Exploitation of Sentinel satellite data to characterize Arctic river catchments

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Across broad spatial and temporal scales, riverine and coastal dissolved organic carbon (DOC) dynamics are linked to the characteristics of river catchments (e.g. its soils and sediments, topography, vegetation and permafrost). Datasets to support spatial analyses, to provide characteristics of river catchments across the Arctic are required.

C-band SAR has shown to be of value for identifying wetlands, shallow water bodies, soil organic carbon content in the upper meter, snow melt patterns and recently also vegetation height in tundra. With Sentinel-1 which consists of two twin satellites, it is possible to monitor Arctic river catchments and their properties with high temporal and spatial resolutions.

Several Arctic river catchments have been selected and compared, grouped by permafrost and landcover characteristics exploiting the ESA DUE GlobPermafrost Permafrost Information System (part of APGC - Arctic Permafrost Geospatial Data Centre hosted by the Alfred Wegener Institute for Polar Research) in a first step. In combination with in situ observation, algorithms for the extraction of spatio-temporal properties of Arctic river catchments were developed. This includes transfer of methods developed for the predecessor ENVISAT ASAR to Sentinel-1.

To facilitate cross-disciplinary analyses, the data will be eventually combined with GIS-data on human settlements and infrastructure within the HORIZON2020 project Nunataryuk (led by AWI).