

## Changes in pan and visible evaporation over Asian Russia Changes in pan and visible evaporation over Asian Russia

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Pan evaporation can be considered as an estimate of potential evaporation because it characterizes seasonal or annual result of thermal and water exchange between the water surface and the atmosphere. By this reason, pan evaporation can be used in estimates of evapotranspiration. Visible evaporation (the difference between pan evaporation and precipitation) is an important characteristic of the regional water cycle. In humid climates, it indirectly indicates the total energy losses due to evaporation over the region. A positive value of visible evaporation indicates a deficit in the regional water budget, and the water demand by the atmosphere exceeds precipitation (so-called "dry" conditions are perceived). When precipitation exceeds pan evaporation, visible evaporation is negative (which corresponds to "humid" conditions). The more negative the visible evaporation, the wetter the region, and the excess water remains for runoff and for replenishing the underground water reservoirs.

Pan evaporation observations in the USSR began in the middle of 1950s. At the peak of the network extent (in the middle of 1980s) more than 200 stations performing these observations operated in Asian Russia. From 1990s the number of stations was significantly reduced, and at present data up to 2008 are available only at 90 stations, (up to 1999, at 110 stations).

Precipitation changes for the study territory were analyzed on the base of data from the archive created in the Russian Research Institute for Hydrometeorological Information that contains data from about 800 stations at the Asian Russia territory for 1966-2008.

Using all available data, the territory of Asian Russia was zoned according to the specific features of the dynamics of the pan evaporation totals during the warm period (May-September). Visible evaporation changes are estimated for each of selected region from 1966 to 2008. Analysis of visible evaporation changes during the past 40 years shows significant changes practically over the entire Asian Russia and the changes are most evident in the regions with permafrost.

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