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Terrestrial material in Antarctic ice cores: The contribution of the Argentine continental shelf

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The amount of terrestrial dust (and dust-derived elements such as Fe, Al, Ca) in Antarctic ice cores varies over a huge range between glacial (high) and interglacial (low). Such changes recur throughout the 800 kyr EPICA Dome C record for example. Both geochemical and modelling studies confirm that Patagonia is probably the dominant source of dust. The dust flux is important both in its own right but also because of its possible role in iron fertilisation of the Southern Ocean, and the role it plays in modulating the preservation of volatile compounds in ice cores. It appears unlikely that transport played the largest role in the huge flux changes observed, which implies that either the nature of the source changed (perhaps because of changing aridity and surface winds), or the size of the source changed (because of changing exposure of continental shelves as sea level rose and fell). In this presentation, we will use the shape and timing of the change in dust flux compared to that of sea level in the last 20 kyr to assess the possible influence of continental shelf exposure: the timing suggests that a large part of the dust flux reduction at Termination I was completed before any significant flooding of the shelf. We will then assess the implications of this finding for earlier times, in particular looking at detailed sea level records of the last climatic cycle, and then back to the early part of the EPICA record, including the change in climate amplitude across the mid-Brunhes period.