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Geological setting of the Concordia Trench-Lake system

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Analysis and interpretation of Radio Echo Sounding (RES) profiles collected in the Vostok-Dome C region, central East Antarctica, highlighted the morphology of the elongated depressions that characterise this region, and proved the role played by tectonics in the development of the subglacial landscape.
Debate is still open on the age and tectonic style that produced the analysed subglacial depressions and proposed ages range from Paleozoic to more reasonably Cenozoic times, as proved by the relatively fresh morphological features.
RES data collected during the Italian Antarctic expedition in the period 1995-2001 in the Vostok-Dome C area allowed the calculation of a moderate resolution (8 km) bedrock map. Based on this map a lake classification for the district between Vostok and the Belgica Subglacial Highlands was proposed. Lakes were grouped in basin, trench and relief lakes. Tectonic analysis proved the compatibility of these depressions with the existence of two crustal listric normal faults, the Aurora and Concordia Faults.
We present the results of the Antarctic Italian Geophysical campaign of 2003 that was mainly addressed to the exploration of the Concordia Trench-Lake system. Collected data allowed to calculate a new, higher resolution map (3 km) showing details of the already known, main bedrock physiographic features, together with a previously unknown N-S array of subglacial depression cutting the Belgica Subglacial Highlands.
At Long. 124.5° E locates the Concordia Trench, over 200 km long and about 20 km wide. A smaller elongated valley locates between Long. 121° and 122° E. It is about 50 km long and 10 km wide. A third elongated subglacial depression, N-S trending, over 80 km long, and about 15 km wide, locates at the longitude of 125.5° E. The

new data of the Concordia Trench allowed to better constrain the along and across strike geometry of the Concordia Fault, confirming its primary role in governing the Cenozoic tectonic evolution of the bedrock in the Dome C region.
The new highlighted catchment basin morphology hosting subglacial lakes and the comparison with the physiographic setting of other fault-controlled lakes, glacial over excavation lakes, and volcanic lakes on the Earth surface allowed a series of morphological considerations. These strengthened the role played by tectonic, glacial scouring and volcanism in the origin of the Trench lakes, Basin lakes and Relief Lakes respectively.