

River channel response to climate change.

I. Kargapolova

Faculty of Geography, Moscow State University

Climate change impacts on river runoff which is a main factor of river channel formation. Runoff fluctuations determine trends, cycles and intensity of river bed processes. Using comparison a number of maps XVIII-XX centuries and space images (Landsat ETM+, Terra Aster) we calculate river channel parameters in different time periods to determine natural trend and human impact. During periods when runoff is above average in Russian and West Siberian plains we observe increase of river bed transformation like river bank erosion, extreme channel deformation and meanders size. Using links between runoff value and meanders size we predict and reconstruct them for several Russian rivers. For example, it was proved runoff decrease in the Severnaya Dvina basin since XVIII century up to 20-30%. As a result cases of extreme deformations such as meanders stretching and runoff migration between branches decreased two times up to now.

Estimation of river bed deformation in long-term period give us chance to evaluate river channel response to climate change in recent centuries and predict their behaviour. It's extremely important because bank retreat rate may be up to first tens meters per year, so deformations can destroy buildings, pipelines, bridges etc. Due to migration of main branch within flood plain areas intakes and even settlements may leave without water.

For forecast verification we can use cases of high scale runoff change to estimate its impact on river bed processes. Water transfer from one basin to another may lead to runoff change compared with one during geological periods. So the Moscow river runoff increased two times since 1937 due to water transfer from the Volga basin. Before present we observe active river channel transformation under increased runoff: river banks are eroded, meanders size is enlarged and meanders shape is varied.