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Hydrological simulation for the large river basins

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The experience of application of a space-distributed hydrological model, ECOMAG, for the large river basins of Russia is presented. In ECOMAG, a studied area is subdivided into a mosaic of elementary watersheds, each to be viewed as a hydrological unit. Space schematisation of the river basin (the allocation of modelled river network, sub-catchments of tributaries, elementary watersheds) is executed on the basis digital elevation model (DEM) using GIS-technology. The model considers the main processes of the land surface hydrological cycle: infiltration, evapotranspiration, thermal and moisture regime of soil, snow melt, formation of river runoff, surface and subsurface runoff and groundwater. The spatial integration of small and meso scale non-homogeneity of the land surface is central point for the model. Procedures of aggregation and averaging of land surface parameters for elementary watersheds are developed. Sensitivity of the model to the spatial scale representation of elementary watersheds and river network was examined.

Since 2004 model was applied for operative simulation hydrological characteristics and inflow of water into reservoirs of Volga-Kama cascade (area of Volga basin is 1350000km^2). DEM, digital soil and landuse maps were used for schematisation of river basin and definition of the model parameters. Operative information from about 600 meteorological stations was involved as input into the model. Scenario simulations of water inflow into reservoirs were used for operative management of water resources in Volga-Kama cascade. During last time the model was applied for runoff simulation in Lena river basin (area 2488000 km^2). Results of simulation are discussed. The challenge is to extend the model for the whole territory of Russia.