EGU21-2287
https://doi.org/10.5194/egusphere-egu21-2287
EGU General Assembly 2021

Atmospheric production and transport of ^{7}Be activity by cosmic rays: Modelling with the chemistry-climate model SOCOLv$_{3.0}$ and comparison with direct measurements

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We present the first results of modelling of the short-living cosmogenic isotope ^{7}Be production, deposition, and transport using the chemistry-climate model SOCOLv$_{3.0}$ aimed to study solar-terrestrial interactions and climate changes. We implemented an interactive deposition scheme, based on gas tracers with and without nudging to the known meteorological fields. Production of ^{7}Be was modelled using the 3D time-dependent Cosmic Ray induced Atmospheric Cascade (CRAC) model. The simulations were compared with the real concentrations (activity) and depositions measurements of ^{7}Be in the air and water at Finnish stations. We have successfully reproduced and estimated the variability of the cosmogenic isotope ^{7}Be produced by the galactic cosmic rays (GCR) on time scales longer than about a month, for the period of 2002–2008. The agreement between the modelled and measured data is very good (within 12%) providing a solid validation for the ability of the SOCOL CCM to reliably model production, transport, and deposition of cosmogenic isotopes, which is needed for precise studies of cosmic-ray variability in the past.