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Seasonal cycle effects on tropical climate variability

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In spite of strong semi-annual solar forcing, the equatorial Pacific climate system exhibits pronounced variability on an annual (not semi-annual) timescale. This presentation reviews the coupled air-sea processes that generate an annual cycle in the equatorial Pacific under present day, mid-Holocene and future greenhouse warming conditions. The seasonal cycle in SST, coupled feedbacks, thermocline depth, ocean currents and winds impacts also the ENSO system, its seasonal locking and its global teleconnections. We will present new results that demonstrate that many diagnosed phase-relationships between ENSO and other climate modes (e.g. Indian Ocean Dipole) have to be re-interpreted, if seasonal processes are properly accounted for.