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The Vague Volcano-Seismic Clock of the South American Pacific Margin

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A volcano-seismic correlation was for a long time suspected to occur for the Pacific margin events of South America. During his trip on the Beagle, Charles Darwin (1840, 1897) wrote about the eruptions associated to the Conception earthquake of 1835. Casertano (1963) survey following the 1960 great Chilean earthquake found some unclear evidence of a link between eruptions and the seismic event, while some reservations has been raised (Tazieff, 1962). Scalera (2008) using the data available in 2006 in the Smithsonian Institution Catalogue of volcanic eruptions revealed grounded evidence that South-American Wadati-Benioff zone earthquakes with magnitude greater than 8.4 are associated to an enhanced rate of volcanic eruptions, but still was impossible to determine the causal chain between the two phenomena. An average return period of about 50 years was deducible from the data for the time window 1800-1999. After 2006, the Smithsonian Institution effort to improve our knowledge of this region has greatly increased the completeness of the catalogue adding the new eruptions for the 2000-2010 interval, but also adding a 50\% of new entries in the list of the Andean volcanoes. The occurrence of the Chilean Maule earthquake of 27 February 2010 (M=8.8) – occurred at five decades from the 1960 one – has been the occasion to rework all the data in searching for additional clues able to indicate a preferred causal direction eruptions-earthquake or earthquake-eruptions or from a third more general cause (e.g. a mantle movements) to both eruptions and earthquakes. Finally, a possible synchronicity of the volcano-seismic correlation events with features of the Markowitz oscillation of the secular Polar Motion is investigated. If this synchronicity will be confirmed by comparison of a longer series of Polar Motion data and volcano-seismic events (average return period of 40-50 years), we would reasonably be in the presence of a phenomenon that puts in communication the Earth's surface with its deeper interior (core-mantle boundary; where the cause of the Markowitz oscillation is hypothesized to be located) and that should be directly linked to a slow asymmetrical expansion of the Earth.