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Trace metal ions in the snow, ice and freshwater of East Antarctica

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Sixteen metals have been analysed in 35 water and ice samples collected by Negoita from the lakes, snow

and ice cap in East Antarctica to put into evidence the influences of the global metal emisions on the East Antarctic freshwater system.

Concentrations of the dissolved microelements ranged between <0.00001-0.0096 mg/L for Cd and 0.0013-0.0044 mg/L for Cr in lake water and ice; <0.00001-0.0202 mg/L for Cd and 0,0003-0,0130 mg/L for Cr in snow samples; and <0.00001-0.0024 mg/L for Cd and Cr in ice samples from the Antarctic ice cap. The Mn content recorded minimum values of <0.00001 mg/L and a maximum of 0.0406 mg/L in lake water, and 0.0538 mg/L in snow samples from Molodezhnaya Station areal. Most of the samples have a Ni content <0.0002 mg/L. Maximum values for Ni, of 0.0137 and 0.0120 mg/L, have been determined in lake ice in Schirmacher Oasis, Novolazarevskaya Station zone and, respectively, in snow samples from Larsemann Hills, Progress Station. These values are comparable with those determined by Negoita and Ropota in Spitsbergen rivers in 1997. In the same time, the obtained values meet the standard concentration limits for freshwater, except for a maximum of 0.0202 mg/L determined for Cd in the snow samples from Larsemann Hills. Many of the analyzed samples had a Pb content <0.001 mg/L, below the minimum standard concentration limit for freshwater. The obtained maximum levels, of 0.1365 mg/L, 0.1171 mg/L and 0.1102 mg/L for the lake ice, snow, and ice in Antarctic ice cap, respectively, are

lower than the maximum standard concentration limit for freshwater, but twice higher than those determined by us in Spitsbergen, suggesting Pb emission transport over long distances. The maximum values for Cd, Fe, Ti, Cu and Zn (0.586 mg/L in lake water in Molodezhnaya station and 0.2148 mg/L in the ice cap) result from the accumulations of dust particles from rock disintegration. The Sb concentrations ranged between <0.0001 mg/L in Schirmacher Oasis area, Larsemann Hills (Progresss Station and Stornes Peninsula) and 0.0246 mg/L in water from lake no.2 and the snow sample no.20 from Progress Station areal. The Sn values ranged between <0.00001 mg/L in snow samples in Stornes Peninsula, Druzyhnaya – 4, in snow on the ice cap in Mirny zone, and 2.7750 mg/L in snow from Progress areal. The minimum Zn values, <0,0055 mg/L in water from lake no.2 in Novolazarevskaya area, in the ice and snow on the ice cap in Mirny area, are lower than the minimum standard concentration limit for freshwater. The maximum values of 0.586 mg/L in lakewater in Molodezhnaya and 0.2148 mg/L in the icecap ice at a depth of 2,5 m in the same area, are about the same with the maximum concentration limit for freshwater, but higher than the Zn concentration determined by us in 1997 in the snow- and glacier rivers in Spitsbergen. The maximum concentration of dissolved Fe in Antarctic lake water and ice is of 0.4405 mg/L in Larsemann Hills and the lake ice in Stornes Peninsula. Most of the Fe concentrations in lake water and snow, as well as in the icecap ice are <0,0053 mg/L.