A WEB PROCESSING SERVICE FOR GNSS REALISTIC PLANNING

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WHY:

The result of a GNSS campaign benefits from an accurate planning, especially in presence of natural or artificial obstructions that reduce the satellite visibility.

HOW:

The planning task over wide areas has been made fully automatic in a GIS by using a digital surface model to build the obstruction plot and the GNSS almanac to evaluate the satellites' positions and their ground visibility.

A Web Processing Service has been implemented to allow also non GIS specialists to perform that task through a simple WebGIS interface.

The implementation follows the OGC specifications and relies fully on FOSS software, combining different systems to provide the user web interface, the data storage and the processing engine.`

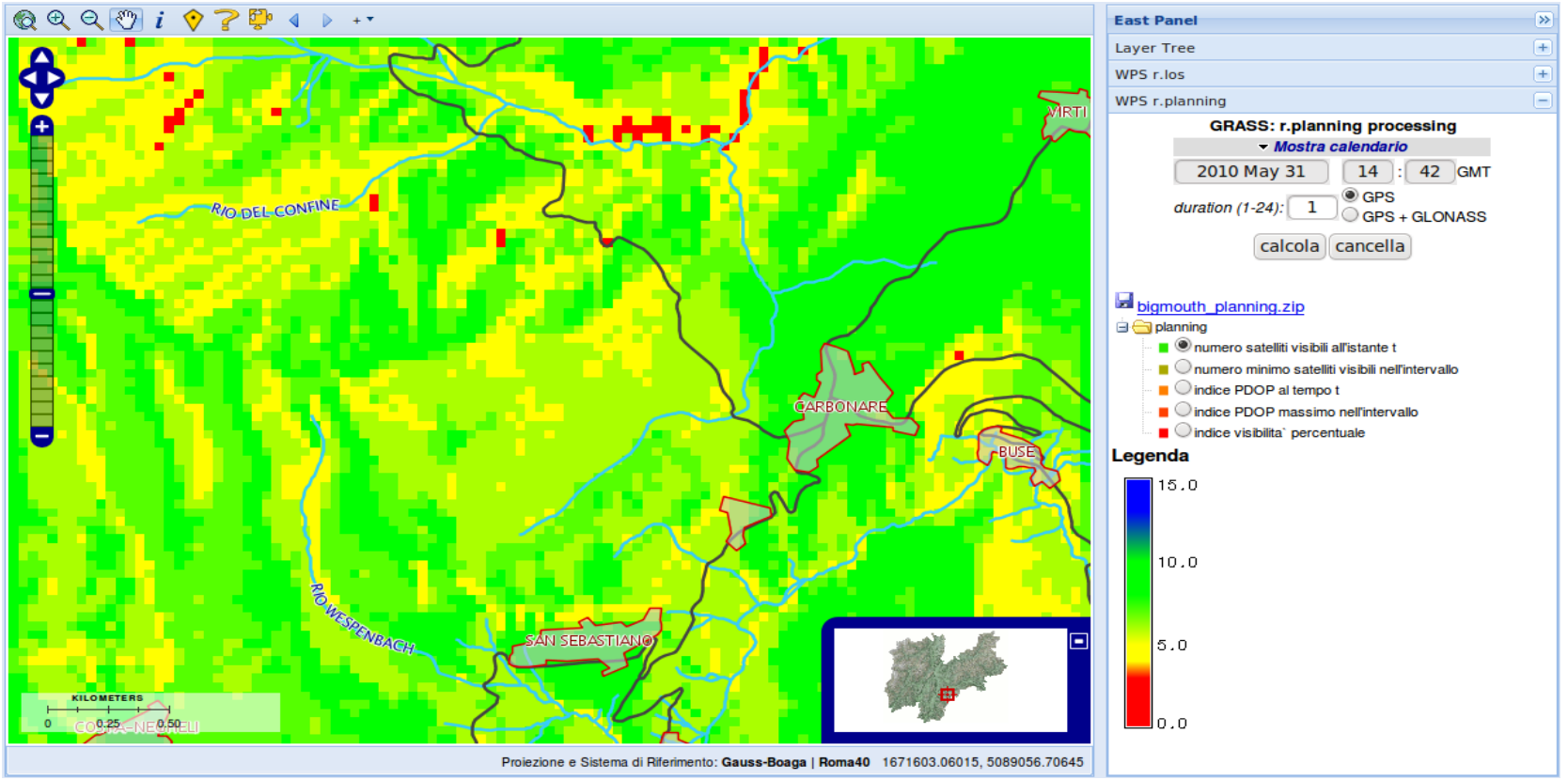
GNSS PLANNING with GIS

A GNSS planning software has been developed as modules of the GIS GRASS.

The procedure creates maps of realistic satellites visibility in three logical steps:
1) compute the obstructions to satellite signals due to terrain morphology or buildings;
2) compute the relative position of satellite-receiver and check the visibility of each satellite;
3) create maps of the number of visible satellites, PDOP and percentage of visibility indexes.

WPS for GNSS PLANNING

The integration of the WPS in a WebGIS has been carried out using PyWPS



TEST and FUTURE WORK

Planning results from the WPS have been verified by comparing the number of visible satellites to the number of satellites actually tracked by 8 GPS permanent stations in the Trentino region in Italy.

Out of 16 samples,
10 show a perfect accord between predicted (WPS) and observed (RNX) number of satellites;
in 5 cases the number of visible satellites is higher than predicted;
only in 1 case it is lower than predicted.

	10-11 GMT+00			15-16 GMT+00		
Station	WPS	RNX		WPS	RNX	
PASS	6	6	=	5	7	+
PARR	5	5	=	7	7	=
PEJO	7	6	-	5	6	+
POZZ	6	7	+	6	7	+
RONC	6	6	=	6	6	=
SARN	6	7	=	8	8	=
SPER	7	7	=	8	8	=
TREN	7	7	=	7	8	+

Future work will consist in:

- the use of SRTM or ASTER;
- the possibility for the user to chose other datums and local time;
- the implementation of a "multi-station network" mode to predict the number of common visible satellites for a set of permanent stations;
- the implementation of a procedure to assess the variability of the estimated parameters within the time span of the planning;
- the possibility to evaluate satellites' visibility for lines, 2D on over a DSM or 3D;
- additional test on scattered points where obstructions are more problematic.