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The influence of human activity and landscape features on the concentration of metals in the river waters at the Russian Far East

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The chemical composition of the river waters is used broadly as indicator of water resource quality and status of the river basins. The high temporal-spatial variations of some chemical parameters, including concentrations of metals, make necessary to study this variability for the proper assessment of water quality and linkage between landscape structure of watersheds and river chemistry. Problems still existing for the data quality should be taken into account as well.
The concentrations of dissolved and suspended forms of Fe, Mn, Zn, Cu, Pb, Cd, Ni along with common chemical parameters have been studied seasonally and presented for the more than 30 small, medium and large rivers of the Russian Far East with different level of anthropogenic load. The minimal seasonal changes of the chemical composition are observed for the most pristine small rivers drained wooded mountainous watersheds and large rivers with large buffering capacity. The summary mineralization expressed through conductivity and reduced forms of nitrogen are suitable parameters of the anthropogenic press. The flood events lead to the decrease of main ions concentration due to dissolution. Unlike common chemical parameters, the influence of hydrological regime on the dissolved metals is more complex and depends on anthropogenic load, landscapes of watersheds and variability of pH. The elevated concentrations of dissolved metals were observed at the beginning of spring flood and during the low water period especially in the winter under the ice. Outside the areas of sewages discharge influence the concentration of dissolved metals in the rivers of Russian Far East are the follows: Zn, Ni, Cu – 0,n μg/l, Pb – 0,0n μg, Cd – 0,00μg/l, Fe – 10n-100n μg/l, Mn – n-10n μg/l. These values are close to the most pristine rivers of the World. At the same time the 2-10 times variability of metal concentrations reflect the subregional and regional level of anthropogenic load, initial stages of pollution, and sometimes the geochemical peculiarities of the river basins. The dissolved forms of Fe and Mn with variability up to 100-200 times are especially informative and useful as indicator of landscape features of watersheds. Though increase of dissolved Mn is connected in many cases with human activities at the river basins.
The assessment of the metal fluxes to the some adjacent coastal sea areas will be also presented, and the main factors controlling the chemical contamination of the rivers and semi enclosed sea areas of the Russian Far East will be described.