M25a Decadal Variation of the Solar Total Irradiance and the Climate Change of the Earth

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In a series of study of the mechanism of the long-term variation of the solar total irradiance (STI), we have postulated that the land-air temperature anomalies of the Earth can be a good indicator of the STI variation. A concrete evidence of the validity of this fundamental postulate is the similarity of the behavior of the decadal components of the time variation of the instrumentally measured global land-air temperature anomalies and of the STI variation directly measured from space by Solar Maximum Mission and Nimbus 7 from solar cycle 21 to solar cycle 22. We report here that the land-air temperature anomaly time variation and the solar magnetic field cycle had similar decadal components and were in anti-phase from solar cycle 13 to solar cycle 15 and that this phase relation slowly turned obscure in solar cycle 16 and became in phase after solar cycle 19. If the decadal component of land-air temperature anomalies reflect well the decadal component of the STI variation, then the STI variation should be in anti-phase from solar cycle 13 to 15. This finding leads to a solution of the enigmatic excellent correlation between the water level of Lake Victoria and the solar magnetic cycle in solar cycles 14 and 15 found by Brooks (1923). Since the correlation turned obscure after solar cycle 16, the correlation was taken as a classical example of spurious correlation of the climate of the Earth and the Sun without any dynamical link. However, if we accept that the solar magnetic cycle and the STI variation need not be always in phase and that the climate of the Earth is influenced more by the STI variation than the solar cycle magnetic activity, then the enigma of Lake Victoria is no longer an enigma but a strong evidence of the Sun-climate connection. The case of the Lake Victoria also indicates an anti-correlation between the precipitation in the African continent and the global land-air temperature anomalies.