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## Strong summer monsoon during the cool MIS-13

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**Abstract.** The  $\delta^{18}\text{O}$  record in deep-sea sediments show a significant reduced amplitude of the ice volume variations before Marine Isotope Stage 11, about 400 ka ago, with less warm interglacials and less cold glacials. The deuterium temperature and the greenhouse gases records in the Antarctic ice cores show the same feature. As the reduction in the amplitude of climate and greenhouse gases concentration variations before 400 ka BP is present in both deep-sea and ice cores, it is tempting to conclude that this is a worldwide phenomenon. This is not necessarily true, at least as far as some of the records, in particular of China and Europe, are concerned. The loess in northern China, the sedimentary core in the eastern Tibetan Plateau and the palaeosols in southern China all record an unusually warm and wet climate during Marine Isotope Stage 13, indicating an extremely strong East Asian summer monsoon. The pollen record from Europe shows that the climatic conditions during the interglacials previous to Marine Isotope Stage 11 are at least as warm as the younger interglacials. During Marine Isotope Stage 13, unusually strong African and Indian monsoon are recorded in the sediments of the equatorial Indian Ocean and of the Mediterranean Sea. Other extreme climate events are also recorded in sediment cores of the equatorial Atlantic, the Pacific, the subtropical South Atlantic Ocean and in the Lake Baikal of Siberia.

[Final Revised Paper](#) (PDF, 669 KB) [Discussion Paper](#) (CPD)

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