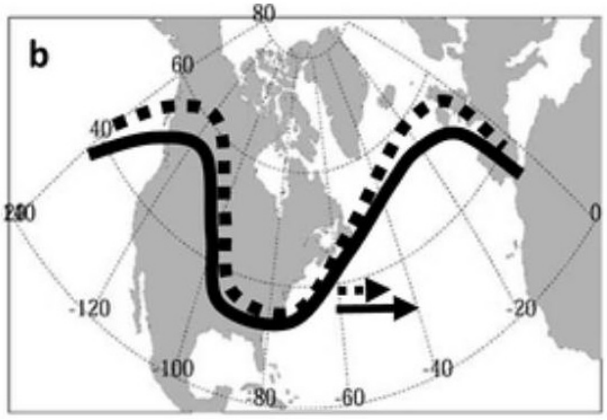
# Arctic Amplification, Sea Ice Loss & Interactions with Lower Latitudes

**Tutorial by Peter Lang Langen (Danish Meteorological Institute)**

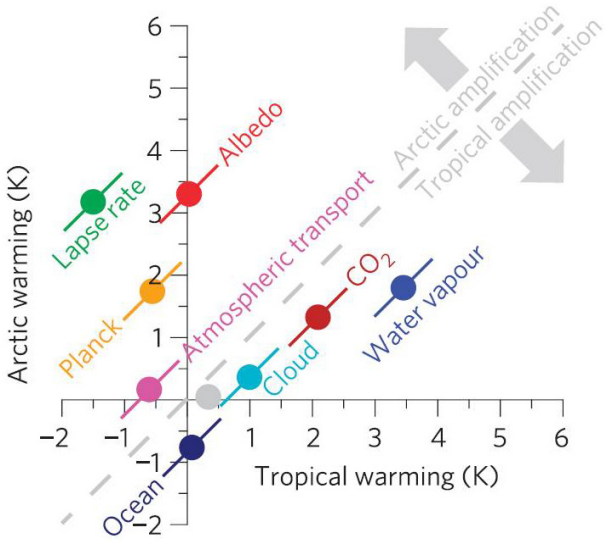
## *Part I.*
## *Arctic amplification - contributing feedbacks and local vs. remote drivers*

As climate warms or cools these changes have been found in observations, paleo-climatic proxies and climate model simulations to be more pronounced at high latitudes. This feature is by many assumed to be due the surface albedo feedback whereby disappearance of snow and ice permits greater absorption of solar energy at high latitudes. Many studies have, however, found that this effect is not the dominant cause of arctic amplification. In this first lecture, many potential mechanisms will be reviewed and physics involved in each will be illustrated.




*Schematic from Francis and Vavrus (2012) illustrating ridge elongation (dashed vs. solid) in upper-level heights caused by enhanced warming in Arctic relative to mid-latitudes.*

*Illustration by Pithan and Mauritsen (2014) of the contributions to Arctic amplification by different processes evaluated from a collection of climate models.*




## *Part II.*
## *Summer sea ice loss and potential influences on mid-latitude weather*

The rapid loss of summer sea ice associated with Arctic warming combined with a series of cold winters in Northern Europe and North America has recently spurred enormous interest in the potential for Arctic late-summer sea ice loss to influence mid-latitude weather in the following winter. One mechanism involves the slowing down of westerlies as a result of weaker north-south temperature differences, a more slowly propagating and wavy atmospheric flow and increased likelihood of northerly winds bringing cold Arctic air masses southward. In this second lecture, a series of observational and model studies of this question will be reviewed.