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Correlation and spectra analysis of climate data sets

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In January 2013 O.Humlum, K.Stordahl, and J.Solheim published [1] a correlation and spectral analysis of inter-annual oscillations for multiple climate data sets covering the time span from 1980 to December 2011. A similar but independent study of other climate data was published in September last year [2]. Here the ENSO-index [3], global surface temperatures (GST) [4], and the Mauna Loa CO_2 monthly data [5] were analyzed for the period 1958-2012. Methods of trend extraction in these two studies were similar but not the same. Nevertheless, three spectral lines coincided in [1, 2] within the exactness of the calculations. The corresponding periods are equal to 2.48(width 1%), 3.64(width 1%), and 9(width 2%) years. The line half-widths turned out to be from two to four times the theoretical limit related to the data length.
The inter-correlation functions (covariance) showed lags in the order ENSO/GST/CO_2. Analysis of longer data sets reveals higher covariance maximums (up to 0.74 for GST/CO_2) with significantly lower lags than in [1].
We also seek a relation between the ENSO index and the 1962-2013 length of day (LOD) data [6]. The LOD/ENSO covariance reveals a rather low maximum about 0.2 with lag of +1 and width of 2 months. Such a nearly simultaneous covariance indicates a possible weak, coupled interaction between the Moon dynamics and the Pacific temperature and pressure oscillations.
All the correlations mentioned above could provide better probability predictions for climate changes at the inter-annual scale.
Literature
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