Multi-millennium changes of the geomagnetic field and solar activity

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The long-term solar activity has been recently reconstructed on the multi-millennium time scale (Solanki et al., Nature, 431, 384, 2004) from the measured concentration of radiocarbon ^{14}C in tree rings. The exact level of the reconstructed solar activity depends, however, on independently evaluated data of the geomagnetic dipole strength variations. Recently, a new series of the palaeomagnetic dipole moment reconstruction for the last 7000 years has been presented by Korte and Constable (Earth Plan. Sci. Lett., 236, 348, 2005), on the basis of a thorough complex analysis of global samples. The new palaeomagnetic series yields systematically lower dipole moment in the past, compared to the earlier geomagnetic reconstructions. We have revised the earlier sunspot activity reconstruction since 5000 BC, using the new geomagnetic data, and found that it is consistent with the previous results during most of the period, although it yields a slightly higher level of the reconstructed sunspot activity. The earlier finding on the very unusual level of the contemporary solar activity over the last millennia is confirmed with the new palaeomagnetic series. The Sun spent only 2-3 % of the time in a high activity state, similar to the modern episode, implying that the modern high activity level is very unusual during the last 7000 years. On the other hand, grand minima occupy about 12 % of the time in the recent history of the Sun. The new reconstruction allows for a comparative study of solar-terrestrial relations in the multi-millennium time scale.