Geophysical Research Abstracts
Vol. 19, EGU2017-1176-1, 2017
EGU General Assembly 2017

Climate related trends and meteorological conditions in European Arctic region – Porsanger fjord, Norway

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Climate change has significant effect on the Arctic environment, where global trends are amplified. In this study, we have focused on the Porsanger fjord, located in European Arctic in the coastal region of the Barents Sea. We have analyzed climate related trends and meteorological condititions in the area of interest.
Meteorological data included wind speed and direction, air temperature (AT) and precipitation from Era-Interim reanalysis (1986-2015) and local observations (1996-2015) from Lakselv (L, fjord's head area) and Honningsvaag (H - fjord's exit area).
Our results confirm that this region is undergoing climate change related warming, which is indicated by rising air temperatures. Based on long-term reanalysis data, estimated trends for air temperature (AT) in Porsanger fjord are: 0.0536 °C year-1 at fjord's exit and 0.0428 °C year-1 at fjord's head. The results show that climate change does not seem to have a significant effect on long-term changes of wind speed and precipitation in the Porsanger fjord.
Statistical analysis underlined significant spatial variability of meteorological conditions inside the fjord. For example, there are large differences in the annual cycle of AT with monthly mean January and July values of -8.4 and 12.6 °C in L and -2.5 and 10.1 °C in H. Dominant wind directions in Lakselv are S and SSE, while in Honningsvaag S and SSW directions prevail. Strong wind events (above 12 m s-1) are more frequent in H than in L. Annual cycle is characterized by stronger winds in winter and seasonality of wind direction. Precipitation for a given location can change by about 50% between years and varies spatially.
Synoptic scale and within day variability are extremely intense in the area of interest. Air temperature and wind speed and direction can change dramatically in hours. In addition, regular patterns of the daily cycle of AT have different intensity in L and H. It is interesting to note that in spring/summer season, the daily cycle of air temperature difference between L and H is also strong and has an influence on winds. Estimates of land-originated water discharge (derived from the E-Hype model) show seasonal cycle with the maximum runoff in late spring/early summer.
The main features of climate related trends and the effects of oceanic/continental interactions, presented in this study, shape the environment of the fjord and are possible to be analogous in other Norwegian fjords with comparable geographical location.
This work was funded by the Norway Grants (NCBR contract No. 201985, project NORDFLUX). Partial support for MS comes from the Institute of Oceanology (IO PAN).