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Tectonic activity and climate change: Evolution of our planet from the primordial to the present situation

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Piezonuclear fission reactions, which occur in inert materials, are induced by high frequency pressure waves and, in particular, by brittle fracture in solids under compression. Their experimental evidence can be also confirmed considering the anomalous chemical balances of the major events that have affected the Earth's crust, oceans and atmosphere, over the last four Billion years. These anomalies include: (i) the step-wise time variations in the most abundant elements in correspondence to the formation and most intense activity of tectonic plates (ii) the Great Oxidation Event (2.7 to 2.4 Billion years ago), with a sharp increase in atmospheric oxygen and the subsequent ocean formation and origin of life (iii) the increase in carbon and nitrogen concentrations within the primordial atmosphere. Recent studies have revealed that not only the Earth's crust, but also its atmosphere and the concentrations of the basic elements for the development of life in the oceans have drastically changed over the Earth's lifetime. Piezonuclear reactions, recently discovered, can explain the strong variations between past and present compositions of the Earth's atmosphere, as well as the ocean formation itself. Today, several scientists sustain that, throughout the Twentieth Century, new forms of carbon pollution and the reactive nitrogen released into terrestrial environment by human activities (synthetic fertilizers, industrial use of ammonia, etc.) have been responsible for the dramatic increase in greenhouse gases. However, a strong doubt remains whether these phenomena may be also interpreted considering the piezonuclear effects on atmosphere and ocean evolution through plate tectonics and seismicity. As a matter of fact, the piezonuclear reactions can be put into relation to the increase in seismic activity that has occurred over the last century. In particular, neutron emissions measured in seismic areas exceeded the usual neutron background level up to three orders of magnitude in correspondence to rather appreciable earthquakes of the 4th degree in the Richter scale of magnitude. Moreover, appreciable CO_2 emissions have been observed before seismic events of relevant magnitude, reaching their maximum values some days before the earthquakes. Recently, an investigation has been carried out by our group. It starts from the experimental data acquired in the summer 2008 within the framework of a research activity devoted to monitoring neutron radiation at high altitude (Plateau Rosa laboratory, in the Western Alpi Mountains). Even more recent data refer to a dedicated experimental campaign carried out in January 2013 at a seismic area of the Appennini Mountains. In addition, an *in-situ* monitoring at a gypsum mine started in June 2013 and is still in progress. This activity is devoted to evaluate the seismic risk with the detection of acoustic, electromagnetic, and piezonuclear phenomena, together with radon and CO_2 emissions. These further experimental studies will give support to the idea that, integrating all these different measures, it is possible to set up a sort of multiparameter system for an environmental warning monitoring.

Biography

Alberto Carpinteri is the Chair of Solid and Structural Mechanics at the Politecnico di Torino (Italy). He was the President of different scientific associations and institutions, among which the International Congress on Fracture (ICF) and the National Research Institute of Metrology in Italy (INRIM). He is the author of more than 700 publications, of which over 300 in international peer-reviewed journals. He is presently the Editor-in-Chief of the journal "Meccanica".

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