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Earth's climate as a complex system

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Planetary climates are complex systems composed of many interacting components. In the case of Earth, the atmosphere, oceans, cryosphere, geosphere and biosphere interact nonlinearly on a multitude of spatial and temporal scales, generating feedback mechanisms that lead both to climate variability on all time scales, as well as to long-term stability of the climate system that has allowed life persistence in the last 3.5 billion years. In this lecture, I shall review some of the basic feedback mechanisms that control Earth climate, addressing the role of the biosphere and the physical and chemical characteristics that make our planet habitable. The role of anthropic influence on climate, mainly through emission of greenhouse gases and land-use changes, is finally discussed, together with possible climate change mitigation options such as carbon capture and sequestration.

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