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Zonal mean dynamics on Saturn from Cassini and Voyager data

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A high resolution map of zonal mean zonal winds and potential vorticity in Saturn's upper troposphere and stratosphere has been constructed assuming geostrophic thermal wind balance from a combination of cloud-level winds (derived from Voyager and Cassini images) and profiles of temperature and molecular hydrogen para-fraction retrieved from measurements by the Cassini Composite InfraRed Spectrometer (CIRS) between October 2004 and March 2006. Away from the equator, the results show a clear pattern of alternating jet streams extending to the high latitudes, all of which are found to decay significantly with height between 100 and 10 hPa pressure. The equatorial jet also exhibits strong decay with height into the lower stratosphere, but with evidence of some more complex structure in the middle and upper stratosphere. Potential vorticity profiles show evidence for a hyper-staircase structure, much as found on Jupiter. These results will be presented and discussed in the context of their implications for global atmospheric dynamics on Saturn and the other outer planets.