Geophysical Research Abstracts
Vol. 15, EGU2013-1733-1, 2013
EGU General Assembly 2013

Chemical differences in atmospheric, talus and stream water from a small rainforest low-mountain experimental catchment, Sikhote-Alin' Mountains, Pacific Russia

Anna Boldeskul (1), Vladimir Shamov (1), Nadezhda Kozhevnikova (2), Boris Gartsman (1), Andrey Bugaets (1), Sergey Lupakov (3), Lubov Matveyeva (3), and Tatyana Lutsenko (1)

(1) Pacific Institute of Geography FEB RAS, Vladivostok, Russian Federation (vlshamov@yandex.ru), (2) Institute of Biology and Soil Sciences FEB RAS, Vladivostok, Russian Federation (nkozhevnikova@ibss.dvo.ru), (3) Far East Federal University, Vladivostok, Russian Federation (rbir@mail.ru)

Some results of detailed hydrological and hydrochemical observations on the experimental low-mountain basin "Elovyi", Pacific Russia in 2011-2012, are presented. The studied catchment area is 82 ha, and its elevation ranges from 620 to 960 m a.s.l. The basin is shaped by a narrow deeply-incised valley, and entirely covered by typical coniferous-deciduous forest. The regional temperate and humid climate is attributed to monsoon activity. Brown mountain-forest soils (top and sides of the valley); mountain-taiga illuvial-humus soils (sides of the valley); soddy-alluvial soils (bottom of valley) are the main soil types there. The underlying effusive rocks (mostly liparite porphyres, porphyrites, dacites, syenites and its tuffs) are rather acid.

All the dataset obtained was studied to reveal the most applicable chemical indices for distinguishing of water sources. Preliminarily, the seven genetic categories of water as 1) cyclonic rain, 2) intermittent rain, 3) throughfall, 4) talus flow, 5) low-water streamflow (specific discharge is less 2.5 l/s per sq. km), 6) low flood streamflow (specific discharge is more 2.5 and less 16 l/s per sq. km), and 7) medium flood streamflow (specific discharge is more 16 and less 100 l/s per sq. km) were sampled and analyzed for chemical compounds. The talus water was taken from tensiolysimeters.

According to the sequence of the water types given above, the following is the series of mean values of several compounds:
TDS (ppm) = 2.4, 5.7, 9.4, 28.2, 22.6, 24.2, 22.7;
pH = 4.8, 4.4, 5.2, 6.4, 5.9, 5.8, 5.7;
K (ppm) = 0.09, 1.27, 3.47, 1.35, 1.42, 1.63, 1.49;
Na (ppm) = 0.04, 0.21, 0.39, 2.30, 1.60, 1.91, 1.64;
Ca (ppm) = 0.36, 1.11, 1.00, 4.11, 2.97, 3.40, 2.98;
Mg (ppm) = 0.02, 0.16, 0.32, 0.74, 0.54, 0.57, 0.59;
Hydrocarbonate (ppm) = 0.33, 0.16, 2.61, 10.3, 3.07, 3.84, 3.10;
Sulfate (ppm) = 0.94, 4.25, 1.49, 8.00, 9.75, 10.20, 8.24;
Chloride (ppm) = 0.19, 0.85, 0.46, 1.47, 0.75, 0.97, 0.88;
Nitrate (ppm) = 0.70, 2.74, 0.52, 1.39, 2.47, 1.66, 3.87;
Si (ppm) = 0.01, 0.05, 0.25, 8.67, 7.88, 8.90, 7.02;
DOC (ppm) = 1.3, 5.2, 20.5, 4.9, 2.9, 3.1, 4.2;
Fe (ppb) = 10.3, 45.8, 45.3, 38.3, 53.7, 35.2, 30.1;
Mn (ppb) = 4.6, 31.0, 107.1, 26.5, 31.4, 32.2, 16.6;
Al (ppb) = 7.2, 45.7, 52.9, 71.1, 65.6, 39.9, 93.0;
Zn (ppb) = 13.6, 74.3, 40.4, 18.7, 28.8, 18.7, 18.2;
Ba (ppb) = 1.6, 8.2, 7.7, 10.4, 20.5, 19.2, 15.4.

All the water analyzed are found to be ultra-fresh (TDS =1 to 52 ppm) and differ markedly in their chemical compositions. It is noteworthy that the proportion of main ions in water from the stream is found factually to not depend on streamflow rate.

With PCA procedure, the data obtained allow using some geochemical tracers in order to estimate shares of water sources in streamflow with taking into account its dynamic behavior.