



QBO cycle identified by changes in height profile of the zonal winds: new regularities and relation to variations in the solar UV flux

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The vertical wind profiles in the equatorial atmosphere for 1953-2003 have been examined to study the regularity in the wind reversal in course of the Quasi-Biennial Oscillation (QBO). The detail analysis of rotation in the stratospheric wind profiles reveals that the quiet periods alternate with active periods, characterizing by strong disturbing winds. The stage with the easterly winds above 20-30 hPa and westerly winds lower this layer (Stage 1) always starts in solstice (winter or summer) and can be of different but quite discrete duration (about 3, 9, or 15 months). Then, the disturbing winds descend below 20-30 hPa (Stage 2). It takes 20-21 months for next 2-8 stages and Stage 1, with the easterly winds above and westerly winds below 20-30 hPa, is formed again in solstice. Accordingly, the full cycle of the wind evolution takes 24, 30, or 36 months depending on duration of the Stage 1. To reveal influence of solar UV irradiation on (QBO) of zonal winds, the vertical profiles of zonal winds have been examined in relation to variations of solar $F_{10.7}$ index. It turned out that the easterly winds descend below ~ 30 hPa only under condition of the steady increase of the UV irradiation happening in time of the first equinox in course of partial QBO cycle. If the UV irradiation decreases during the equinox, the easterly winds typical of the upper layer, do not descend below 30 hPa, and Stage 1 persists till next equinox. In other words, occurrence of the stalling region at ~ 30 hPa is affected by decrease of the UV irradiation in the proper time. Since the length of the QBO cycle is determined by duration of Stage 1, the cycle length can be predicted setting the time of transformation from Stage 1 to Stage 2.