Analysis of the winter air mass transport at Svalbard

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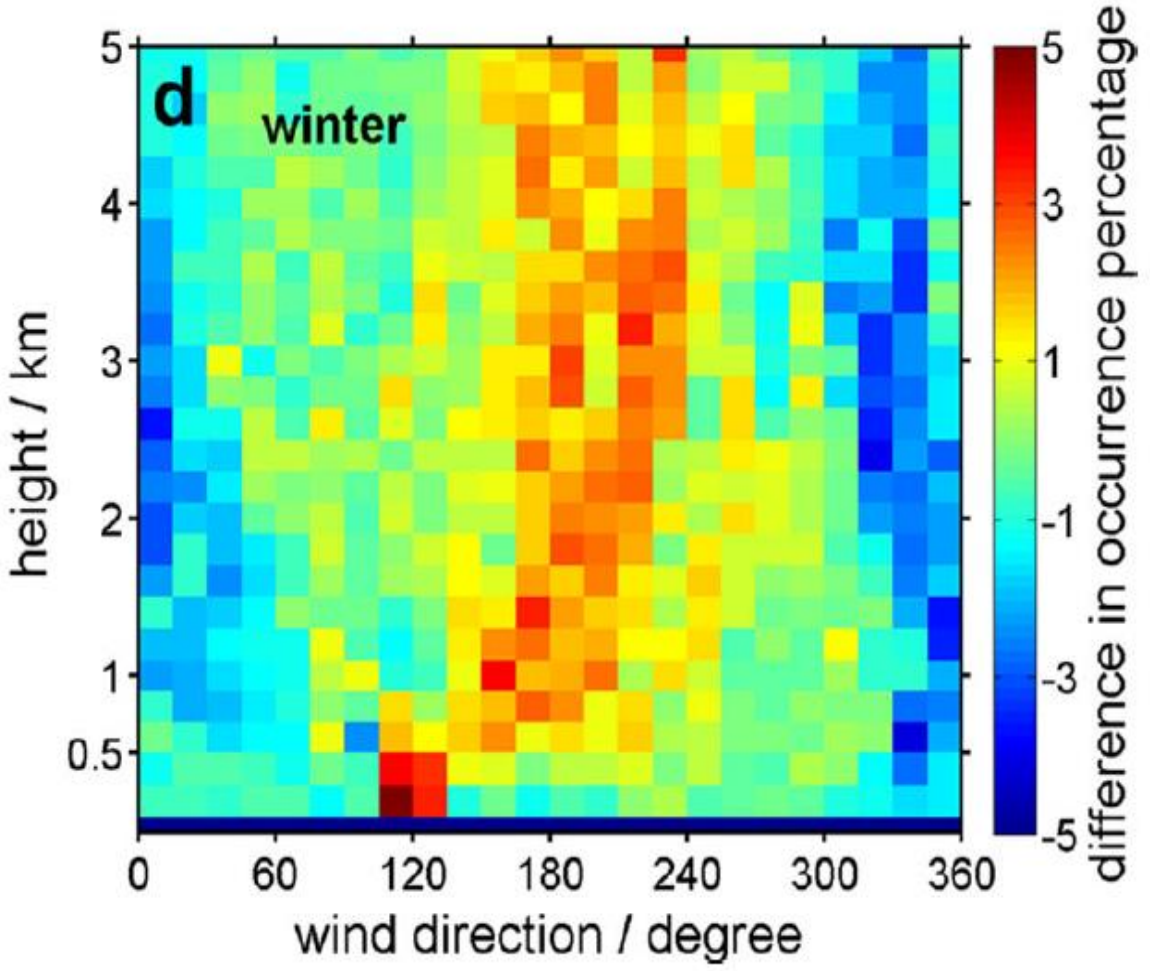
Introduction

- Maturilli & Kayser (2016): found an increased northward mass transport, during the winter season using radiosonde data.
- Hysplit back-trajectories: Three different altitudes and see if we can see a shift, especially in the most recent years
- This could be relevant for temperatures and humidity increase in the arctic.



Maturilli and Kayser (2016)

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Methods and data

- Air mass transport analysis: Hysplit back-trajectories: winters for two periods 2005-2007 and 2017-2019; calculated probability of occurrence of trajectories
- ERA-5 reanalysis (T and RHs)
- Insitu meteo data at Zeppelin – T, RH, wind direction and speed (run out of time though!)

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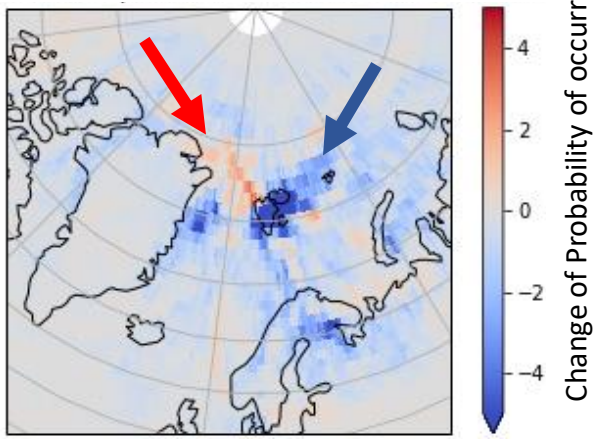
Results

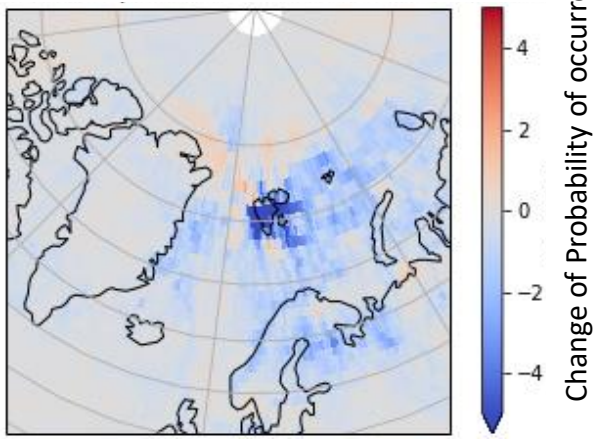
Between 2005-07 and 2017-19 change in air mass transport pattern:

- NE =>NW (N at 1500 a.s.l.)
- More S (weaker pattern though)

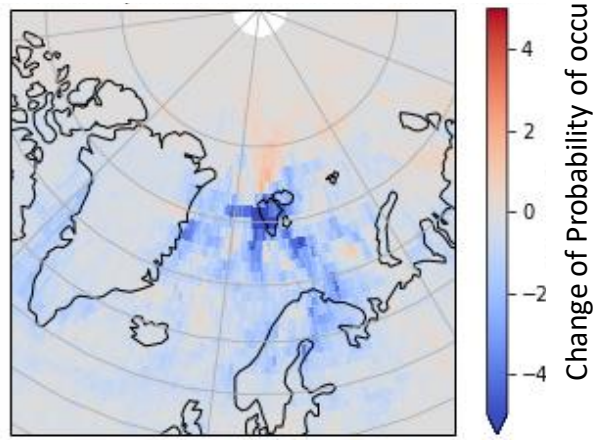
Mass air transport 100m



Mass air transport 500m



Mass air transport 1500m



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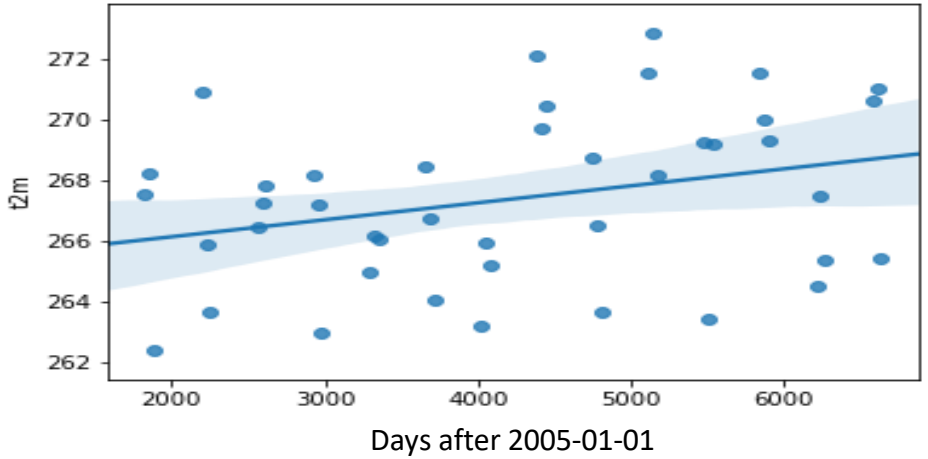
Results

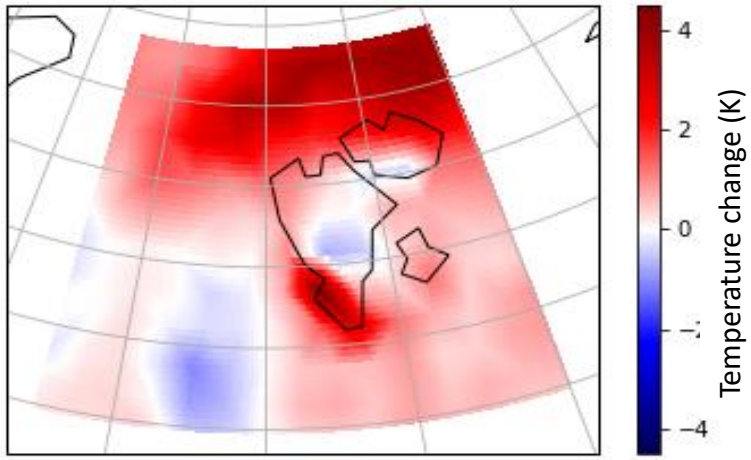
Strong warming in Ny-Alesund in ERA-5

Spatial variation: strongest warming to the north, cooling over central Svalbard and S-W

Temperature trend from 2005-2018(JFM), ERA-5



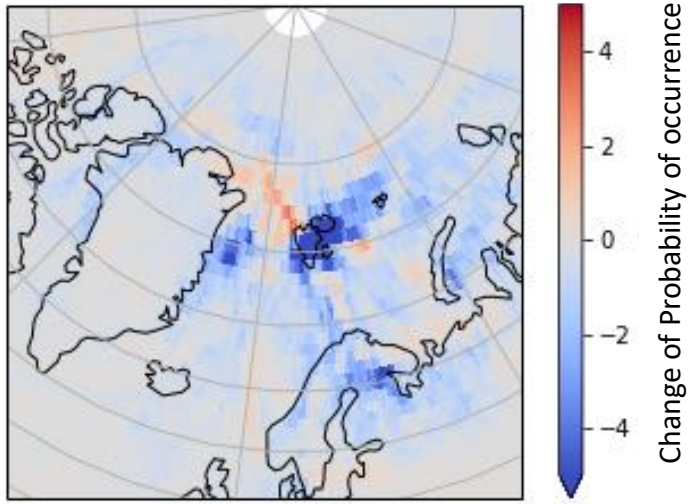
Temperature difference (2005-2007) and (2017-2018)



What is connection?

Is there connection?

Mass air transport 100m



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Conclusion

- N-E to N-W change in the air mass transport between two studied periods
- T reanalysis shows strong warming trend in winter in Svalbard
- Temperature didn’t change over Svalbard uniformly =>
- Can’t be sure that our analysis found connection between T change and air mass transport patterns

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Outlook

- Analysis of insitu T, RH, wind speed and direction – can we see change in wind direction and can we explain T change by wind?
- Perform air mass transport analysis for years previous to 2005-2007 – can we find the shift from N to S as in Maturilli & Kayser 2016?

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References

- M.Maturilli, M.Kayser, Arctic warming, moisture increase and circulation changes observed in the Ny-Ålesund homogenized radiosonde record(2016). DOI 10.1007/s00704-016-1864-0