

R.E. Benestad, I. Hanssen-Bauer, E.J. Førland.

rasmus.benestad@met.no

Climate Division,

The Norwegian Meteorological Institute

PO Box 43 Blindern

0313 Oslo, Norway

Letter of Intent.

The implications of polar conditions for subsequent weather statistics over Northern Europe.

Data collected and model studies carried out for the IPY can contribute to the endeavour to explore potential signals in polar climate that may be utilised in seasonal prediction schemes for northern Europe. There are several aspects of the polar climate that potentially can be utilised in seasonal forecasting:

- i) *Sea-ice extent* (the polar cap) has a strong controlling influence on sea-air fluxes and the local radiative energy balance through the albedo. Furthermore, open sea is an important source of moisture, and sea ice shuts down this fresh water flux to the atmosphere. The edge of the polar cap sets up a contrast between maritime and continental climate, implying sharp temperature gradients, pronounced wind shear and baroclinicity. Cold outbreaks and polar lows may also be tied to the sea ice. It is plausible that the local conditions influence the large-scale circulation, e.g. through baroclinicity, position of stormtrack and the polar front or through the effect on the regional energy budget.
- ii) *Deep convection* may influence the sea-ice cover, the oceanic heat content and ocean currents. The latter is associated with transport of heat and salt. The oceanic heat content also affects the sea-air fluxes.
- iii) *Stratospheric composition and circulation* such as aerosols, affecting the radiative balance, and ozone, modulating the solar UV radiation, may affect the weather statistics closer to Earth's surface. The absorption of short wave solar radiation has implications for temperatures and their meridional gradients, and hence the thermal wind balance. The Arctic Oscillation may be one manifestation of how stratospheric processes affect the weather, and there have been reports of downward propagation from the stratosphere to the troposphere. The vertical propagation of information may be conditional to the state of the circulation and the polar vortex.

If the climatic processes described above are persistent, e.g. vary slowly, and that they turn out to affect the weather statistics, then they will be useful for seasonal forecasting. The seasonal forecasting aspect ties well in with Theme 1 proposed activities, in 'Norway and the International Polar Year 2007-08' (Atmospheric dynamic process studies in polar region, The causes and effects of albedo changes). Seasonal forecasting may add value to observation/monitoring programmes and improved knowledge, and may be one way of increasing public awareness of the importance of polar processes for climate, weather and the environment at middle and low latitudes as well as global well-being.