

In this paper, the authors aim to assess the production rate using the CRAC: Be and the transport process of the cosmogenic Be isotopes using the Chemistry-climate model SOCOL-AERv2-BeV1. The  $^7\text{Be}$  concentrations in the near-ground air calculated by the model were compared with the observed concentrations at four high-latitude stations in both hemispheres from 2002 to 2008. The model calculation data in the Northern Hemisphere stations are in reasonable agreement with the observation data, especially the monthly and annual mean values.

This paper contributes to an understanding of the production and transport process of the cosmogenic Be isotopes, but some hypotheses of the gas transport process of Be isotopes are different from the common sense of transport with aerosol. Therefore, this paper is required to major revision for either modification of the transport process or explaining the substantial reason for the gaseous behavior of the cosmogenic Be isotopes.

#### Section 4.3

P11 L225-226: “It should be noted that we treat  $^7\text{Be}$  as gas only for the advective transport when the result is the same for the small particles and gas components. “- Why the  $^7\text{Be}$  is treated as gas not the aerosols when the result is the same. The  $^7\text{Be}$  is treated as the aerosols in both the previous model and the observation. Why is it not sufficient to treat the  $^7\text{Be}$  as an aerosol?”

P12 Figure 4: Isn't the vertical axis the amount of cosmogenic Be isotopes in the atmosphere? I have never seen the concentration of the cosmogenic isotopes as  $10^8$  atoms  $\text{m}^{-3}$ , also in the stratosphere (Jordan *et al.*, 2003).

#### Section 5.1

P13 L290: Since volume of the air is extremely changing with atmospheric pressure, it is recommended to use at /  $\text{m}^3$  SPT as the volume unit.

P15 Figure 6: The color contour is unclear to represent the deposition distribution described in the text. It should be made clear that the deposition at the West of the continents is lower than other areas.

#### Section 5.2

P15 L316: “on the 30<sup>th</sup> day after the event “- It might be miss touch “on the 30 days after the event.”

P15 L324: Miyake *et al.*, 2018 (GRL <https://doi.org/10.1029/2018GL080475>) detected the SEP signal at 993-994CE of  $^{10}\text{Be}$  in the quasi-annual Antarctic ice core record. Is it possible that the SEP event is stronger than a few orders of magnitude?

P16 L329: Figure 9 is not atmospheric concentrations. Please check the data.

#### References

There is some typo in the text, and, in some cases, abbreviations are not used in the journal name. Please check again.

P22 L446: “Three-dimensional simulation of  $^7\text{Be}$  in a global climate model.” - “Three-dimensional simulation of  $^7\text{Be}$  in a global climate model.”

P22 L465: “Modeling production and climate-related impacts on  $^{10}\text{Be}$  concentration in ice cores.” - “Modeling production and climate-related impacts on  $^{10}\text{Be}$  concentration in ice cores.”

P23 L500: “Sulfur, sea salt and radionuclide aerosols in giss modele.” - “Sulfur, sea salt and radionuclide aerosols in GISS modelE.”

P23 L507: “Stratosphere–troposphere exchange in a changing climate simulated with the general circulation model maecham4.” - “Stratosphere–troposphere exchange in a changing climate simulated with the general circulation model MAECHAM4.”

P23 L508: “Deposition of naturally occurring  $^7\text{Be}$  and  $^{210}\text{Pb}$  in Northern Finland.” - “Deposition of naturally occurring  $^7\text{Be}$  and  $^{210}\text{Pb}$  in Northern Finland.”

P24 L513: “Geomagnetic and atmospheric effects upon the cosmogenic  $^{10}\text{Be}$  observed in polar ice.” - “Geomagnetic and atmospheric effects upon the cosmogenic  $^{10}\text{Be}$  observed in polar ice.”

P24 L522: “Extended versions of the convective parametrization scheme at ecmwf and their impact on the mean and transient activity of the model in the tropics” - “Extended versions of the convective parametrization scheme at ECMWF and their impact on the mean and transient activity of the model in the tropics”

P24 L525: “Geophysical Research Letters” is not an abbreviation.

P35 L558: “Global cloud and precipitation chemistry and wet deposition: tropospheric model simulations with echam5/messy1. Atmospheric Chemistry and Physics” - “Global cloud and precipitation chemistry and wet deposition: tropospheric model simulations with EHCAM5/MESSy1. “. “Atmospheric Chemistry and Physics” is not an abbreviation.

L26 L597: “atmospheric  $^7\text{Be}$  in Europe” - “atmospheric  $^7\text{Be}$  in Europe”