



Solar activity – climate relations: A different approach.

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Abstract. The presentation of solar activity-climate relations is extended with the most recent solar activity and temperature data series. The extension of data series shows clearly that the forcing of terrestrial temperatures is dominated by sources different from solar activity after \sim 1985. Based on analyses of data series for the years 1850-1985 it is demonstrated that apart from a single-period sinusoidal excursion in Earth's temperatures between \sim 1923 and 1965 there is a strong correlation between solar activity and terrestrial temperatures delayed by 3 years, which complies with basic causality principles. Regression analyses between solar activity represented by the cycle-average sunspot no., SSNA, and global temperature anomalies, Δ TA, averaged over the same interval lengths, but delayed by 3 years, provides the relation Δ TA = 0.009 (\pm .002) • SSNA. Since the largest ever observed SSNA is \sim 90 (in 1954-1965), the solar activity-related changes in global temperatures could amounts to no more than \pm 0.4°C over the past \sim 400 years where the sunspots have been recorded. It is demonstrated that the small amplitudes of cyclic variations in the average global temperatures over the \sim 11 year solar cycle excludes many of the various driver processes suggested in published and frequently quoted solar activity-climate relations. It is suggested that the in-cycle variations and also the longer term variations in global temperatures over the examined 160 years are mainly caused by corresponding changes in the total solar irradiance level representing the energy output from the core, but further modulated by varying energy transmission properties in the active outer regions of the Sun.