

Perchlorate in surface snow along a transect in East Antarctica

S.JIANG^{1*} AND J. COLE-DAI²

¹Polar Research Institute of China, Shanghai 200136 P.R.

China (*correspondence: jiangsu@pric.org.cn)

²Department of Chemistry and Biochemistry, South Dakota State University, Avera Health and Science Center, Box 2202, Brookings, SD 57007, USA (jihong.cole-dai@sdstate.edu)

Perchlorate is a persistent inorganic compound, which can interfere with iodide uptake by the thyroid gland and poses a significant health risk [1]. Environmental perchlorate has both anthropogenic and natural sources. Snow carrying chemical substances from the atmosphere deposits and accumulates continuously on polar ice sheets. These records can be used to track the sources of important substances including pollutants and to investigate relationships between atmospheric chemistry and climatic conditions.

During the 31st Chinese Antarctic Research Expedition in 2014/2015 austral summer, a set of 116 surface snow samples were collected along a transect from Zhongshan Station to Dome A in East Antarctica. The snow samples were used to assess the spatial variability of perchlorate along the transect and to determine what factors influence spatial variability of perchlorate in snow. Results show that the perchlorate concentrations vary between 32 and 200 ng kg⁻¹, with an average of 104.3 ± 33.3 ng kg⁻¹. These values are within the range of perchlorate concentrations in Antarctic snow ever reported [2,3], but are much higher than those in Arctic snow [4,5]. The perchlorate concentration profile shows only regional trends but no single consistent trend along the entire transect. When perchlorate concentrations are plotted against accumulation rate along the transect, higher perchlorate concentrations are found at sites with lower accumulation rates ($r = -0.466$, $p < 0.001$, $n = 112$). The negative correlation between perchlorate concentrations and accumulation rates is much more significant in the coastal region ($r = -0.780$, $p < 0.001$, $n = 21$) and the inland region ($r = -0.714$, $p < 0.001$, $n = 23$) than the transect as a whole.

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