Extent and cause of an extreme flooding occurred in spring - summer 2017 over the Indigirka River lowland in Northeastern Siberia

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Flooding is one of the greatest disasters that produce strong effects on the ecosystem and livelihoods of local population. It is expected that the flood frequency will increase globally making its risk assessment an urgent issue. In spring - summer (June - July) 2017, an extreme flooding occurred in the Indigirka River lowland of Northeastern Siberia that covered a large area with water. In this study, the extent and cause of the flooding were determined using the results of field observations, satellite images, and climate re-analysis datasets, and its possible effects on the ecosystem were discussed. It was found that the flooding covered a significant lowland area equal to about 9530 km^2 and that the rise in the relative Indigirka River water level with respect to the average value determined for the period of nine years spanning from 2009 to 2017 amounted to about 350 cm. The largest annual maximum snow depth (snow water equivalent: SWE) in the lowland was observed in 2017 over the same period (2009-2017), and the surface of the lower reach of the lowland was partially covered with snow even in the end of June due to the extreme snowfall that occurred in fall - winter 2016. The climate re-analysis dataset obtained for temporal-spatial variations in SWE, snowmelt, and runoff over the lowland during 2015-2017 revealed that a large amount of snow-melted water had flown into the river system in June 2017, resulting in the extreme flooding. The latter also waterlogged most trees over the lowland, which caused serious ecosystem devastation and changes in the material cycling in the studied region.

Keywords: extreme flooding, Indigirka River lowland, Northeastern Siberia, material cycling, water level, snowfall

