset provided by the Coimbra City Hall (Antunes et al. 2015); and **Paris, France** through comparison against the French official dataset provided by IGN (Brovelli et al. 2016b). In the second case a high OSM completeness and positional accuracy were found.
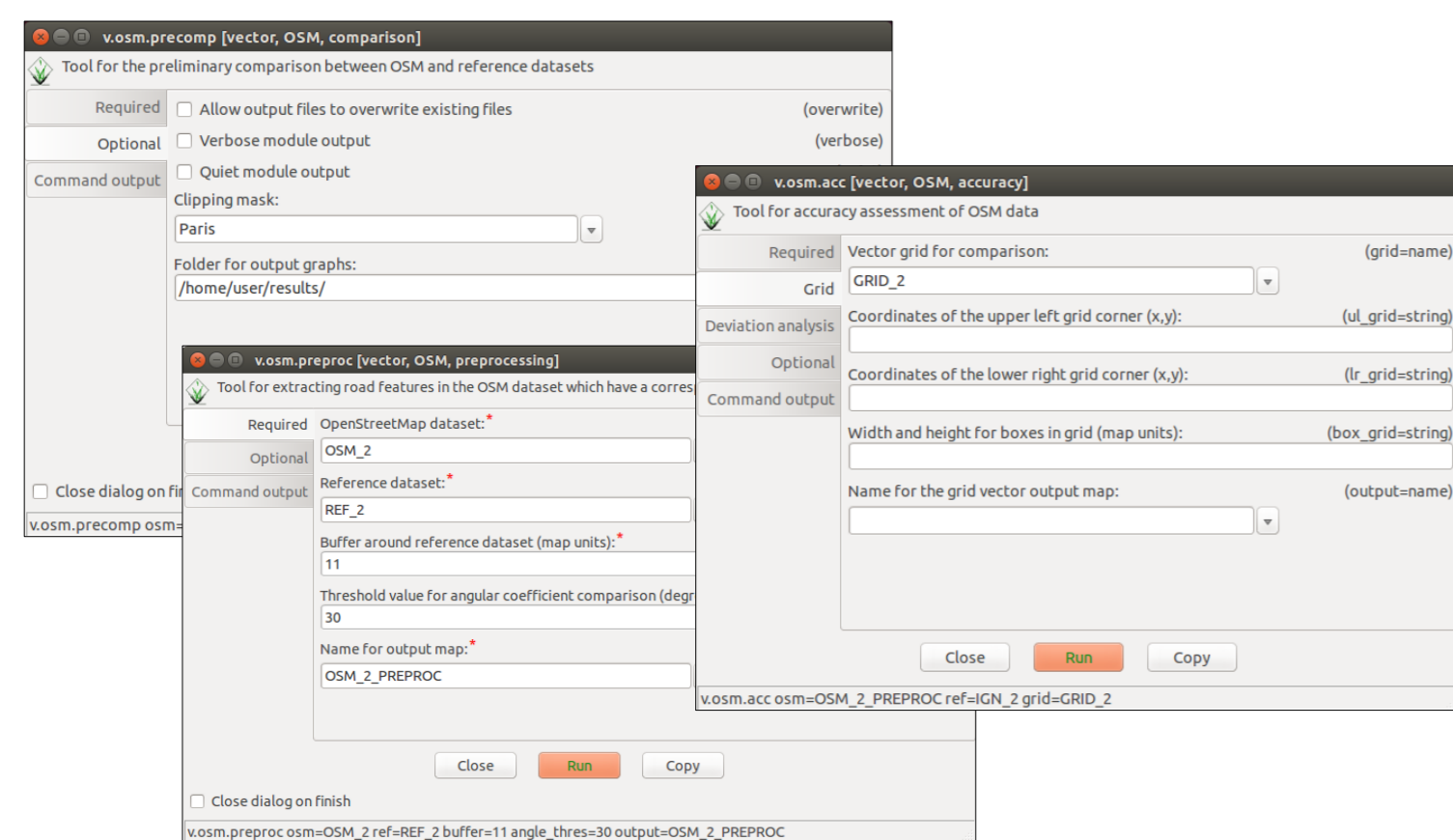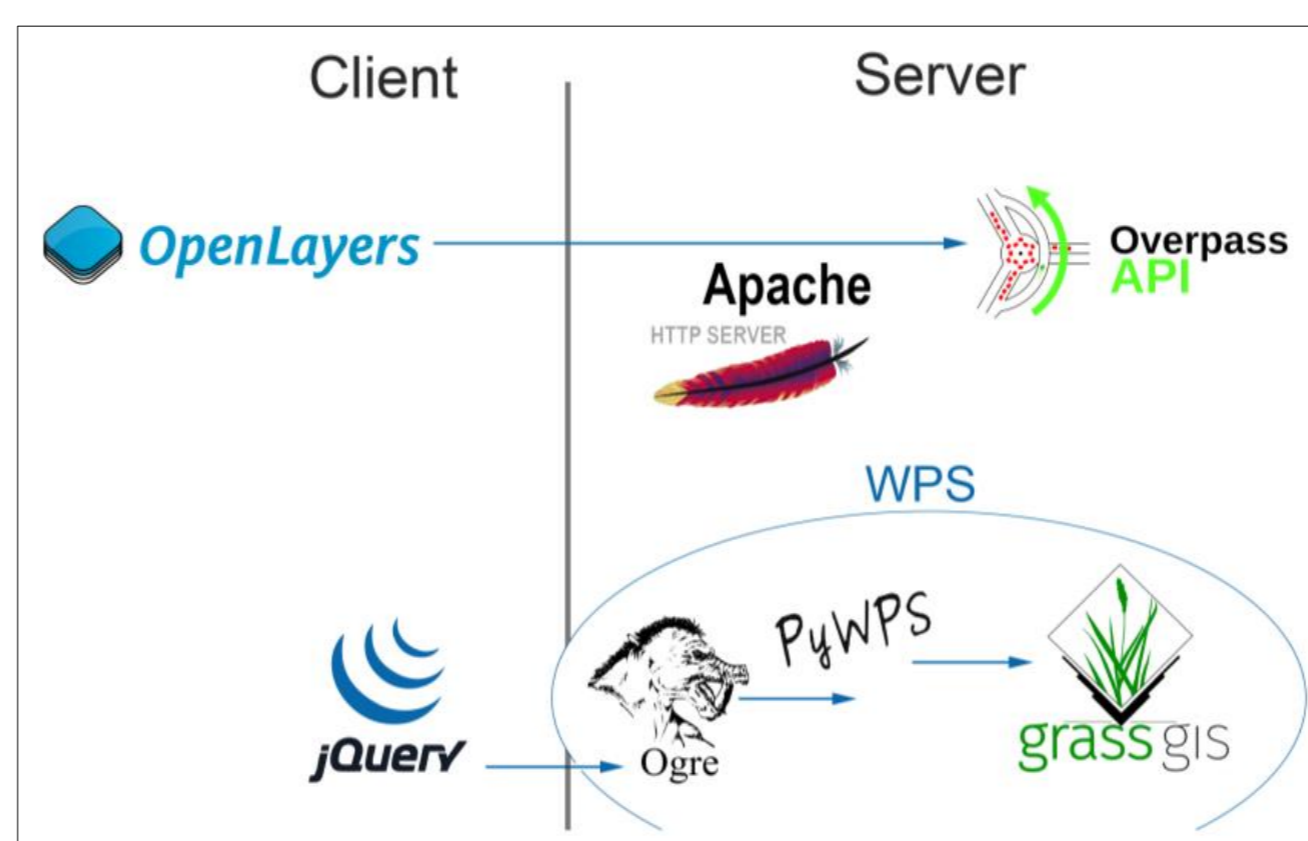

Screenshots of the three GRASS GIS modules
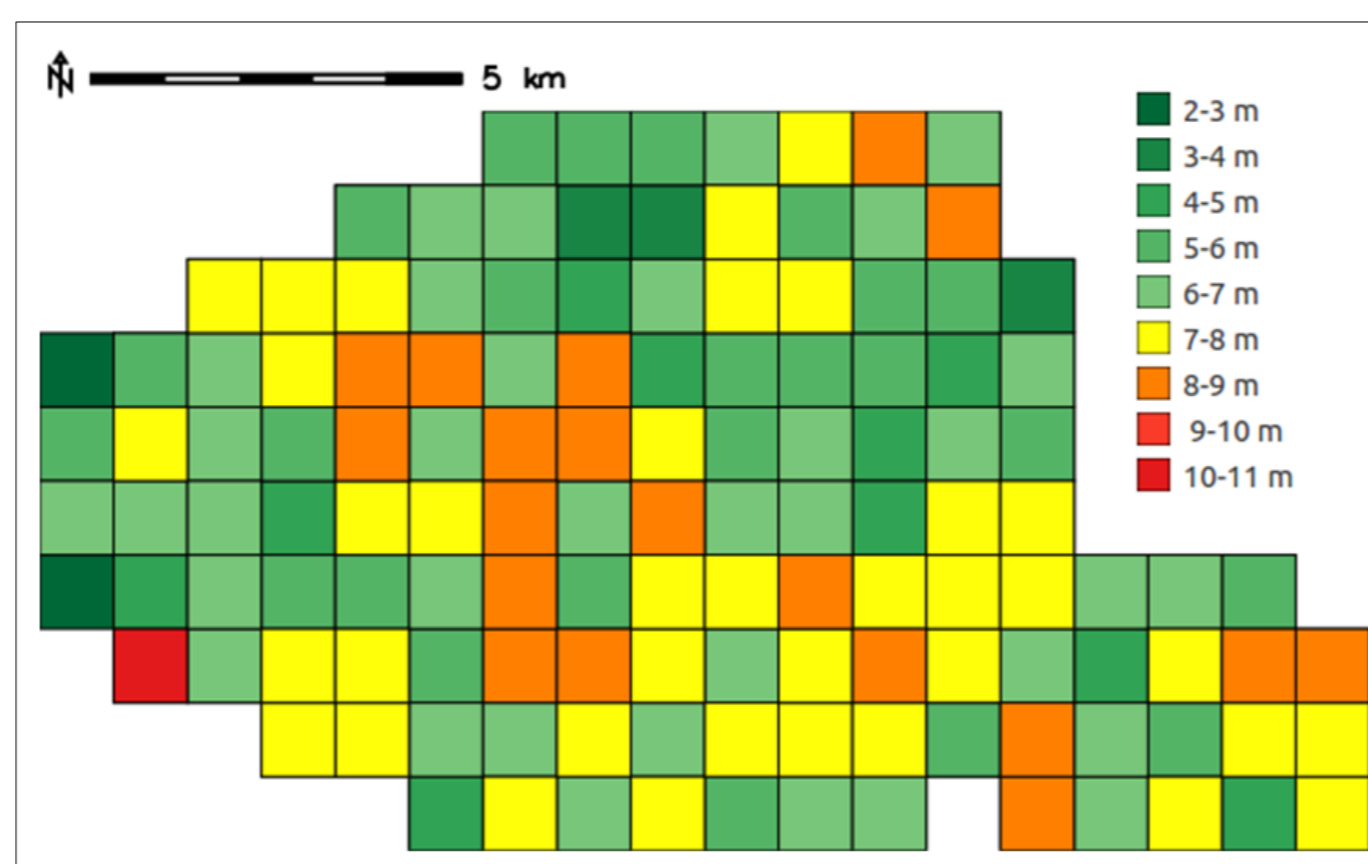
Positional accuracy assessment of OSM roads in Paris, France

Transposition of the procedure as a Web Processing Service

Applying a parallel processing approach to reduce the computational time, the **v.osm.precomp** module is exposed on the Internet as a **Web Processing Service** based on the PyWPS implementation of the OGC WPS standard. On the server side the process is executed by GRASS GIS, while Ogre ensures the reprojection of the datasets and the Overpass API allows to retrieve data from the OSM database. On the client side, a map viewer based on OpenLayers and jQuery allows users to exploit the Web Service (http://131.175.143.84/WPS).

Architecture of the Web Processing Service

Scan these QR codes to access:
1) the source code repository; 2) the WPS client;
3) the PDF version of this poster.

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References

➢ Antunes F., Fonte C.C., Brovelli M.A., Minghini M., Molinari M.E. & Mooney P. (2015) Assessing OSM Road Positional Quality with Authoritative Data. *Proceedings of the VIII Conferência Nacional de Cartografia e Geodesia*, Lisbon (Portugal), October 29-30, 2015.

➢ Brovelli M.A., Minghini M., Molinari M.E. & Mooney P. (2015) A FOSS4G-based procedure to compare OpenStreetMap and authoritative road network datasets. *Geomatics Workbooks* 12, 235-238.

➢ Brovelli M.A., Minghini M., Molinari M.E. & Mooney P. (2016a) Towards an automated comparison of OpenStreetMap with authoritative road datasets. *Transactions in GIS*. doi:10.1111/tgis.12182

➢ Brovelli M.A., Minghini M. & Molinari M.E. (2016b) An automated GRASS-based procedure to assess the geometrical accuracy of the OpenStreetMap Paris road network. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume XLI-B7, 919-925. doi:10.5194/isprsarchives-XLI-B7-919-2016