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Geo Spots and Vortex Theory

Valentino Straser
Italy (valentino.straser@alice.it)

The relationship between the convection currents of the mantle-lithosphere system with terrestrial dynamics has represented one of the main themes of tectonophysics for over a century, in addition to the relationships interwoven with crust dynamics. Likewise, the relevant debate has animated the scientific community for more than a century, as recalled by the work of Kreighauger (1902), Ampferer (1906), Schwinner (1919), Holmes (1928), Griggs (1932), Pekeris (1935), Kraus (1951), Hess (1962). Though never directly observed, the convection currents in the mantle manifest their effects in the Earth's crust in various ways, such as the flow of heat in the oceans and continents, and magnetic anomalies. These are the result of effects caused by ferromagnetic materials dragged upwards by convection movements, as demonstrated by the laboratory simulations carried out by Glatzmaier and Olson (2005). With respect to the initial simplified and theoretical modelling of the first authors of the last century, the studies by Bercovici, Schubert and Glatzmaier (1989) and those of Glatzmaier and Olson (2005) revealed a complex three-dimensional model of the dynamics of convection processes in the mantle, even if it is not yet clear to what extent this mechanism actually reflects reality. The differences in temperature in the Earth's inner shells causes convection movements that can manifest both on a large scale with laminar flows and plumes, and on a small scale with turbulent flows concentrated in limited areas of the globe. The trajectories in a vortex, also proposed by Gurevich (2012), generated by complex motions in the mantle-lithosphere system, are driven by the Coriolis Effect. The combination of these mechanisms together with the Coriolis force creates, on the whole, ascending helical motions with a similar effect to that of an atmospheric cyclone interacting with the lithospheric shell. In this study it is believed that the ascending whirling movements (Vortex Theory), when limited to particular regions, may have created in the past and perhaps still do to this day torsions in localized spots of the Earth's crust (Geo Spots), which over time have conditioned the distribution of tectonic stresses on the surface of the Earth at a regional scale.