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Solar modulation during the Holocene

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Here we compare several models of the local interstellar spectrum (LIS) often used in literature. It is shown that the modulation potential ϕ which parametrizes the modulation of the LIS in the heliosphere, strongly depends on the LIS itself. Taking the LIS-dependency of the modulation parameter into account, we first derive simple linear equations to convert ϕ between the different LIS. Higher polynomials only hardly improve the conversion, and thus it is concluded that the conversion with linear equations can be done with good results. Then, a long-term reconstruction of ϕ derived from a record of the cosmogenic radionuclide 10Be is investigated. This reconstruction shows unphysical negative values during some periods. Besides non-heliospheric effects such as the uncertainties in atmospheric mixing and in paleo-geomagnetic field intensity, these negative values could also be due to the usage of a too less intensive LIS. The next step will be to remove the non-heliospheric effects from the ϕ record, which then would probably allow to identify the "true" LIS.