



Identification sources of pollen spectra in dry and wet atmospheric deposition in the forest-steppe zone of Altai Krai (Russia)

Natalia Ryabchinskaya (1), Galina Nenasheva (1), and Natalia Malygina (2)

(1) Altai State University, Barnaul, Russia, (2) Institute for Water and Environmental Problems, SB RAS, Barnaul, Russia

Pollen spectra circulating in the atmosphere contain the important information about primary biological aerosol particles (PBAP), worldwide interest in which has significantly increased in recent decades [Despres, 2012]. It is related to the fact that many researchers suggest primary aerosols as a condensation nucleus significantly affected on the formation of clouds and precipitation and, consequently, on the hydrological cycle and climate, especially at the regional level [Andreae et al., 2008; Poschlet et al., 2010; Prenni et al., 2009]. We present the comparison of pollen spectra obtained during the dry and wet atmospheric deposition in Altai Krai (Russia) and identification of the sources/regions of their receipts.

Altai Krai is located in the center of the Eurasian continent, at the border of several natural and climatic zones. A significant part of the region's territory is characterized as a forest-steppe zone with a lot of natural and anthropogenic landscapes, accompanied by continental climate. It provides a rich diversity of natural vegetation and cultural associations.

During last 10 years pollen grains has been monitored in the airspace of Barnaul city (the capital of Altai Krai) located in the central part of the forest-steppe zone). During the monitoring, the attempts to determine the origin of pollen spectra (local or introduced) were made as well. In the long-term average dates of the first wave of dusting in the spring season 2014 Burkard pollen traps were used in order to monitor the airspace in Barnaul, namely dry deposition of pollen grains [Nenasheva, 2013].

To estimate the wet deposition PBAP (pollen), which can reach 80% in the middle latitudes, precipitation sampler were installed close to Burkard pollen traps in order to sample precipitation. The samples were filtered through a filter having a pore diameter of 1 μm , then prepared and examined for the presence of pollen grains.

The comparison of the results of pollen analysis of 10 samples of precipitation and the samples obtained by Burkard pollen traps for dates with precipitation from April to May 2014 showed the following.

Pollen spectra isolated from the different types of precipitation (dry and wet) correspond to each other in taxonomic composition in 85% of cases. For example, isolated pollen spectra for 11 April, considering the wet deposition, is characterized by the presence of *Pinus sylvestris*.

According to Burkard pollen traps, pollen grains *Pinus sylvestris* were also identified in the air. To identify the sources of pollen grains, we estimated the long-term average date of pine dusting on the territory of Barnaul. During the period from 2004 till 2013 it accounts for the end of the second decade of May.

Thereby, isolated pollen grains are unlikely to have local origin. To confirm this fact, backward trajectories were calculated on April 11, 2014 using the model HYSPLIT [<http://ready.arl.noaa.gov/HYSPLIT.php>]. Trajectories showed the southwest transport of pollen to have been identified in the atmospheric surface layer from the territory in the south of Altai Krai, including the surroundings of Lake Zaisan (Kazakhstan), where earlier dusting of pine could be observed mentioned.