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Title

Seasonal Cycle of Arctic Cloud Cover based on AVHRR Satellite Data

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Author

Tam, Rachel

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Seasonal Cycle of Arctic Cloud Cover based on AVHRR Satellite Data

Presenter: Rachel Tam (ystam@ucsd.edu)

Advisor: Professor Amato Evan (aevan@ucsd.edu)

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Project Goal and Motivation



Why Clouds?

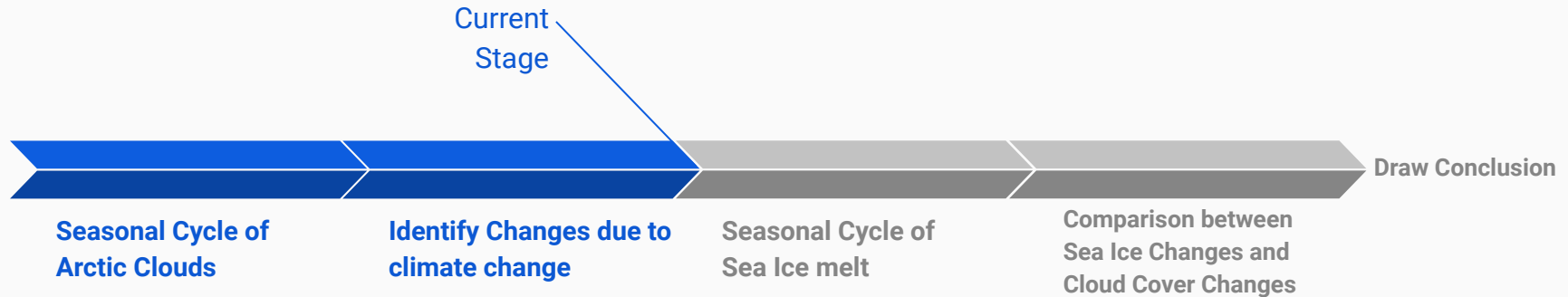
- Crucial Role in Climate remain **unknown**

Why Arctic?

- Urge from rapid and massive impacts
- **First** places to experience Climate Change

Project Outline

Identify Relationship between Arctic Sea Ice Melt and Arctic Cloud Cover Changes



Source of Measurements:

Advanced Very High Resolution Radiometer (AVHRR) on NOAA satellites (NOAA07-NOAA19) in the period of 1982-2019

3 Main Findings

1. Precipitation **Maximum** occurs in **Summer**; and Cloud Cover **Minimum** occurs in late **Winter**

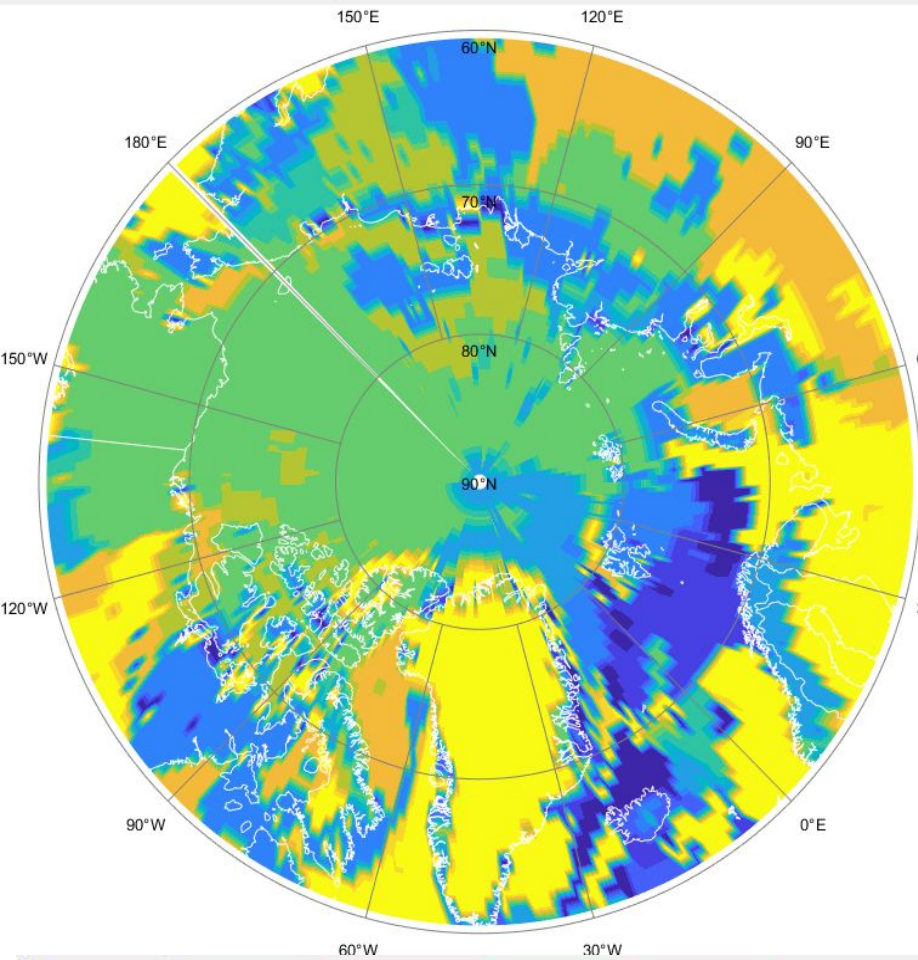


Winter Minimum

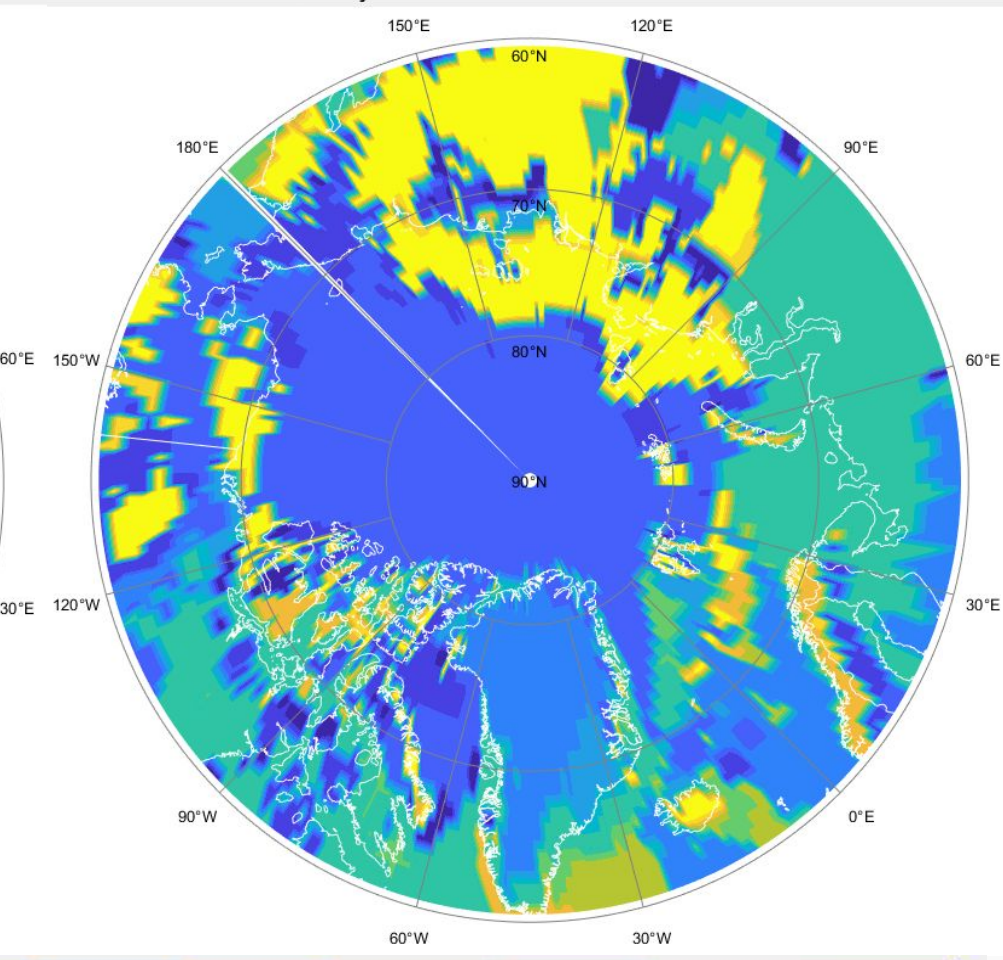


Summer Maximum

Month of Seasonal Cycle Maximums of Cloud Fraction in 60N to 90N in Polar Plot



Month of Seasonal Cycle Minimums of Cloud Fraction in 60N to 90N in Polar Plot



Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sept

Oct

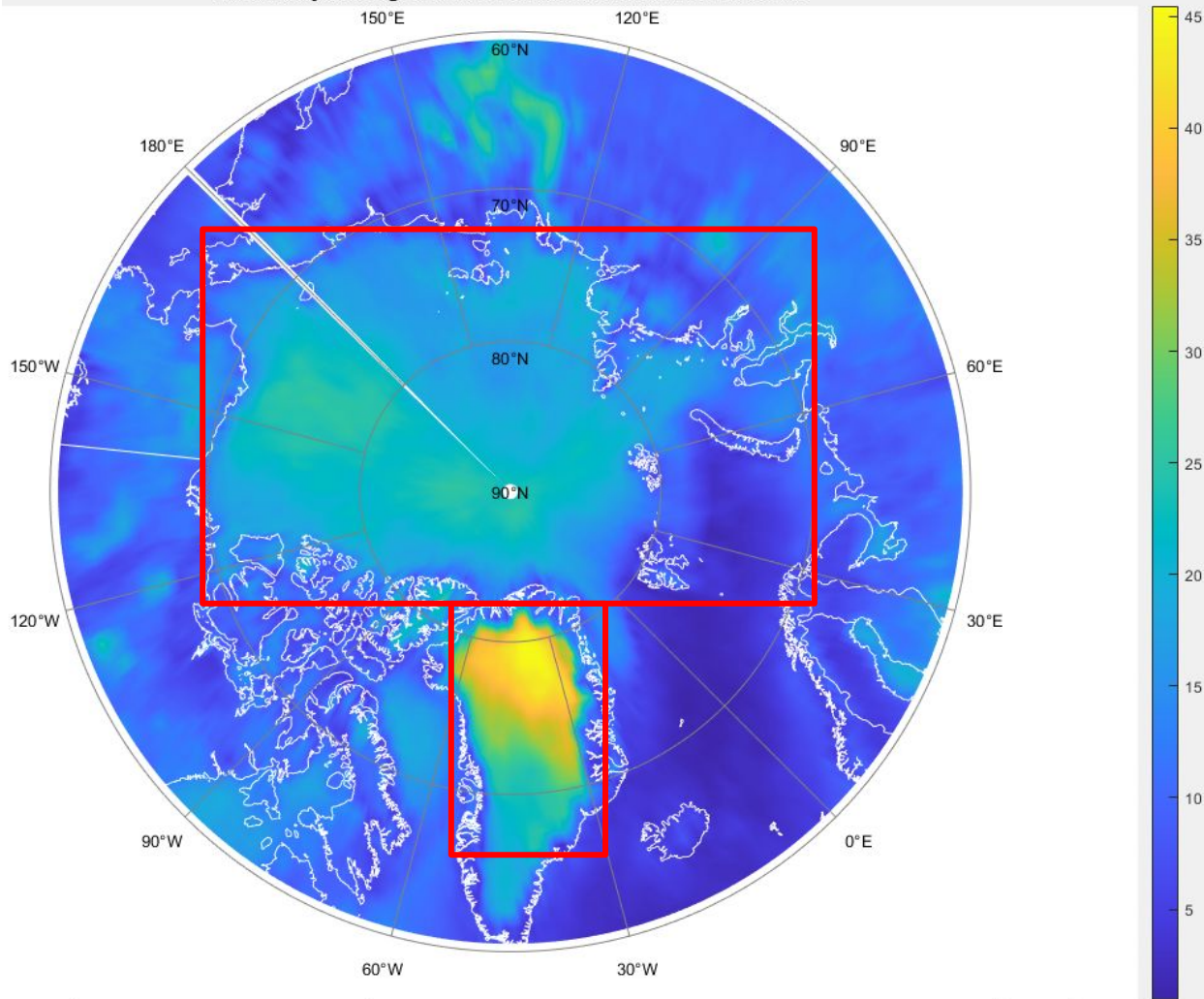
Nov

Dec

3 Main Findings

1. Precipitation **Maximum** occurs in **Summer**; and Cloud Cover **Minimum** occurs in late **Winter**
2. Large annual change in cloud cover in Northeast edge of **Greenland**
3. Large annual change in cloud cover in **Arctic Ocean**

Seasonal Cycle Range of Cloud Fraction in 60N to 90N in Polar Plot



~45% cloud cover
difference in a year in
Greenland

~20-25% cloud cover
difference in a year in
the Arctic Ocean

Possible Sources of Error

1. Sampling Error in Early Measurements (1982-2003)
 - a. NOAA-7 - NOAA-11: 2 channels only:
2. Seasonal Cycle Range concentrated in Greenland
3. Satellite Orbital Drift

Orbital Drift

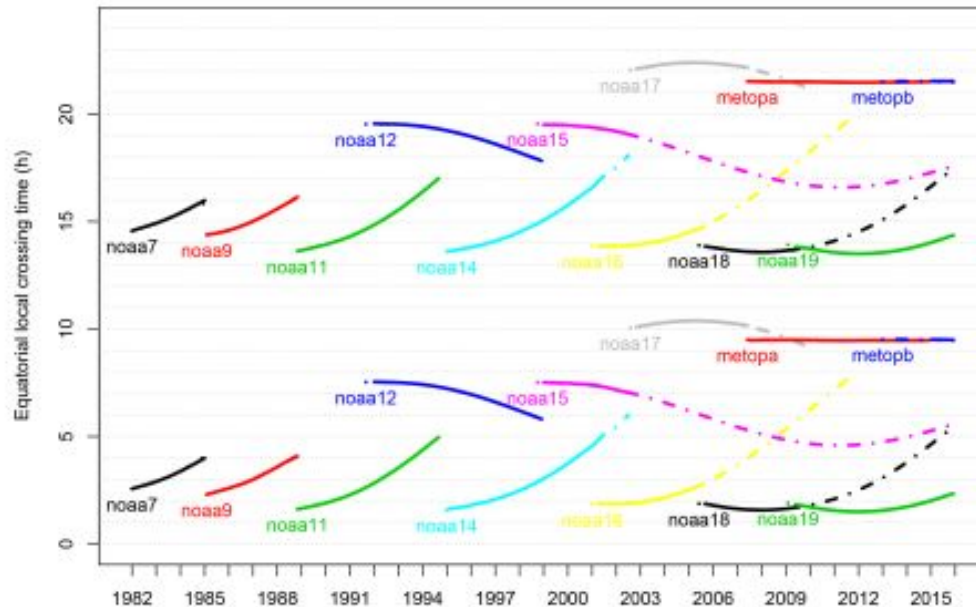


Figure 1. Time series of equatorial crossing time of the NOAA and MetOp satellites. Two observations per time per satellite are related to two satellite nodes (ascending and descending). The dot-dashed lines indicate data which are included in the CLARA-A2 dataset but excluded in other CFC CDR (e.g. the Cloud_cci dataset) due to an overlap with other satellites. This exemplifies one source of spurious trends in satellite CDRs caused by different data aggregation strategy.

Summary

1. Consistent Seasonal Cycle
2. Unconfirmed findings on Large annual change in cloud cover in regions
3. Next Steps: Removal of possible sources of errors

Acknowledgement

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