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Decadal dynamics of Arctic continental water cycle in the framework of MONARCH-A .

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The main objective of MONARCH-A FP7 European program is to generate a dedicated information package tailored to a subset of multidisciplinary essential climate variables and their mutual forcing and feedback mechanisms associated with changes in terrestrial carbon and water fluxes, sea level and ocean circulation and the marine carbon cycle in the high latitude and Arctic regions.

High latitude regions are predicted to suffer much greater warming than lower latitudes as a result of climate change. This will cause drastic changes in the carbon and water balance of the region, with associated large effects on snow cover, soil freeze-thaw periods, soil moisture, permafrost, growing season, land cover, greenhouse gas fluxes and albedo. Of crucial concern are the feedbacks between these land surface processes and climate warming; this is recognized as one of the greatest sources of uncertainty in climate prediction (IPCC 2007).

Decadal change in snow properties and dynamics of high latitude water bodies are analyzed over the last 20 years. Snow cover, depth and duration are good indicators of climate change and have strong effects on fresh water discharge into the Arctic Ocean, albedo, plant growth and vegetation growing periods. While the large numbers of lakes at high latitudes are important for evapo-transpiration, runoff, groundwater and methane emissions.

We analyze various satellite-derived (SSM/I and radar altimeters) environmental parameters (snow extent, depth and duration, fraction of water surface and wet zones extent) in the context of climatic changes (from reanalysis and in situ data) and their role in the Arctic water cycle with specific attention to Western Siberia.

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