Geophysical Research Abstracts,
Vol. 11, EGU2009-13704, 2009
EGU General Assembly 2009

Cyclic volcanism at convergent margins: Controlled by global climate changes?

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The records of widespread tephras of sub-Plinian to Plinian, and occasionally co-ignimbrite origin, which are particularly well preserved on the ocean floor, are representative of how eruption frequency varied with time. We investigate temporal variations of tephra deposits since the Pleistocene around the Pacific Ring of Fire accounting for about half of the global length of 44,000 km of active subduction. Eruptions at such arc volcanoes tend to be highly explosive and climatically relevant because their magmas are commonly volatile rich. Volcanic activity along the Pacific Ring of Fire evolved through alternating phases of high and low frequencies similar to periodicities as enforced by the Milankovich orbital parameters of the Earth and which also are observed in long-term climate proxies. For the first time we are able to show that there is a significant correlation between volcanic activity, changes in global sea-level and glacial stages such that peak volcanic activity occurs with a delay of about 20 ka after times of maximum rates in sea-level rise and strong deglaciation on the continents, helping the climate system to return to less intense warming and thus modulating the climate variations forced by orbital changes of the Earth.