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The principle of universality as the only way to overcome hydromythology in hydrological modelling

Olga Makarieva (1,2,3), Tatyana Vinogradova (1,2), Natalya Neterova (1,4), and Lyudmila Lebedeva (3)

(1) St. Petersburg State University, Institute of Earth Scienses, St. Petersburg, Russia, (2) Gidrotehproekt Ltd, St. Petersburg, Russia, (3) Melnikov Permafrost Institute, Yakutsk, Russia, (4) State Hydrological Institute, St. Petersburg, Russia

The issue of this session is not new and has been raised as a real problem for future development of hydrology not only by Pomeroy et al (2011), but by Beven and continuously by Makarieva (previously Semenova) with coauthors starting from EGU 2009.
Here we would like to bring attention to the universality principle (UP) in hydrological modelling as the only way to overcome the charms of hydromythology. UP implies the possibility to simulate hydrological processes from elementary slope scale up to the basins of any size within the framework of a single methodological approach and unified parameterization. As pointed by Pomeroy et al. (2011) the more advanced physically-based descriptions of "surface" processes may be justified where there is sufficient information, in ungauged basins they can be conceptualized. However, physically-based descriptions of the subsurface processes (the Richard's, Saint-Venant and Boussinesq equations) do not lead to realistic simulations of sub-surface hydrology in any cases, causing nonlinearity, uniqueness, uncertainty, equifinality and scale problems.
Hydrograph is a Russian process-based model which core is the concept of runoff elements allowing for description of surface and subsurface water movement at any scale (Vinogrdov et al., 2011). The probable idealization – hierarchical sequence of layers of runoff elements arrangement which take part in river inflow – is proposed. The following empirical facts are taken into account: the decrease of infiltration capacity of water-holding rocks and outflow rate and the simultaneous increase of water storage with the depth in groundwater aquifers. Each level in the system of runoff elements is characterised by two hydraulic parameters, relaxation time and rate of outflow, water storage. Runoff elements can be easily identified with the natural formations. Surface runoff elements depending on natural conditions but mainly on inclination can be measured from shares and ones up to tens of thousands square meters. Underground runoff elements can be much greater. The conceptual parameters of runoff elements can be assessed based on the results of specific studies at research catchments and transferred from small (slope)-scale to watershed- and basin-scale modelling.
Mountainous areas of North-Eastern Russia are characterized by variety of landscapes, climatic conditions. But this region has almost none specific observational data due to it remoteness. For area of more than mln km2, there were only two research watersheds during historical period. This is the high-altitude Suntar-Hayata station at the Suntar river basin (1957-1959) and the Kolyma water balance station at the Kolyma river basin (1948-1997). Based on that data we developed the database for the mountainous areas of the Yana, Indigirka and Kolyma rivers which includes GIS of main landscapes and their parameters for the Hydrograph model. The model parameters were verified at the scale of soil column to small watersheds in different permafrost landscapes. We applied developed parameterization scheme for 30 basins with available flow data with areas from 0.3 to 90 000 km2 without change. The satisfactory results of this study show the possibility for scale-free modelling with adequate to natural processes conceptualizations. They will be reported.