



CICLO DI SEMINARI

Venerdi 15 Maggio 2015

Sala riunioni terzo piano - ore 11:00

ENVIRONMENTAL CONSEQUENCES OF ONTONG JAVA PLATEAU AND KERGUELEN PLATEAU VOLCANISM: CLIMATE AND OCEAN VARIABILITY UNDER EXCESS CO₂

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The mid-Cretaceous was marked by emplacement of large igneous provinces (LIPs) that formed gigantic oceanic plateaus, affecting ecosystems on a global scale, with biota forced to face excess CO₂ resulting in climate and ocean perturbations. Volcanic phases of the Ontong Java Plateau (OJP) and the southern Kerguelen Plateau (SKP) are radiometrically dated and correlate with paleoenvironmental changes, suggesting causal links between LIPs and ecosystem responses. Aptian biocalcification crises and recoveries are broadly coeval with C, Pb, and Os isotopic anomalies, trace metal fluxes, global anoxia, and climate changes. Warm temperatures characterized the pre-Oceanic Anoxic Event (OAE) 1a interval, followed by a maximum warming (of ca. 1.5 - 2 °C) during the early phase of anoxia under intense volcanic activity of the OJP. A short-lived cooling episode interrupted the major warming, following a rapid increase in weathering rates.

Massive volcanism occurring at equatorial versus high paleolatitudes and submarine versus subaerial settings triggered very different climate responses but similar disruptions in the marine carbonate system. Excess CO₂ arguably induced episodic ocean acidification that was detrimental to marine calcifiers, regardless of hot or cool conditions. The environmental disruptions attributed to the OJP did not trigger a mass extinction: rock-forming nannoconids and benthic communities underwent a significant decline during OAE 1a, but recovered when paroxysmal volcanism finished. Extinction of many planktonic foraminiferal and nannoplankton taxa, including most nannoconids, and most aragonitic rudists in latest Aptian time was likely triggered by severe ocean acidification.