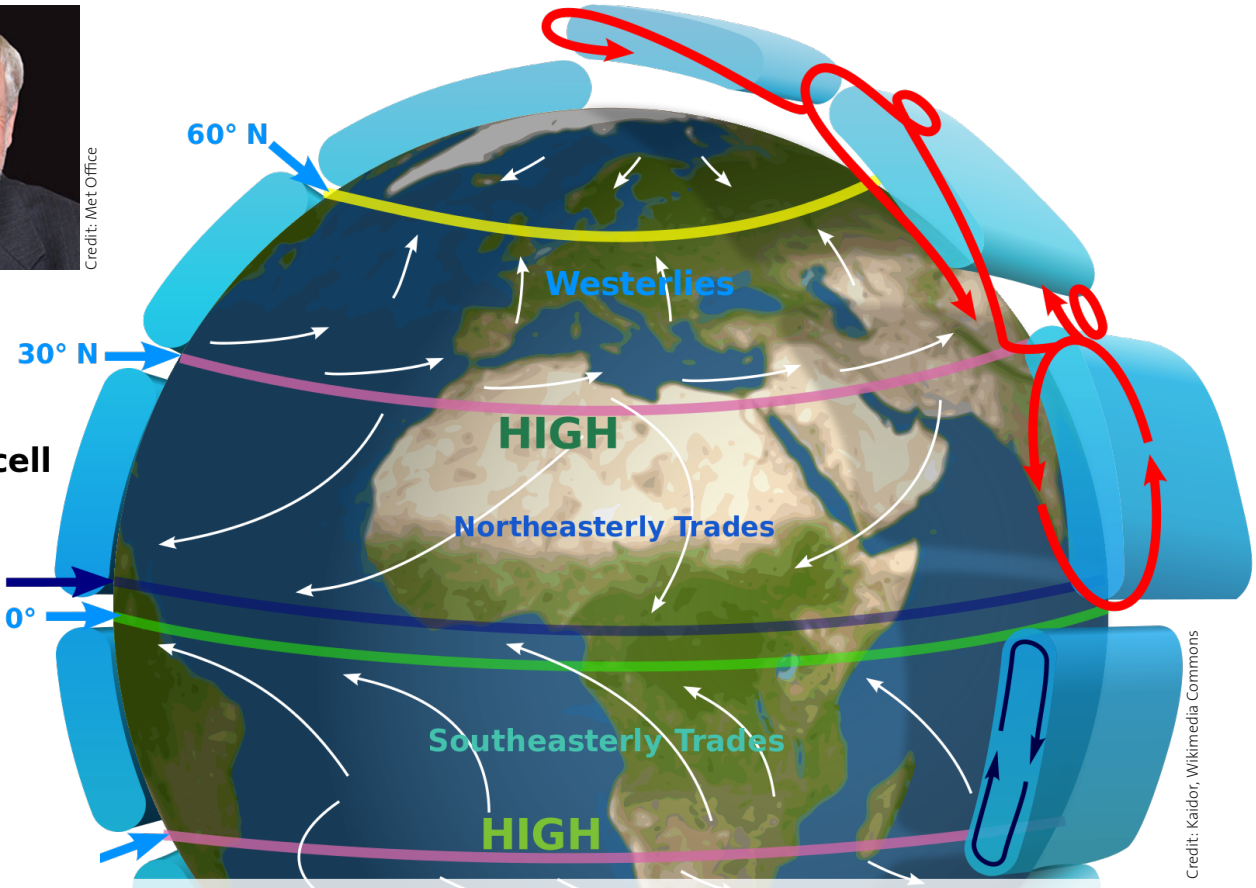
Bolin Centre Seminar

by the Bert Bolin Climate Lecture speaker

Cross-Equatorial Flow and the Hadley Cell

Credit: Met Office



Credit: Kaidor, Wikimedia Commons

The usual picture of the winter and summer Hadley Cells gives the impression of air moving smoothly from one hemisphere to the other in a giant overturning circulation. The classic theories of the Hadley Cell are based on angular momentum conservation with the additional consideration of some mixing. However, a constraint based on both thermodynamics and dynamics means that air cannot move easily from one hemisphere to the other. Near the surface, topographic and frictional processes, aided by diabatic processes, are able to overcome the constraints. However in the upper troposphere, there are no equivalent frictional processes.

Using reanalysis data, the cross equatorial mass flux is found to occur in streamers or filaments that are mixed in in the winter subtropics or reach the winter subtropical jets and strengthen them. The cross equatorial motion in the upper troposphere takes place in westerly waves on the oceanic Inter-Tropical Convergence Zones and in convective events in monsoon heating regions. These processes will be shown to be able to have an important impact on weather. It is argued that they are also important in climate and climate change, and that climate models may not be handling them correctly. Finally, it will be suggested that knowing that the cross-equatorial transfer of trace chemicals in the atmosphere occurs in filaments may have significant implications for the chemistry of the troposphere and for models of it.

Speaker: **Sir, Professor Brian Hoskins, Imperial College London**

Date: **Thursday 12 May, 2016, 10:00–11:00**

Place: **Nordenskiöld room, Geoscience Building**

Bolin Centre for Climate Research
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