

Reflections on the nature of non-linear responses of the climate to forcing

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On centennial to multi-millennial time scales the paleoclimatic record shows that climate responds in a very non-linear way to the external forcing. Perhaps most puzzling is the change in glacial period duration at the Middle Pleistocene Transition. From a dynamical systems perspective, this could be a change in frequency locking between the orbital forcing and the climatic response or it could be a non-linear resonance phenomenon. In both cases the climate system shows a non-trivial oscillatory behaviour. From the records it seems that this behaviour can be described by an effective dynamics on a low-dimensional slow manifold. These different possible dynamical behaviours will be discussed.

References:

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