MINERAL DUSTS IN SNOW COVER (SOUTH URALS, RUSSIA)

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Snow cover sampling is widely used for the purpose of environmental monitoring in such Russian regions where snow cover is stable for a few months. On melting a snow sample is divided into soluble (snow water) and insoluble (snow dust) parts. From the mineralogical point of view, the latter is a fine-grained polymineral mixture which may be researched with the aid of appropriate methods of mineral determination.

For example, snow dust from Miass (South Urals, Russia) is characterised by high concentrations of Cd, Cr, Pb, W, Fe, Zn. With the use of X-ray diffractometry it was established that these metals formed various oxides among which the technogene analogues of such minerals as monteponite CdO, picotite $(Mg,Fe)(Al,Cr)_2O_4$, litharge PbO, minium $Pb^{4+}Pb_2^{2+}O_4$, stolzite $PbWO_4$, magnetite $Fe^{2+}Fe_2^{3+}O_4$ and maghemite $\gamma\text{-}Fe_2O_3$ were found. These compounds are mainly produced by devices and mechanisms burning various kinds of fuel and are accumulated in the heavy fractions of snow dust.

In addition, quarries mining non-metallic resources generate dust waste consisting of silicate and carbonate minerals. It was found that every quarry produced dust waste of well-defined mineral composition – only calcite, only talc or only quartz–feldspar. These minerals are well distinguished on the basis of key lines of their X-ray diffraction patterns, and this fact allows to outline the zone of influence for each quarry, using mass X-ray diffractometry of snow dust samples for this purpose. In principle, specific indicative mineral(s) or compound(s) may be found for every particular pollution source – quarry, plant, factory, mine and so on.

Knowledge of mineral nature of snow dust gives possibility not only to connect a definite source of pollution with a definite indicative mineral and outline the zone of its influence, but also to estimate real scales of various pollutions and to predict correctly the future effects of snow dust on the environment.