

## Effects of Laschamp excursion on cosmogenic isotope production

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The Laschamp excursion is a period of reduced geomagnetic field intensity occurring  $40.7 \pm 1.0$  ky ago [3]. During this period, cosmogenic isotope production was affected not only directly by the reduced magnetic field, but also due to an increased sensitivity to solar activity. The latter occurs because a larger fraction of the lower energy interstellar galactic cosmic ray particles, normally excluded by the magnetic field, is able to reach the earth's atmosphere when the geomagnetic field is reduced. The overall result is a period of increased cosmogenic isotope ( $^{10}\text{Be}$ ,  $^{14}\text{C}$ ) production having considerable structure.

The aim of this study is to estimate, using high resolution (decadal) profiles of  $^{10}\text{Be}$  in ice cores from both Antarctica and Greenland as a proxy for production, input into a 10-box carbon cycle model, the expected influence of the Laschamp event on the concentration of  $^{14}\text{C}$  in the atmosphere between 37.5 and 45.5 ky BP.

Several cases were tested, from modern carbon cycle (pre-industrial) to severely reduced surface-deep ocean exchange flux [1]. We find that the atmospheric  $\Delta^{14}\text{C}$  due to increased production during this period varies from 180 to 300 ‰. This is considerably smaller than the  $\sim 500$  ‰ modelled by Hoffmann *et al.* [2] between 44-41 ky, which they attribute mainly to increased production. We believe the main difference is their use of an inadequate approximation for production as a function of geomagnetic field intensity. Hoffmann *et al.* also deduced an  $\sim 500$  ‰ increase in atmospheric  $\Delta^{14}\text{C}$  from measurements in stalagmites. If such an increase did indeed occur, we conclude that a substantial fraction must have resulted from a redistribution of the carbon cycle.

[1] K. Hughen *et al.* (2006) *Quat. Sci. Rev.* **25**, 3216-3227. [2] D. L. Hoffmann (2010) *Earth Planet. Sci. Lett.* **289**, 1-10. [3] B. Singer *et al.* (2009) *Earth Planet. Sci. Lett.* **288**, 80-88.

## Environmental geochemistry of nickel in stream sediments in Pernambuco State, Brazil

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The studied area covers the whole Pernambuco State, where they were collected 1162 samples of stream sediments to nickel (Ni). Analyses for environmental geochemistry have been achieved by the concentration ratios of metal and the average content in Brazilian standards [1].

The drainage sediments were analyzed by ICP-MS in fractions <80 mesh. Statistical analysis of dispersion of data obtained and toxicological reference [1] provided level above which the Ni may be considered anomalous.

The study shows Ni contents below the background, and environmentally consistent with the average (18 ppm) below which is not predictable adverse effects on biota. With the exception, there are three main areas with few values exceeding the limit proposed by [1]: (i) western 40-75 ppm Ni; (ii) center 43-54 ppm Ni; e (iii) east 50-80 ppm. The above data may correspond to normal values, backgrounds rocks of the area and may not represent anthropogenic pollution.

[1] CONAMA 2004. Resol. N° 344/2004. Web page: <http://www.mma.gov.br>