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Ocean circulation and climate in an idealised Pangean OAGCM

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An idealised Pangean geography (220Ma) is integrated in a low resolution coupled ocean atmosphere general circulation model to investigate the possible form of the ocean circulation and its impacts on the large scale climate system.

A vigorous, hemispherically symmetric overturning is found, driven by deep water formation at high latitudes. Whilst the peak mass transport is around 100 Sv, a low vertical temperature gradient in the ocean results in a maximum heat transport of only 1.2 PW. The form of the circulation is in agreement with that found in other models, although the bottom waters formed are not as warm as those suggested by proxies for this time, despite the vertical temperature gradient present.

The change from a modern to idealised Pangean geography in the coupled model is found to produce a global average warming of 2C, despite an increase in global surface albedo. This is maintained through changes in the atmospheric water vapour and cloud distributions. There is also reduction in the equator-pole temperature gradient, largely attributable to the same causes, avoiding the paradox of low meridional temperature gradients without increased polar heat transport.