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# A Paradigm shift to an Old Scheme for Outgoing Longwave Radiation

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There are many cases where the climate models do not agree with the empirical data. For instance, the data from radiosondes (and MSUs) do not show the amount of warming in the upper troposphere that is predicted by the models (Thorne et al. 2011). The current scheme for outgoing longwave radiation can be traced back to the great 19th Century French mathematician J-B Joseph Fourier. His anachronistic idea was that the radiation balance at the top of the atmosphere (TOA) is maintained by the conduction of heat from the surface (Fourier 1824). It was based on comparing the atmosphere to the 18th Century Swiss scientist H-B de Saussure's hotbox which he had invented to show that solar radiation is only slightly absorbed by the atmosphere. Saussure also showed that thermal radiation existed and argued that the warmth of the air near the surface of the Earth is due to absorption of that infra red radiation (Saussure 1786). Hence a paradigm shift to Saussure's scheme, where the thermal radiation is absorbed at the base of the atmosphere, rather than throughout the atmosphere as in Fourier's scheme, may solve many climate models problems. In this new paradigm the boundary layer continually exchanges radiation with the surface. Thus only at two instants during the day is there no net gain or loss of heat by the boundary layer from the surface, and so that layer is not in LTE. Moreover, since the absorption of outgoing longwave radiation is saturated within the boundary layer, it has little influence on the TOA balance. That balance is mostly maintained by changes in albedo, e.g. clouds and ice sheets. Use of this paradigm can explain why the excess warming in south western Europe was caused by water vapour close to the surface (Philipona et al. 2005), and may also explain why there are difficulties in closing the surface radiation balance (Wild et al. 2013) and in modelling abrupt climate change (White et al. 2013).

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