

SOLAR ACTIVITY INFLUENCE ON GLOBAL CLIMATE OSCILLATIONS

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The solar activity affects all geosystems, including climate and weather. The terrestrial systems are influenced by direct radiation over Earth surface, solar wind, and the solar magnetic field. The variations of these solar parameters are presented in the observed data of sunspot numbers, Total Solar Irradiance (TSI) and North-South (N-S) solar asymmetry. The TSI cycles are the main source of climate indices variations. The solar wind directly affects Earth magnetic field, ionosphere and atmosphere. The variations of solar magnetic field modulate solar wind and Cosmic Rays (CR) in the frame of the heliosphere. The cosmic rays near Earth are modulated by Earth magnetic field variations, too. The variations of sunspot numbers, TSI, N-S solar asymmetry and CR have different spectra for some frequency bands and corresponding different influence on terrestrial systems. The solar activity influence on global climate oscillations is investigated by long time series of global Earth temperature over land and ocean, some regional precipitation and Palmer Drought Severity Index (PDSI). Common solar and climate interannual, decadal and centennial cycles in narrow frequency bands are determined and possibility of their use in climate change prediction is discussed.

INTERANNUAL VARIATIONS OF J₂ COEFFICIENT OF EARTH GRAVITY FIELD DUE TO SOLAR HARMONICS

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The variations of low degree gravity coefficients are strongly connected with Earth rotation oscillations, winds, atmospheric angular momentum, mean sea level, polar ice thickness and global hydrologic cycles. The energy source of their excitation is usually solar activity. The coefficient of second gravity harmonic J_2 is determined by laser observations of several geodetic satellites for the last 40 years. The time series spectrum of J_2 variations consists of several significant oscillations with periods of 1yr, 1.2yr, 1.3yr, 1.5yr, 2yr, 2.5yr and 4-7yr. These oscillations are compared with the interannual harmonics of the Total Solar Irradiation (TSI) variations for the period 1976-2012. The possible interconnection between the solar harmonics, atmospheric angular momentum, mean sea level, earth rotation and J_2 variation is discussed.