Boron and calcium isotope records of glacial-interglacial weathering from river paleochannel sediments

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The aim of this study is to explore relationships between climate and continental erosion from river paleochannel sediments. A previous work on U-series in the sediments from the Murrumbidgee paleochannels (Australia) has revealed that the sediment residence times increased by an order of magnitude during interglacial periods with direct links to climatic parameters [1]. Here, we compare those findings with analyses of B and Ca isotopes in the same paleochannel sediments, which we interpret as proxies for sources and weathering intensity [2,3].

We have analyzed different granullometric fractions of the sediment samples (500-800 μm, <53 μm and <2 μm) and have compared their respective geochemical/isotopic signatures. Analyses of major and trace elements confirm that coarse grains primarily reflect the mineralogy of the parent minerals and most likely reveal a geographical drift of the sediments sources whereas the fine grains show significant depletion of mobile cations that can be related to the intensity of the bedrock weathering. Analyses of $\delta^{11}B$ and $\delta^{44}Ca$ in the different granulometric fractions show that the coarse grains follow a gradual isotopic shift over the last 100 kyr with no evidence of climatic cycle, indicating a decoupling between climate change and the source of sediments in the Murrumbidgee watershed. Overall, $\delta^{11}B$ and $\delta^{44}Ca$ of the fine grains follow the trend defined by the coarse ones, indicating that the fine grains recovered in a river paleochannel sample are chemically related to the coexisting coarse ones.

Our results suggest that $\delta^{11}B$ and $\delta^{44}Ca$ in coarse sediments give information on the origin of the detrital materials but that the difference of chemical and isotopic compositions between coarse and fine grains give access to the intensitity of the bedrock paleo-weathering.

[1] Dosseto A. *et al* (2010) *Geology* **38** (5) 395-398. [2] Lemarchand D. *et al* (2012). *Geochim. Cosmochim. acta* **98** 78-93. [3] Schmitt A-D *et al* (2012) *Comptes Rendus Geoscience* **344** (11–12) 704-722.