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Large-scale motions of extrasolar giant planet atmosphere

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It is now possible to observe large-scale spatial and temporal variations of temperature on extrasolar giant planets. However, since the temperature structure and motions are intimately connected, a good understanding of atmospheric dynamics on extrasolar giant planets is necessary. Preliminary simulations of extrasolar giant planet atmospheres have already been carried out using sophisticated numerical models. In this talk, analysis of equations of motion, appropriate for studying atmospheric motions of spatial scales larger than about a tenth of the planetary radius and time scales larger than about a tenth of the planetary rotation period, is presented. It is found that temperature distribution and variability can depend sensitively on the background flow speed and shear. Offset, or no offset, of a temperature maximum with phase angle observable in the atmosphere can depend on the behavior of wave propagation from the heated region and the possibility of resonance between the flow and the heated region itself.