



## **Investigating past and future changes of sources for precipitation of high latitude cities with a new online Lagrangian moisture tracking algorithm in FLEXPART**

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Water is a key factor in the climate system and it is important to understand development and impacts of changes in the atmospheric water transport. In our study we focus on investigating the source regions for precipitation at 7 high latitude cities (Bergen, Oslo, Stockholm, Helsinki, St. Petersburg, Magadon and Anchorage) in a time period from 1900-2070.

For identifying the source regions of precipitation we implemented a new online tracking method into the Lagrangian particle transport FLEXPART. This Method tracks humidity changes of particles released over a target location by following the particles backward in time over a course of 20 days. The humidity is taken from underlying meteorological data, where we account for evaporation (E) if there is a humidity gain and precipitation (P) if there is an humidity loss. All those humidity changes are attributed to the respective grid cell to obtain monthly global E-P fields for each target location (e.g. a city).

We run FLEXPART based on the coupled climate reanalysis for the 20th century (CERA-20C) data from European Center for medium range weather forecast (ECMWF) for 1900-2010 and for 2006-2070 we use data from a climate model simulation of Norwegian Earth System Model (NorESM) based on the RCP4.5 scenario.

The patterns for E-P for the overlapping period are very similar in the two datasets. We clearly see, that E dominates over marine sources, but during summer the continents gain importance for contributing to precipitation. Most of the stations show a distinct precipitation trend over the 170 years, which is also reflected in intensification of certain areas of E-P.