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Difference between the glacial cycles of Antarctic temperature and greenhouse gases

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Ice-core measurements have indicated that the atmospheric concentrations of the greenhouse gases CO_2 and CH_4 show glacial-interglacial variations in step with Antarctic temperature. To obtain more insight into the nature of this relationship for cycles of different frequencies, measured time series of temperature, CO_2, and CH_4 are reanalysed. The results indicate that the temperature signal consists of a linear superposition of a component related to CO_2 with a period of $\sim$100,000 years and a component from variations in the obliquity of the Earth's orbital plain with a period of $\sim$41,000 years. This suggests that there exist either very different gain factors for the different signals or that CO_2 is not merely a passive follower and amplifier of the glacial-interglacial variations in Antarctic temperature.