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Recent results from the VLNDEF network

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The Italian geodetic infrastructure in Antarctica has been constantly developed during the last two decades. The integration of geodetic instruments with other geophysical sensors has been driving the planning and design of the geodetic infrastructure at Mario Zucchelli Station (MZS) and in a wide area around the base. Our purpose is to maximize the interdisciplinary use of the geodetic observations and to widen the field of investigation.

The first geodetic GPS network was established in the area of Mt. Melbourne in the late 80s to study the local movement and deformation of the volcanic cone. A wider geodetic network was materialized on rocky outcrops in 1999-2000 with the purpose to study crustal deformations in the Northern Victoria Land (NVL). The project, named VLNDEF (Victoria Land Network for DEFormation Control), also aims at collecting measurements to constrain Glacial Isostatic Adjustment (GIA) models. VLNDEF is formed by 28 points that are accessible by means of helicopter, the maximum distance of points from the Italian base MZS being about 500 km. A permanent GPS station (TNB1) was installed in 1998 at MZS with DOMES N. 66036M001. In addition, to increase redundancy in the long term observations at MZS, an additional permanent GPS station TNB2 was installed in 2008 on a marker materialized a couple of years earlier and a few meters apart from TNB1. In addition, during 2008 three semi permanent remote stations were installed: VL01 (Cape Hallett), VL05 (Cape Philips), VL18 (Starr Nunatak). They are powered by a set of batteries and solar panels and provide a few months of data every year. Since its establishment, VLNDEF has been surveyed ten times, of which three are surveys of the whole network.

GPS measurements are the core of the Italian geodetic infrastructure and are complemented by tide gauge measurements (since 2006), radiosoundings (during the Austral summer), on-ground meteorological parameters, episodic absolute and relative gravity measurements, geomagnetic field measurements and other geophysical observations. The deformation patterns obtained with GPS observations over the VLNDEF network are coupled with the data acquired during the geological and geomorphological surveys; the set of observations is used to study the neotectonics of NVL. We present the most recent geodetic results derived from the VLNDEF GPS data set and a recent cinematic model of the whole area. We present the preliminary geoid model in the northern part of the network.