Evolution of Global Snow Cover – Analysis of 23 Years of DLR's Global SnowPack and Latest Processor Developments

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ABSTRACT

As an essential climate variable, the area covered by snow should be recorded daily and with a sufficient spatial resolution. This is currently only achieved with medium-resolution optical remote sensing sensors. The Global SnowPack processor developed at DLR enables the daily derivation of a gap-free (without data gaps due to clouds or polar night) global snow cover in near real time by combining temporal and topographical interpolation methods. So far, the daily snow product from MODIS on Terra and Aqua has been processed, but now also the daily snow product from Suomi NPP VIIRS is included (Sentinel-3 OLCI will also be included in the near future). As a result, we now have a 23-year data set of global uninterrupted snow cover, which can be used both for trend analysis and for forecasting extreme hydrological events. For the determination of long-term trends, the accuracy and the duration of the time series are decisive, for the hydrological application rather the timeliness.

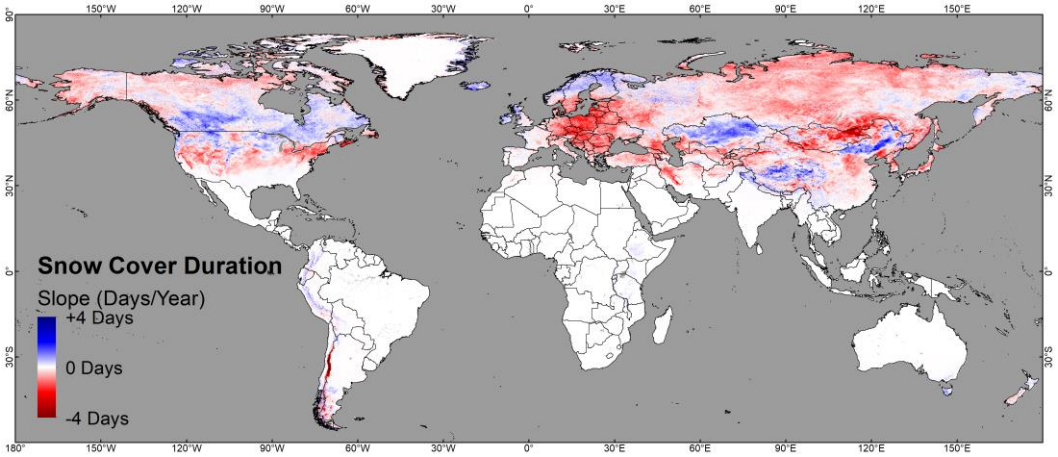

Figure 1: Global trend of full snow cover duration (whole hydrological year).

Our pixel-based trend analysis showed most significant developments in the full snow cover season throughout the full hydrological year (Figure 1; meteorological autumn to summer), where more than 30% of the area showed a significant trend of snow cover duration (two-thirds show a decrease). In addition, analyzes at catchment area level were also made. We will present these results and application examples.

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