Developing the Laschamp (40 ka) ^{10}Be peak as a stratigraphic marker to align marine sediment and ice core records of abrupt climate change

Robert Anderson & Martin Fleisher, Geochemistry Division, LDEO

Introduction and Background

Production of cosmogenic nuclides, such as 10Be, increases as the Earth's magnetic field strength decreases. A pronounced minimum in magnetic field strength at ~ 40 ka BP, known as the Laschamp event, created nearly a two-fold increase in 10Be production, the onset of which coincided with the end of Interstadial (IS) 11.

Past fluctuations in the intensity of the ocean's principal oxygen minimum zones (OMZs), located in the eastern Pacific Ocean and in the Arabian Sea, have been correlated with Dansgaard-Oeschger cycles (e.g., Altabet et al., 2002; Ortiz et al., 2004). We have just completed an NSF-funded study in which we measured 10Be/230Th and 231Pa/230Th ratios across intervals of fluctuating OMZ intensity in cores collected off the western margin of North America. These nuclide ratios were developed previously as a paleoproductivity proxy (Kumar et al., 1995), and they were applied here to assess the role of biological productivity in forcing fluctuations of OMZ intensity. Serendipitously, in a core collected off central California we found a peak in the flux of 10Be corresponding to the time of the Laschamp event (Figure 3), the amplitude of which is also similar to that seen in the Greenland ice cores (nearly a factor of 2). We propose to develop this peak as a stratigraphic marker.