

DLR Global SnowPack - possible applications of the near real-time product

Sebastian Rößler & Andreas Dietz

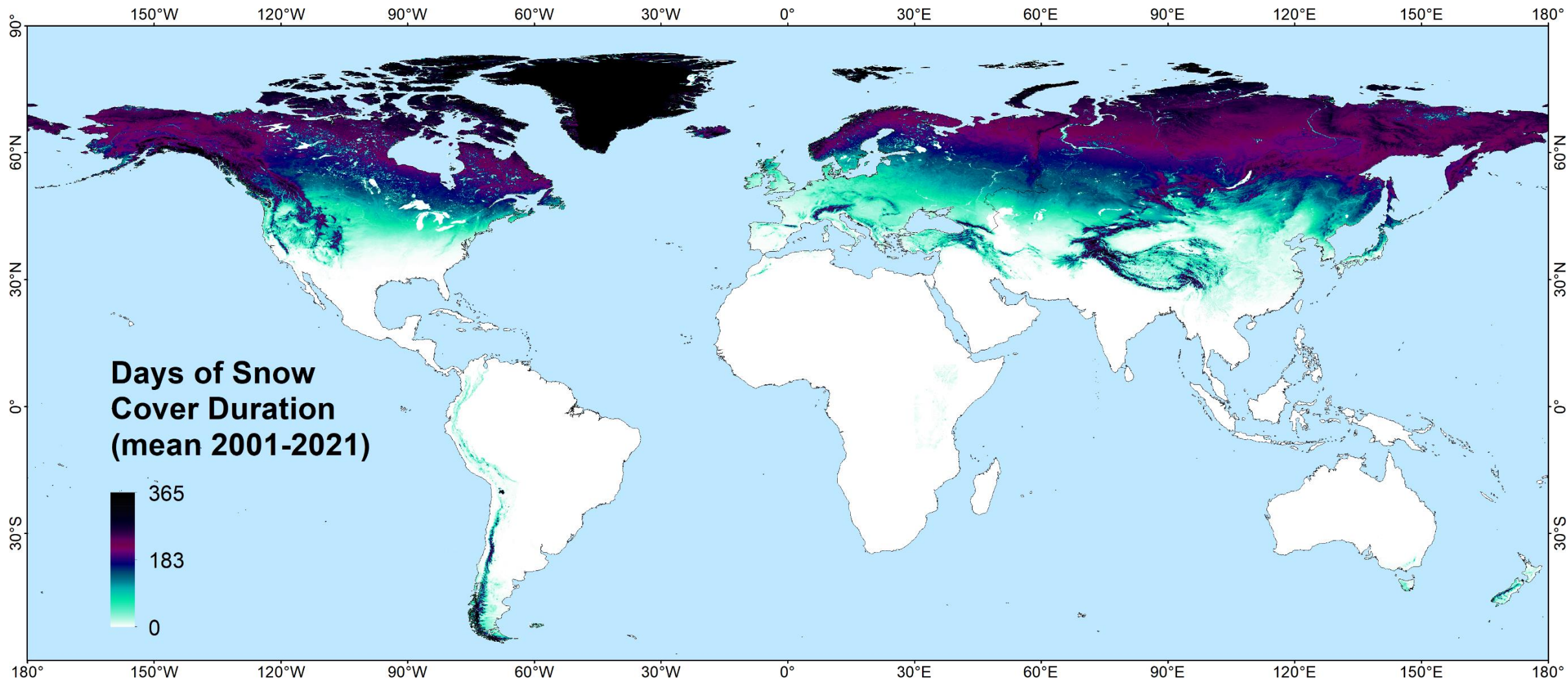
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Earth Observation Center (EOC)
Department Land Surface Dynamics*

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Knowledge for Tomorrow

Global SnowPack – gap filled MODIS daily snow coverage

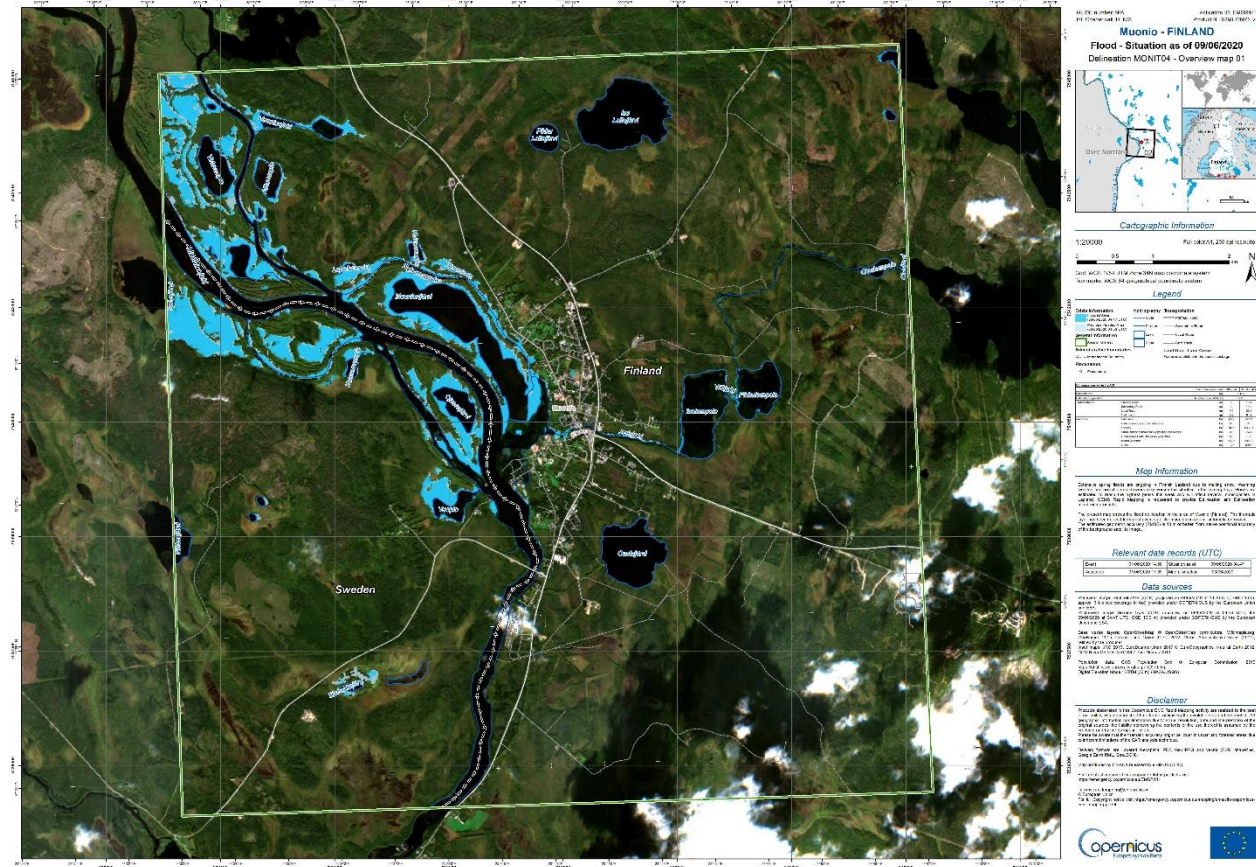


Motivation



<https://www.ely-keskus.fi/-/floods-in-lapland-are-over-and-water-levels-are-falling-lapland->

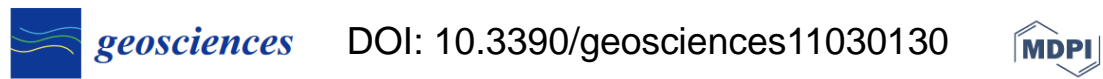
Can our operational remote sensing product recognize events like this?



<https://emergency.copernicus.eu/mapping/list-of-components/EMSR441>

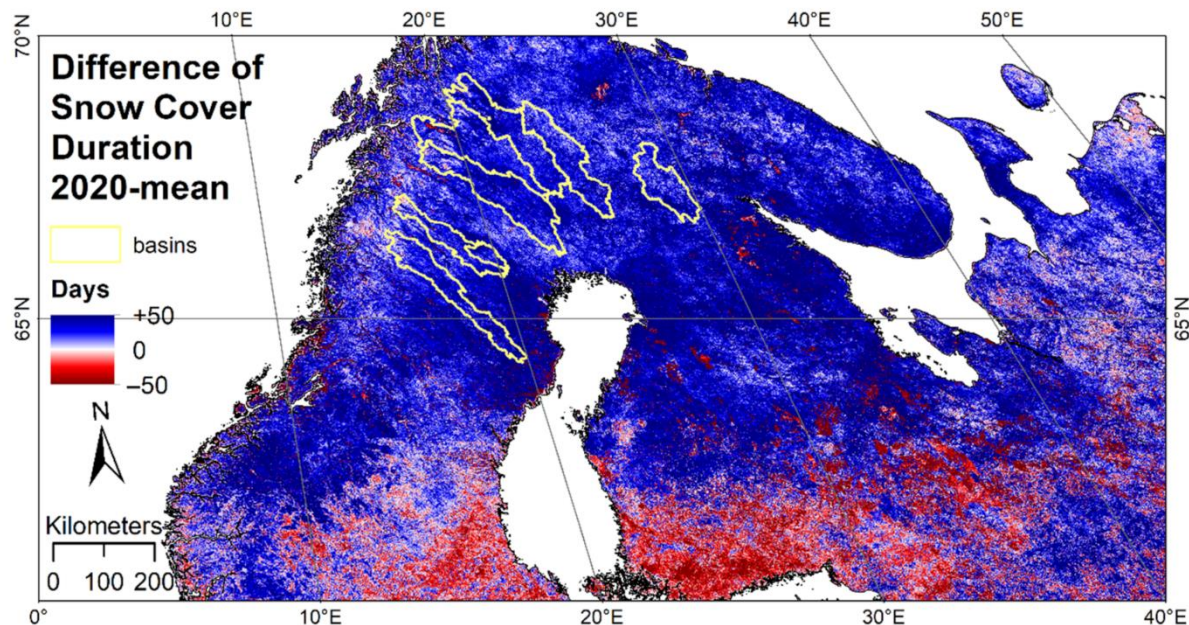
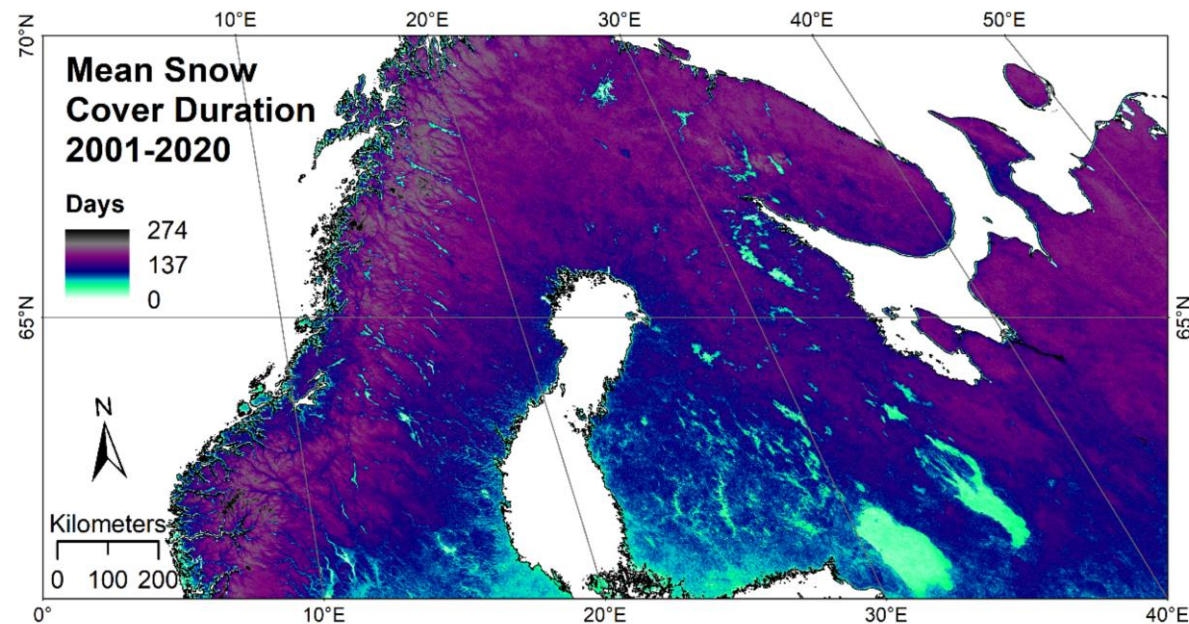
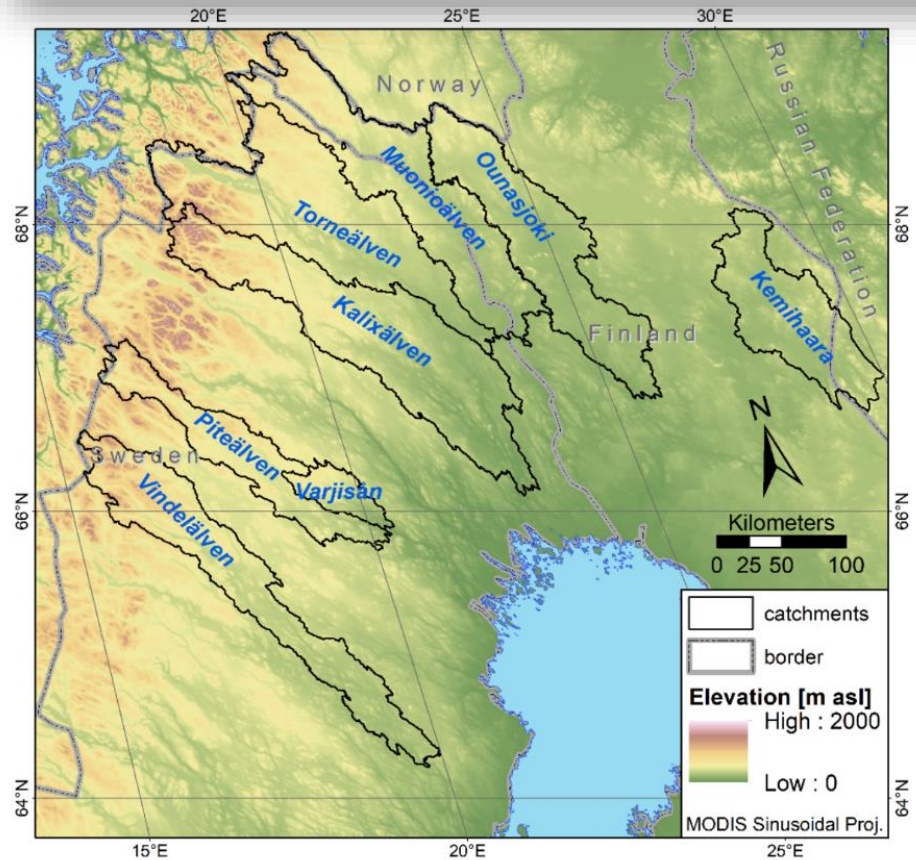


Case study: Flood in Lapland 2020

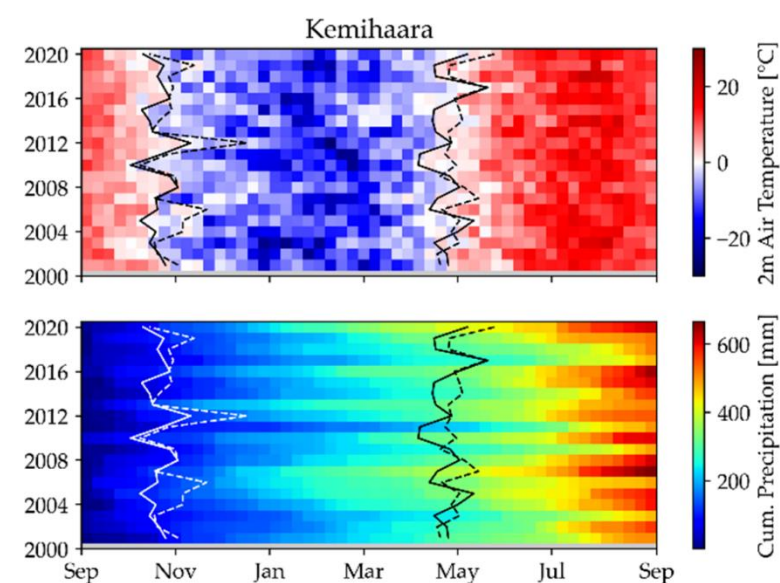
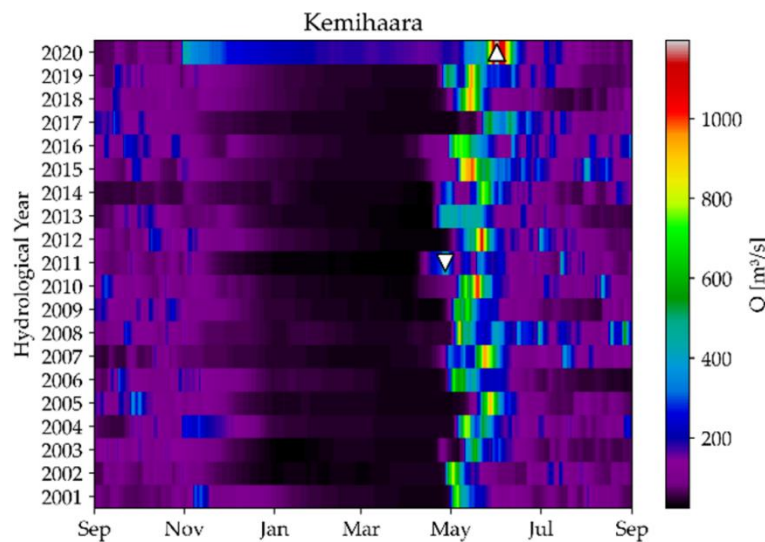
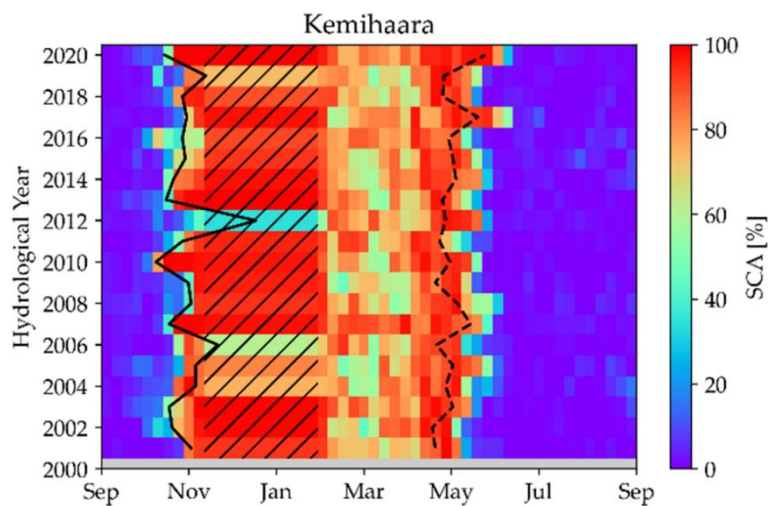


Article Remote Sensing of Snow Cover Variability and Its Influence on the Runoff of Sápmi's Rivers

Sebastian Rößler ^{1,*}, Marius S. Witt ², Jaakko Ikonen ³, Ian A. Brown ⁴ and Andreas J. Dietz ¹

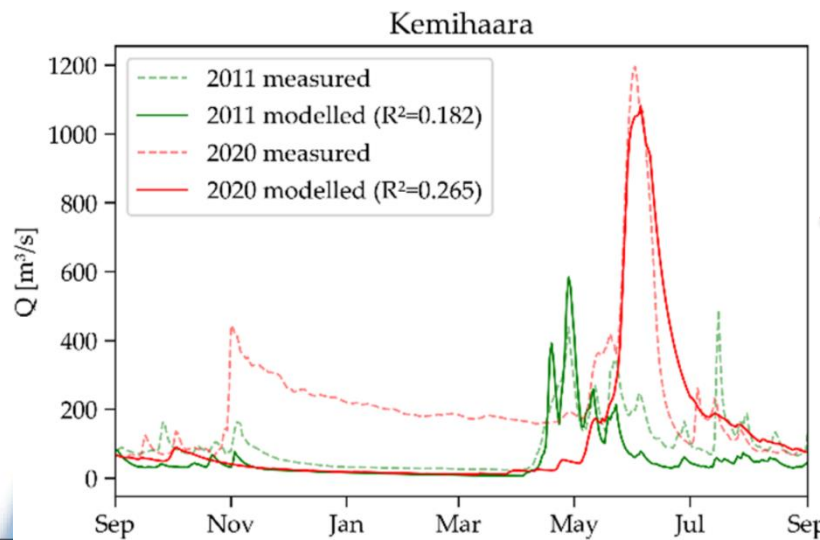


Runoff Analysis: Snowmelt Runoff Modell Results



SRM-Parameterization with

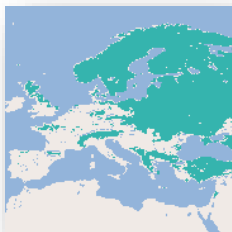
- snow cover
- digital elevation model
- meteorological measurements



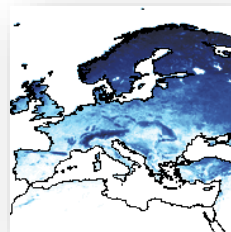
Result of the minimal spring flood 2011 and the maximum spring flood 2020 to the modeled discharge with SRM



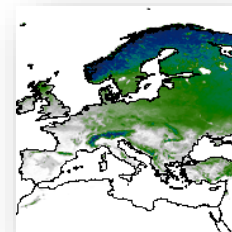
Global SnowPack Products



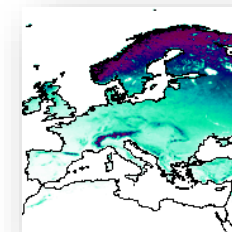
Daily Snow Cover Extent (SCE) in Near Realtime



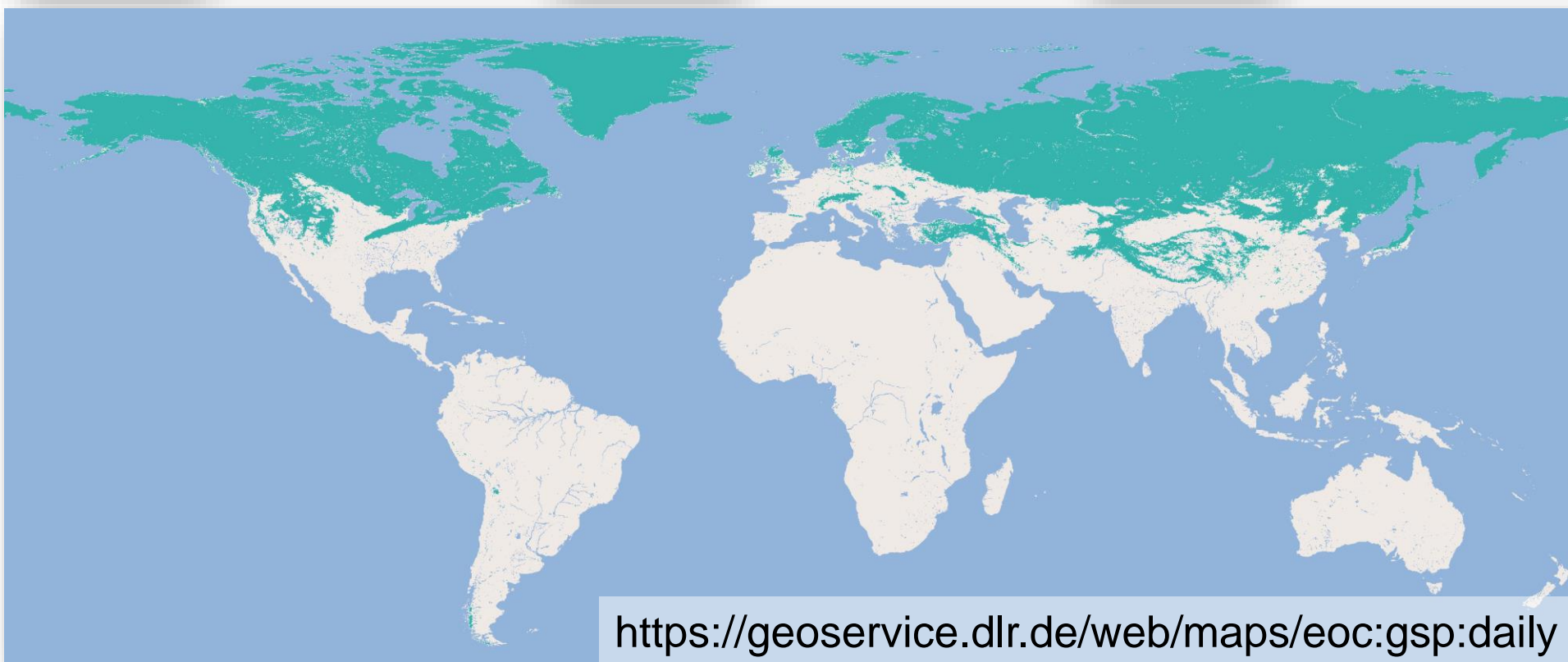
Snow Cover Duration Early Season (SCDE)



Snow Cover Duration Late Season (SCDL)



Snow Cover Duration (SCD)



<https://geoservice.dlr.de/web/maps/eoc:gsp:daily>



Catchment Selection for near-realtime monitoring

Amur



Aral Sea



California



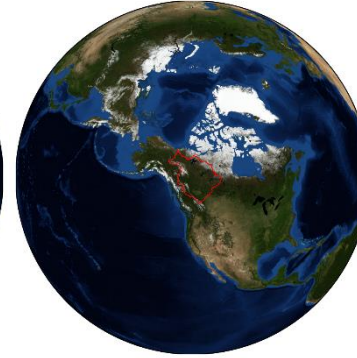
Danube



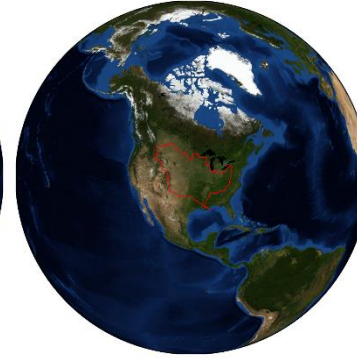
Lena



Mackenzie



Mississippi



Nelson



Ob



Rhine



Saint Lawrence



Volga



Yenisey



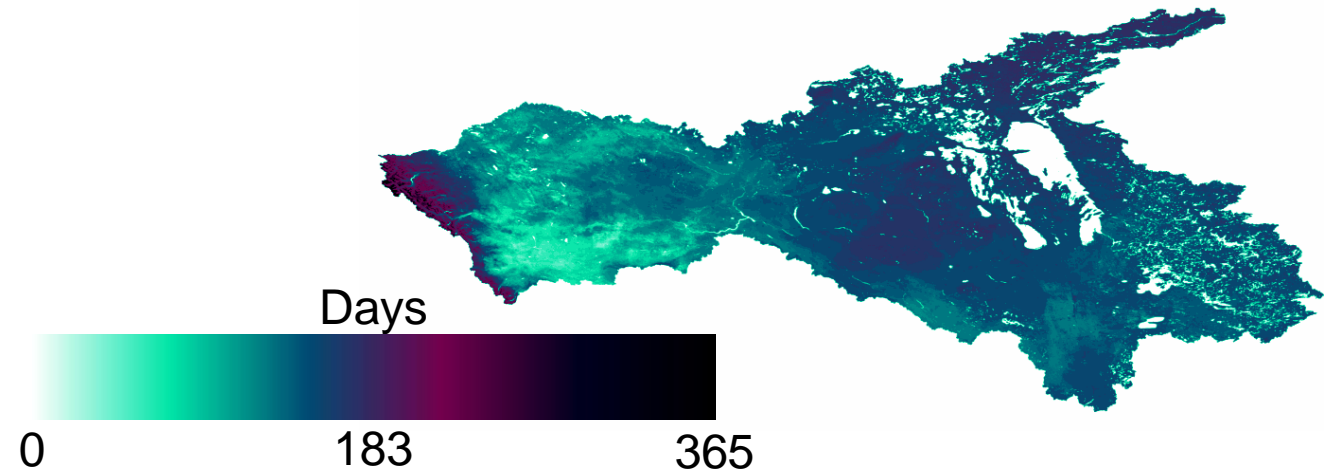
Yukon



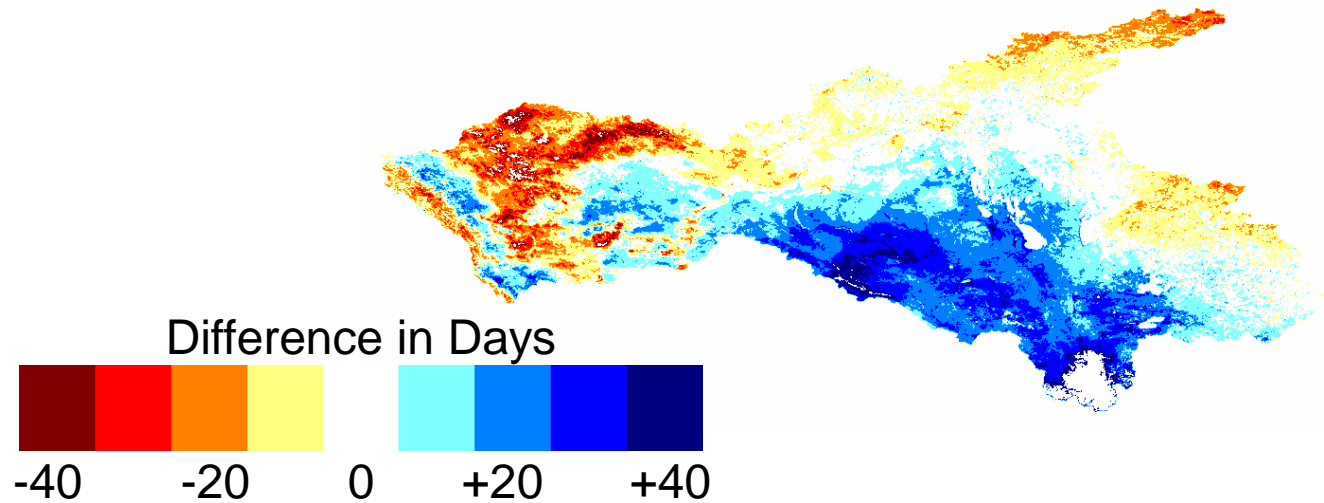
Catchment based analysis – Nelson River



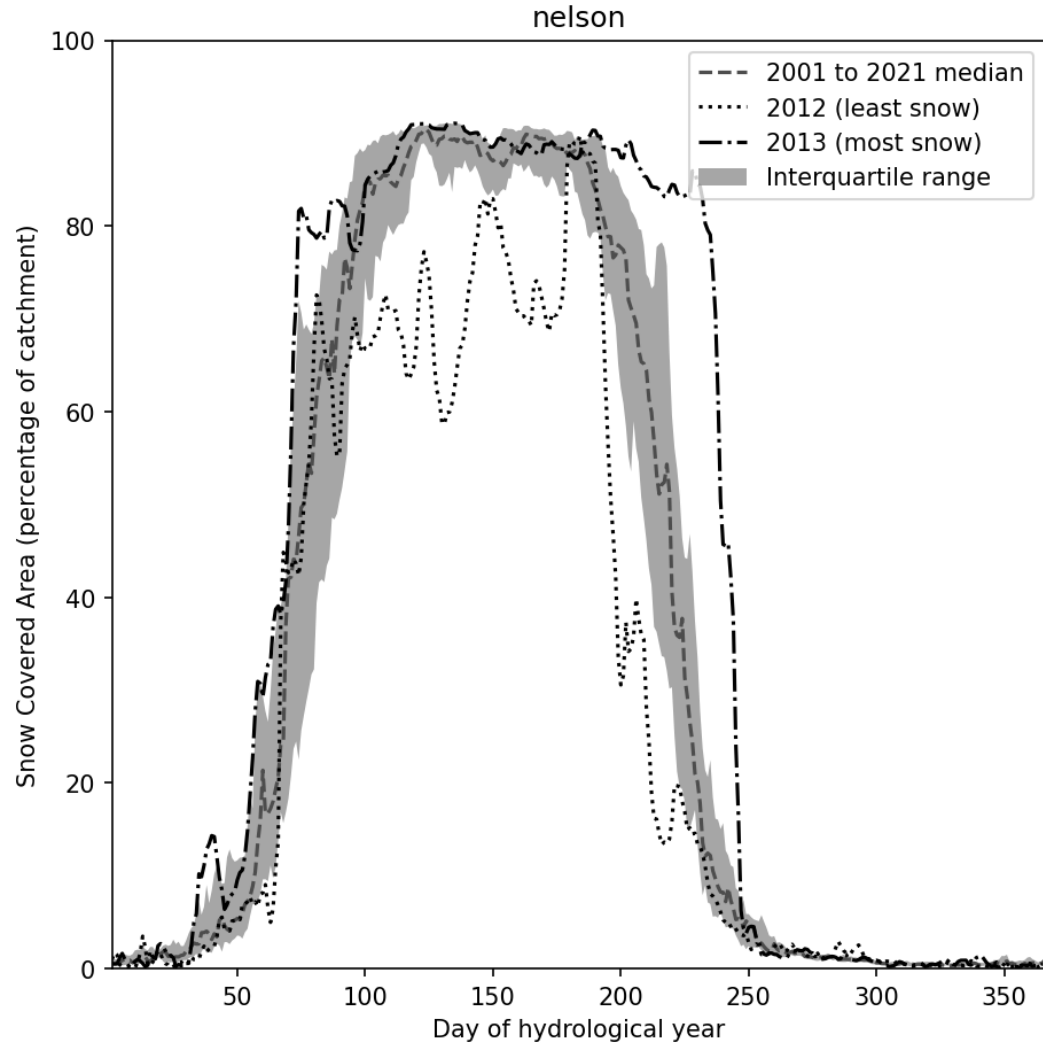
nelson SCD full 2001



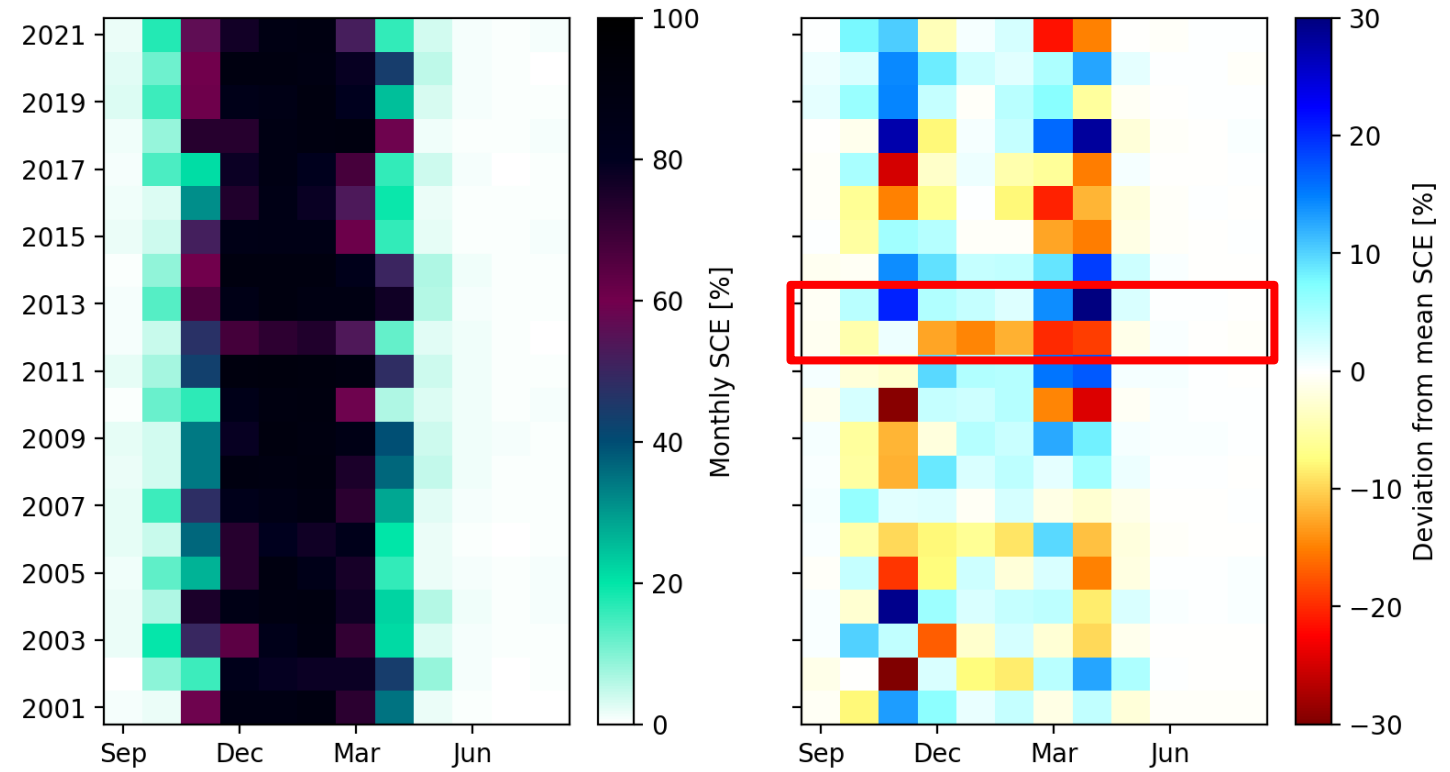
nelson diff SCD full (2001 - mean)



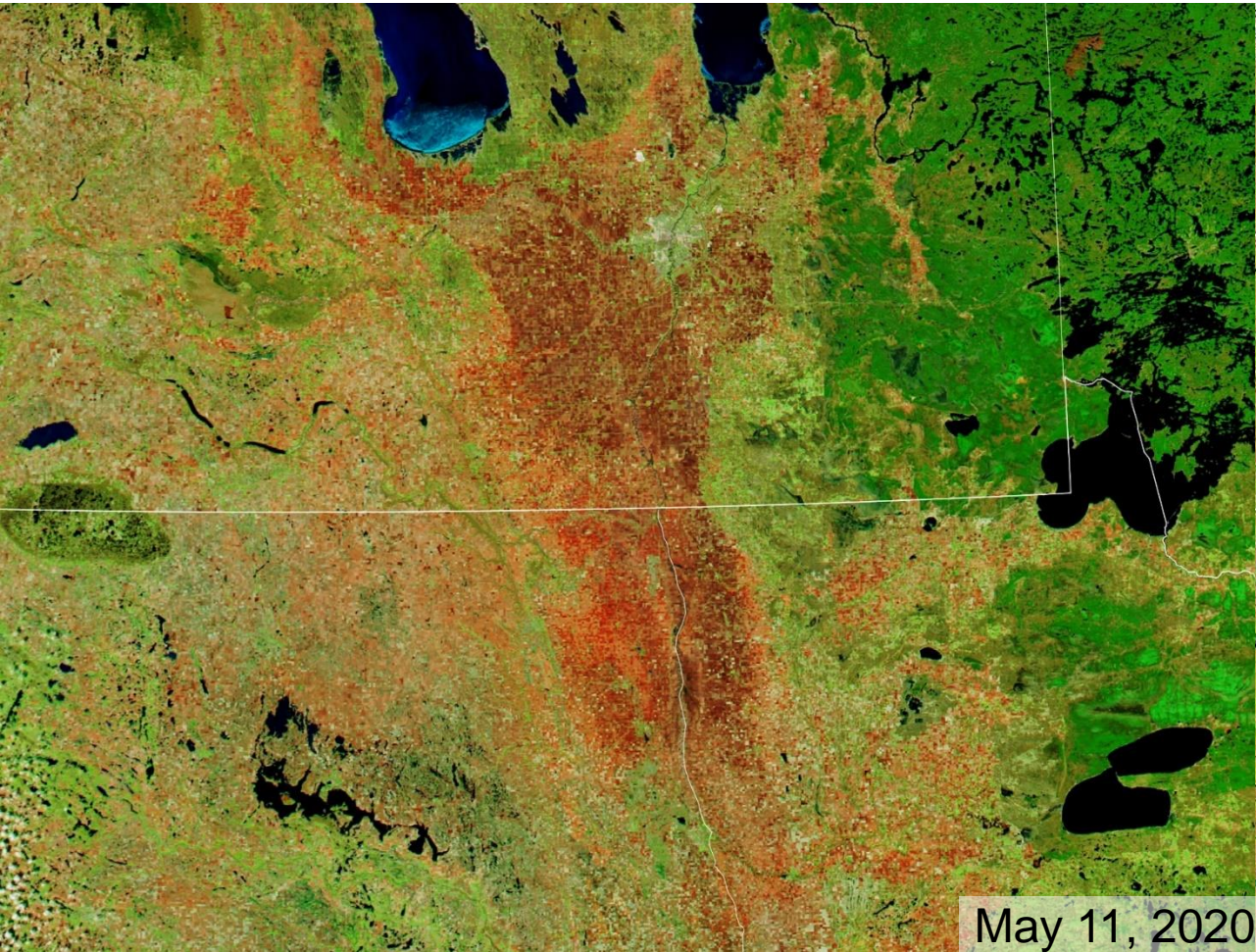
Catchment based analysis – Nelson River



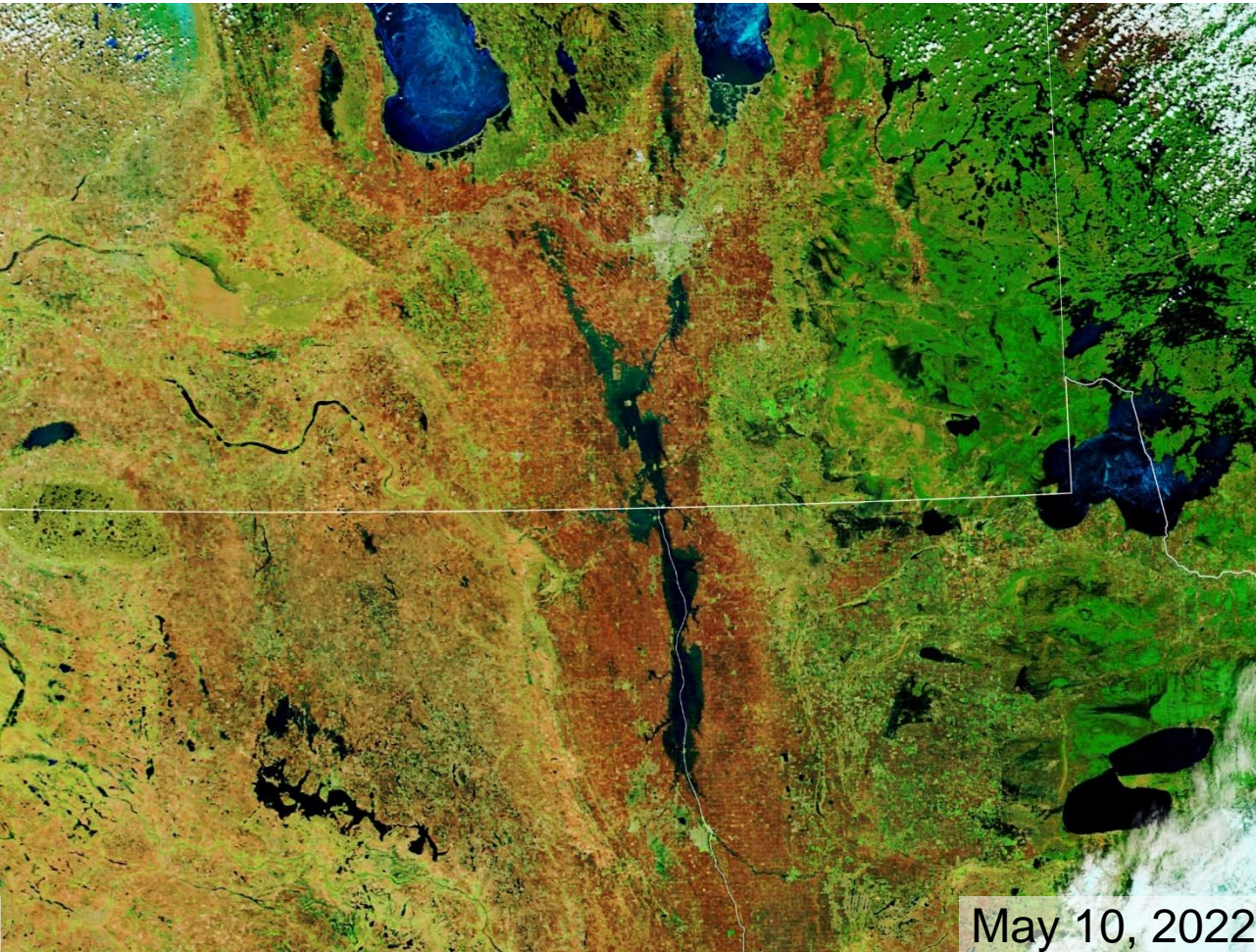
nelson SCE monthly 2001 - 2021



„Red River Flooding is Worst in a Decade”



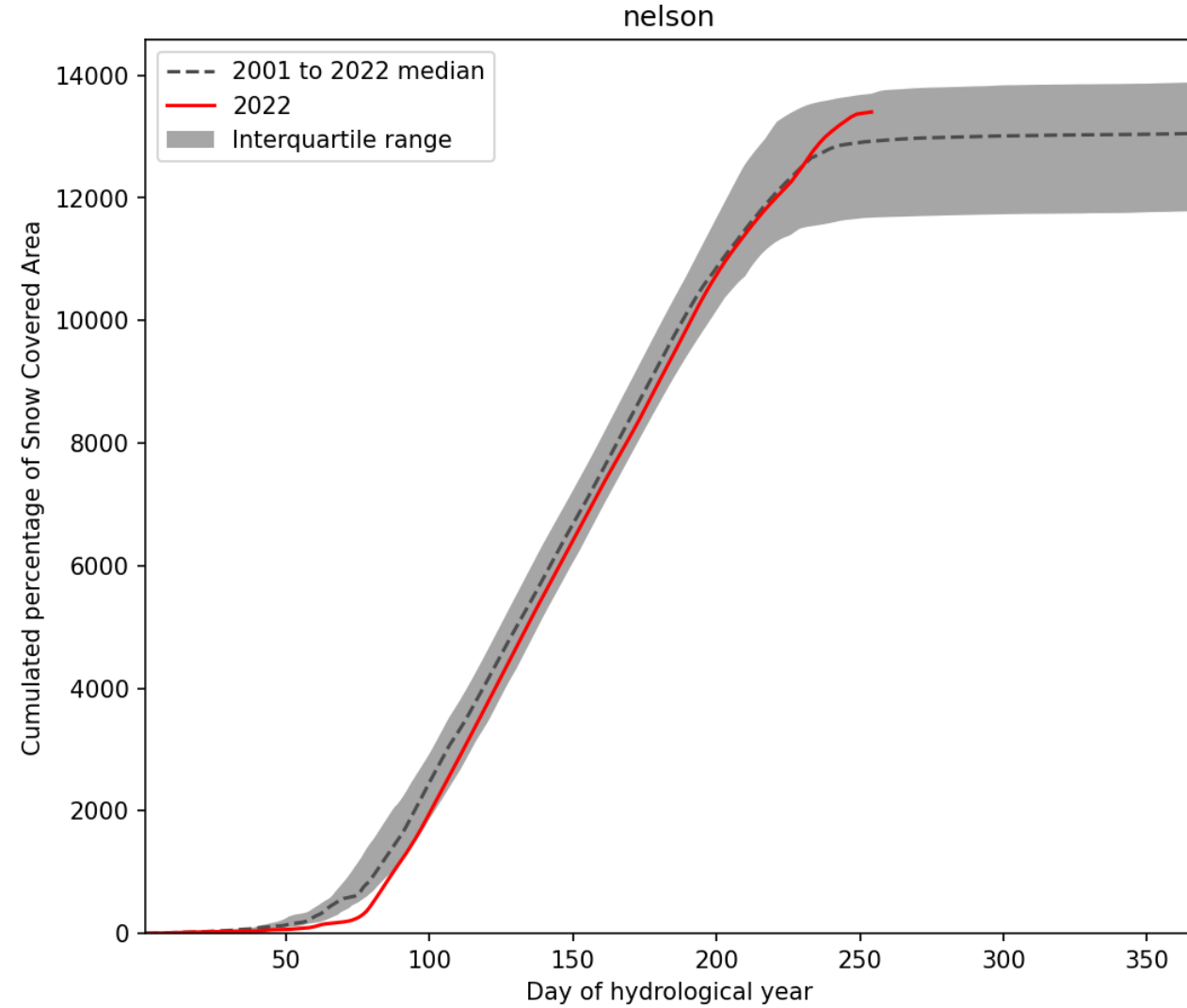
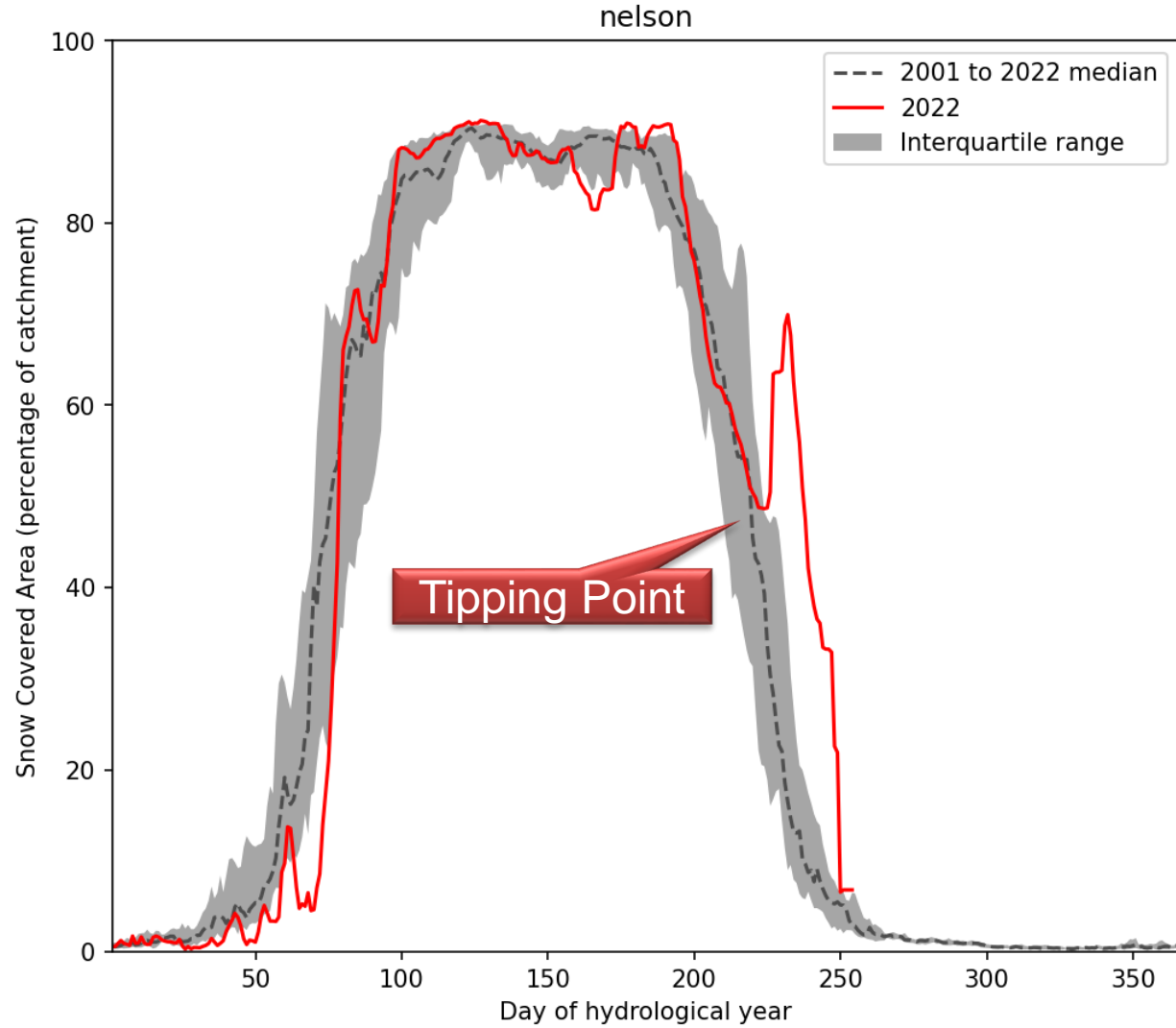
May 11, 2020



May 10, 2022

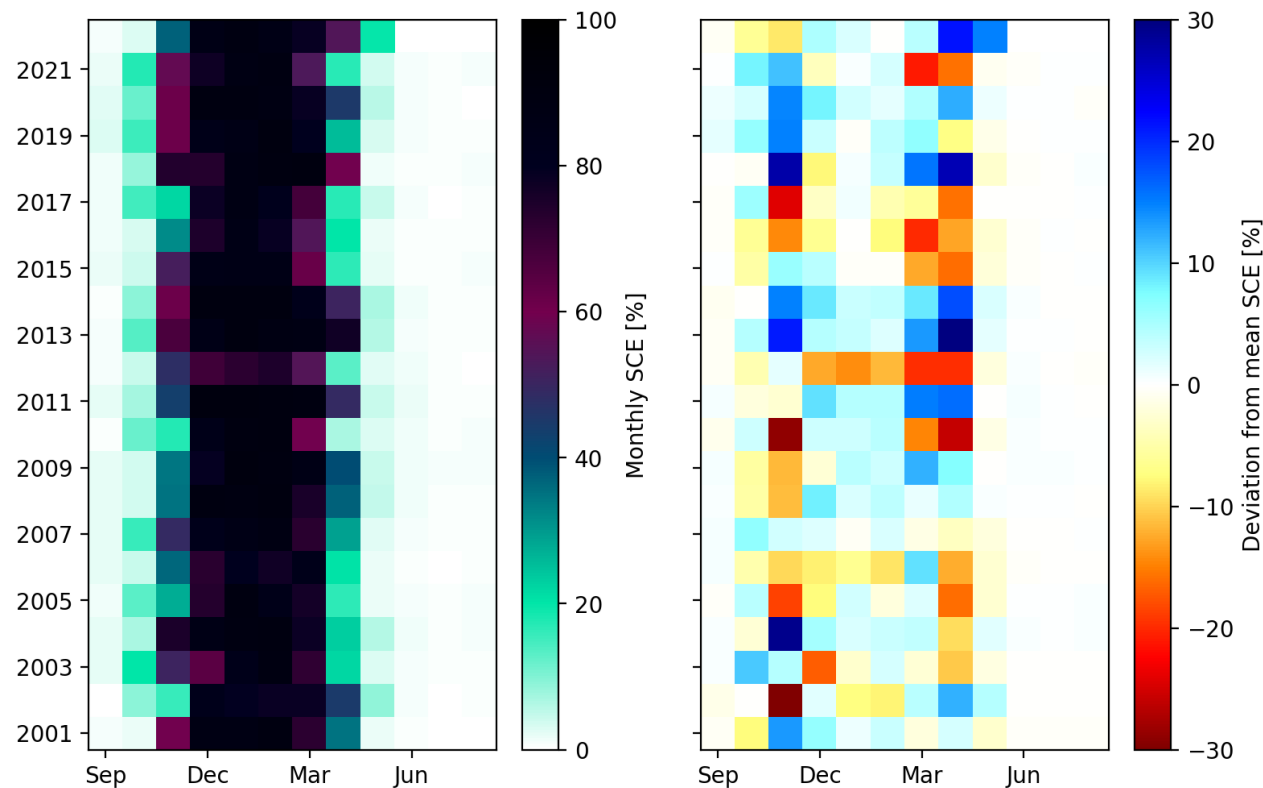
<https://earthobservatory.nasa.gov/images/149822/red-river-flooding-is-worst-in-a-decade>

Seen in the near realtime GSP product

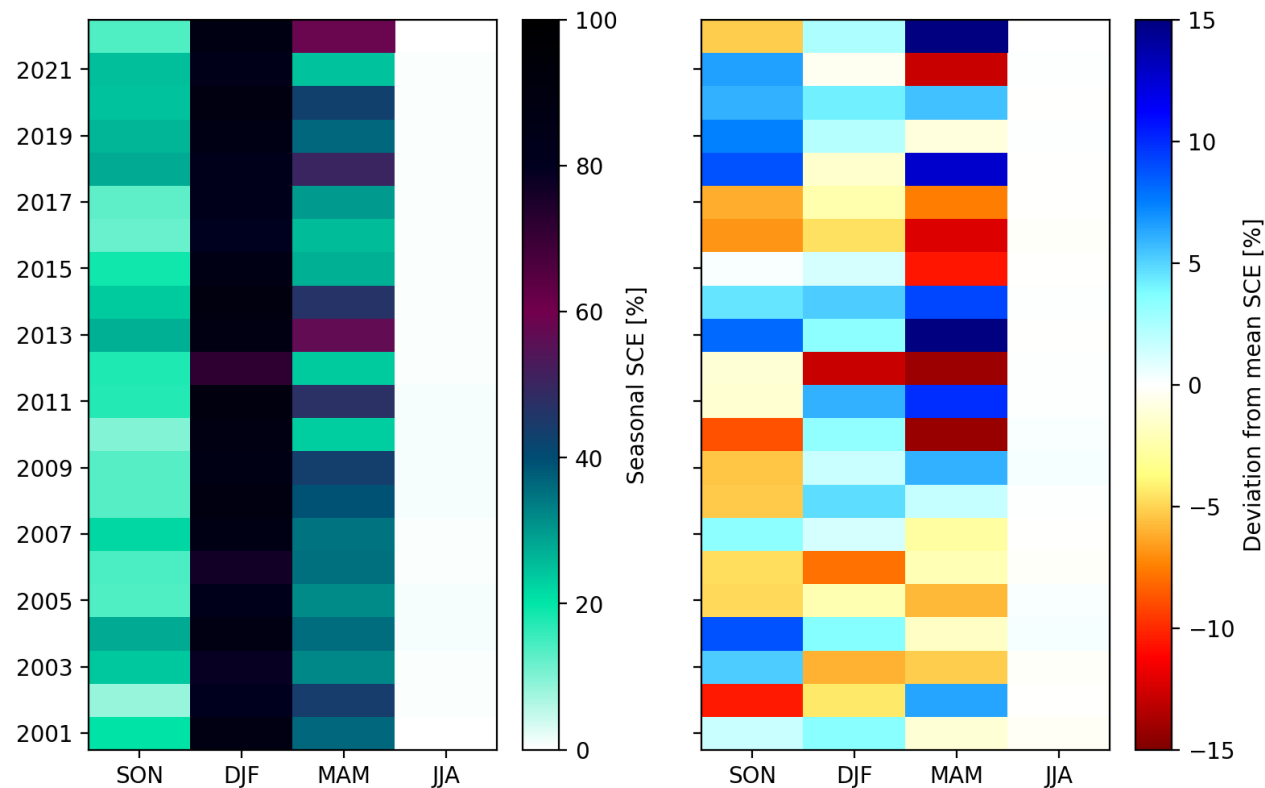


Seen in the near realtime GSP product

nelson SCE monthly 2001 - 2022



nelson SCE seasonal 2001 - 2022



Our Mission: Find tipping points in the development of Snow Cover Extent indicating coming hydrological extremes!



Summary and Outlook

- NRT Global SnowPack product now operational
- With the daily snow cover extent, hydrological extreme events can be identified
- The daily snow cover extent fulfills the requirements as ESV defined by the WMO
- Ongoing analysis of the 14 selected catchments
- Further analysis planned for southern hemisphere and major mountain ranges

Please use our product 😊



Thank you for your attention

I am happy to answer your questions

