

## Cross-check of dust-magnetic correlation and oxygen isotope stratigraphy in the Southern Ocean

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Southern Ocean (SO) marine core chronology forms the basis of understanding the past SO climates. Since the traditional oxygen isotope stratigraphy has difficulty in the SO due to general lack of calcareous foraminifera, dust-magnetic correlation is a promising way for chronology. However, the reliability of the circum-Antarctic dust-magnetic correlation was not fully confirmed, even beyond the last 100 kyrs. Here we show dust-magnetic correlation coupled to oxygen isotope stratigraphy at the marine core in the Indian sector of the SO, and compile the available sites in the Atlantic and Pacific sectors of the SO in order to validate the dust-magnetic correlation. The oxygen isotope stratigraphy confirmed that dust-magnetic correlation is applicable in the SO at least through the last 450 kyrs but revealed non-negligible difference between the two age models. The dust age models tended to be a few thousand kyrs older than the oxygen isotope stratigraphy especially at the glacial terminations. We conducted the phase analysis to show that sedimentation process cannot fully account for the observed difference between the two age models. We then compared, based on dust age models, SO oxygen isotope records with the global benthic stack curve and found that SO oxygen isotope changes earlier than the stack curve. Thus, the early rise in SO bottom water temperature and late response of ice sheet volume would be responsible for the differences between the two age models.

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