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Semi-annual oscillations in the atmosphere of Mars: a study with a general circulation model

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Oscillations of the zonal mean wind in the tropical atmosphere with a half-year periodicity is a well-known phenomenon on Earth. Although the semi-annual oscillations (SAO) are clearly associated with the annual cycle of radiative forcing (the sun crosses the equator twice a year), the SAO are driven primarily by non-axisymmetric eddies: planetary and gravity waves, solar tides. We have found oscillations closely resembling SAO in a multi-year run performed with a general circulation model of the Martian atmosphere. Our analysis revealed similarities and differences in this phenomenon of the Martian and terrestrial equatorial dynamics. In particular, we explored the role of Kelvin waves in forcing the equatorial super-rotation (westerly phase), and of the related momentum transport by the meridional advection, stationary planetary waves, and thermal tides. In this presentation, we shall report on our inferences regarding the forcing mechanism of the Martian SAO, and compare it with that one on Earth.