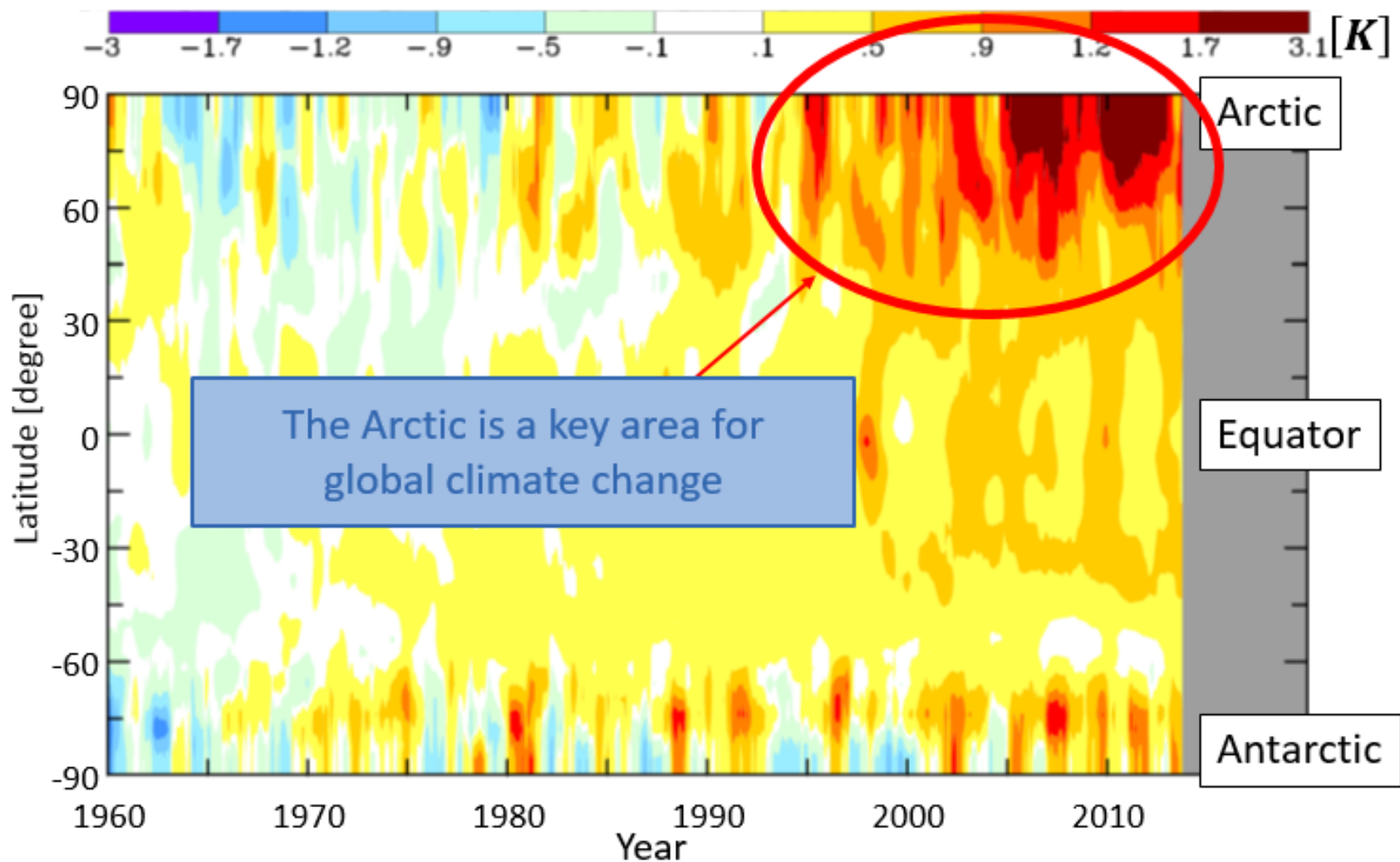


## Multidisciplinary drifting Observatory for the Study of Arctic Climate



A major international research initiative under IASC to improve the representation of Arctic processes in weather forecast and climate models

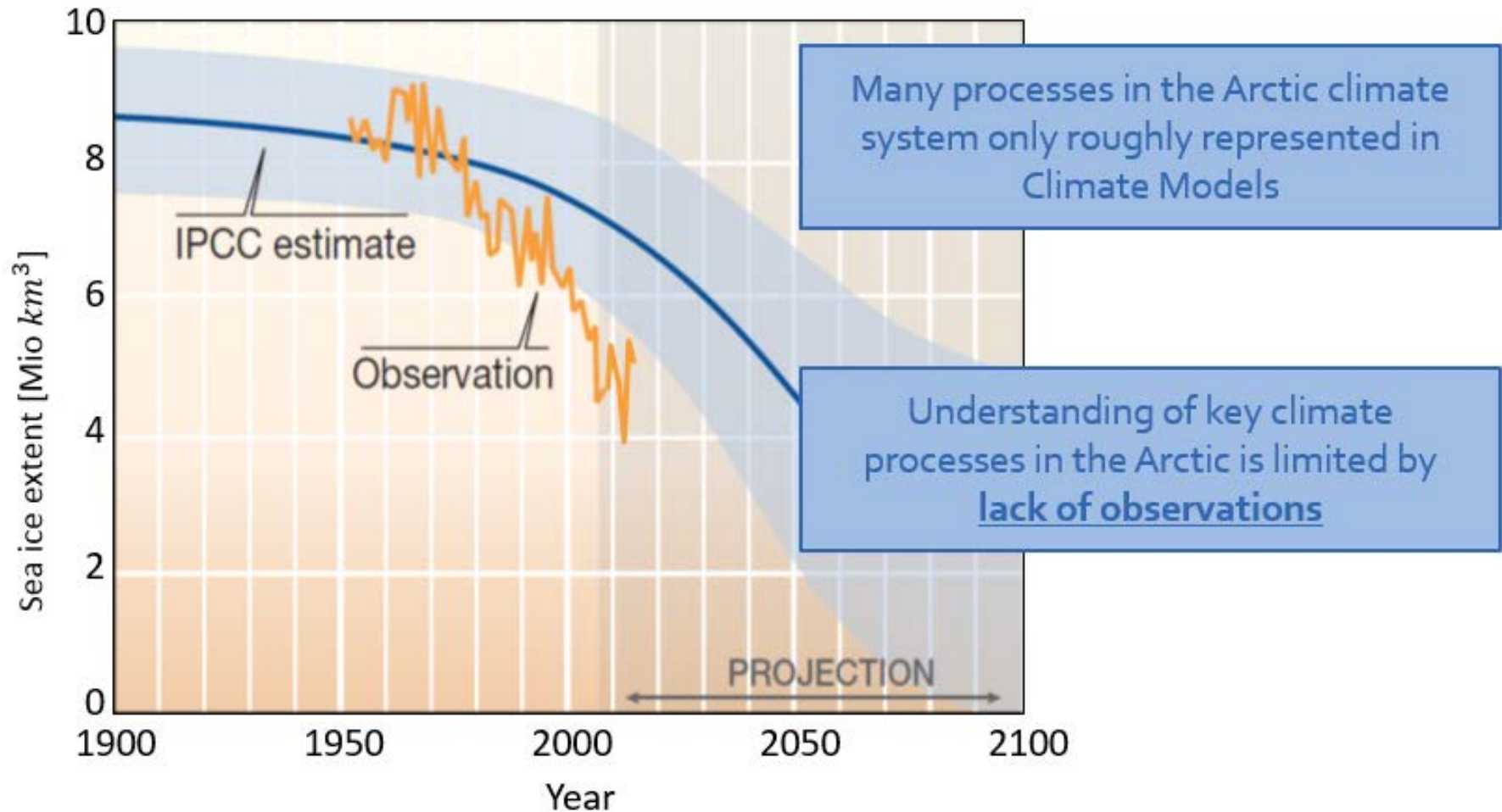
# Motivation



Near surface temperature changes derived from observations

([http://data.giss.nasa.gov/gistemp/time\\_series.html](http://data.giss.nasa.gov/gistemp/time_series.html))

# Motivation



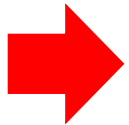
Time series of observed (orange) and simulated (blue) minimum sea ice extent ( $10^6 \text{ km}^3$ ) (Stroeve et al., 2007, updated)

# Overarching Goal

## Overarching goal:

To improve the understanding and model representation of coupled atmosphere-ice-ocean-ecosystem-biogeochemistry processes

in the Central Arctic to support improved sea ice forecasting, regional weather forecasting, and climate predictions.



year-around observations of key climate processes in the central Arctic are urgently needed (highlighted e. g. by IPCC)



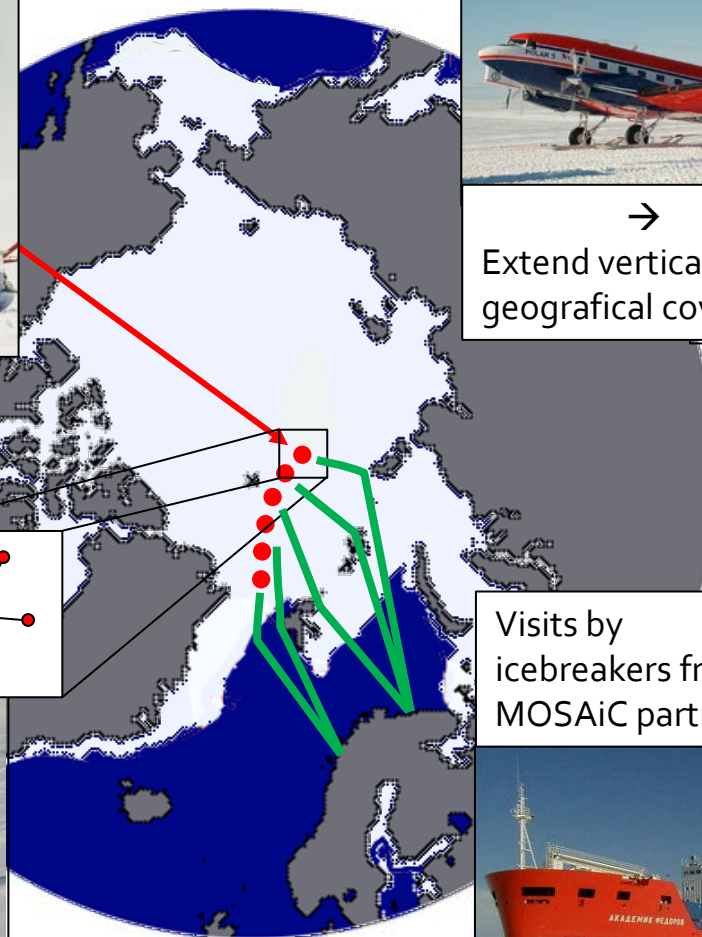
# General Approach

Central Observatory:  
RV Polarstern



Drift fall 2019  
to fall 2020

Distributed network  
of satellite stations



Operations of  
research aircrafts  
and helicopters



→  
Extend vertical and  
geographical coverage

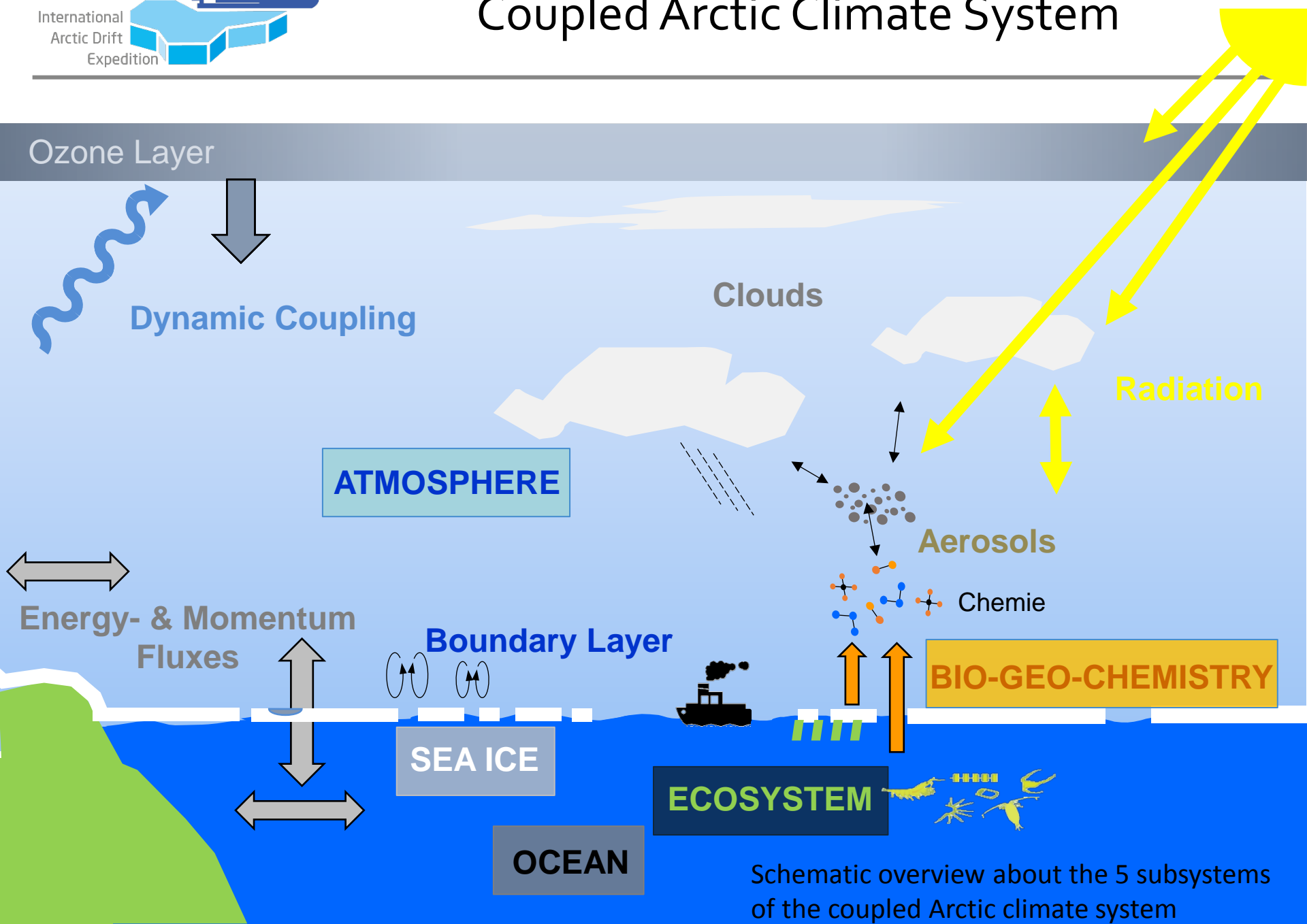


Visits by  
icebreakers from  
MOSAIC partners



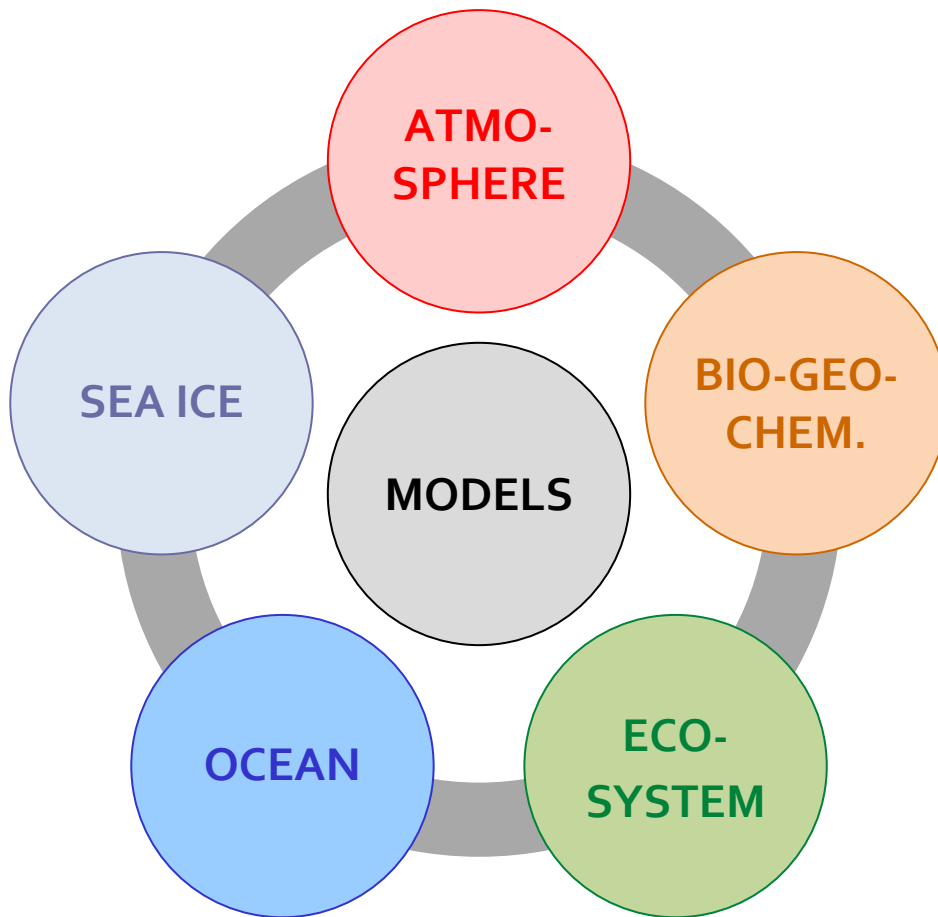
→  
Broader geographic  
coverage & supply

# Coupled Arctic Climate System



Schematic overview about the 5 subsystems of the coupled Arctic climate system

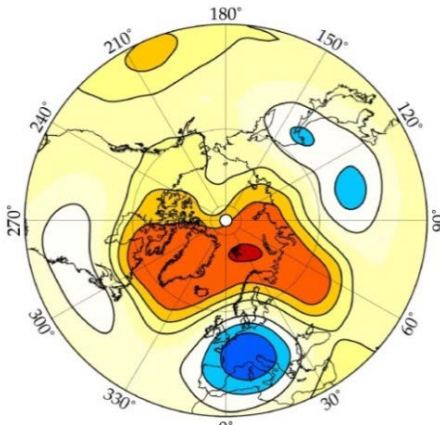
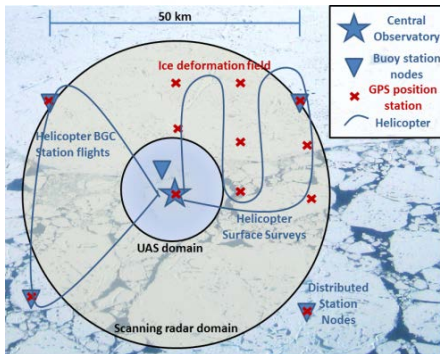
# Working Groups



## Cross cutting working groups:

- Aircraft operations
- Remote Sensing
- Communication & Outreach
- Data science
- Logistics
- etc.

# Spatial Coverage



## Central Observatory

- Ship based
- Sea ice stations
- Process scale observations  $< 5 \text{ km}$

## Distributed Network

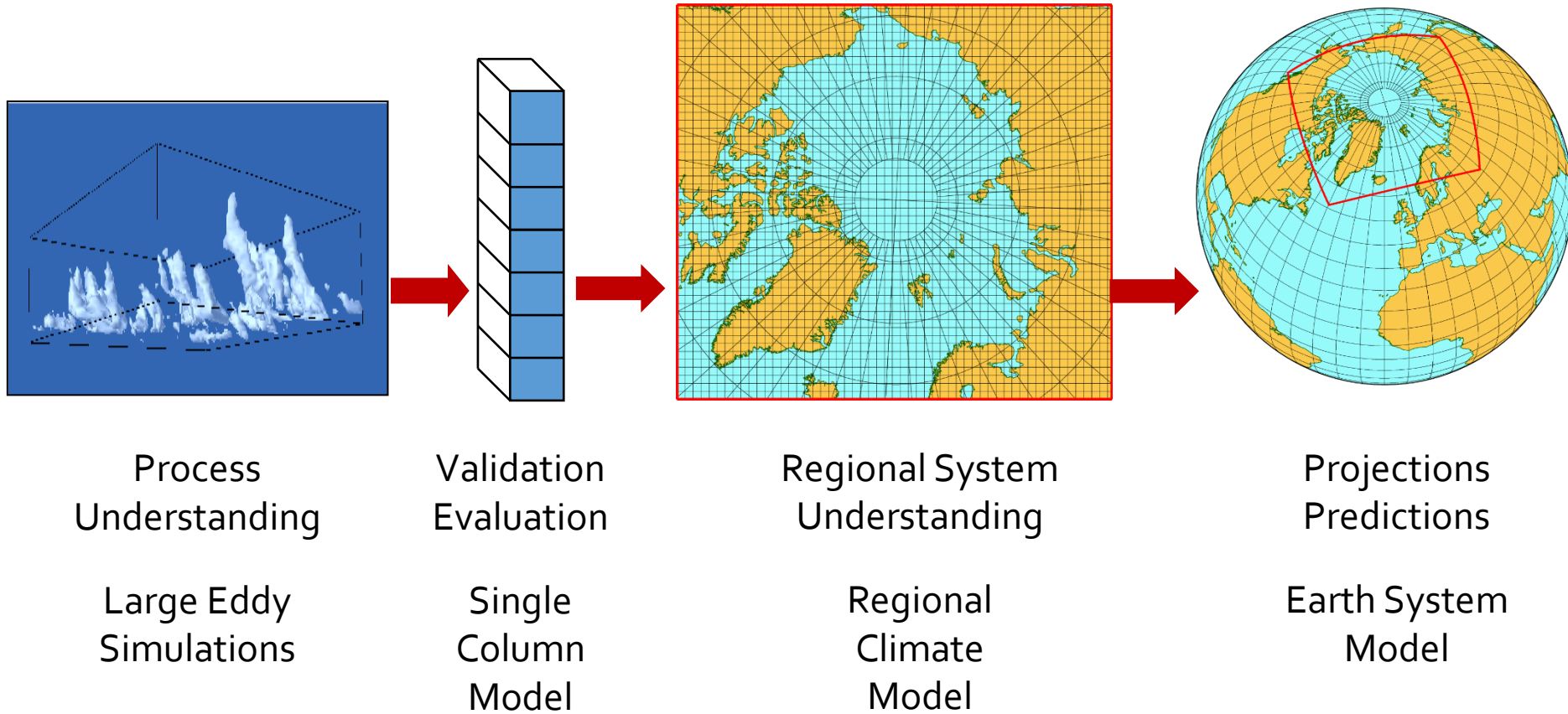
- Sea ice stations visited by helicopter
- UAV, ocean gliders
- Aircraft (Polar 5,6, Halo)
- Process & regional model
- Model grid cell  $< 50 \text{ km}$

## Large-scale linkages

- Collaborating research vessels (Academic Fedorov, Xue Long, Oden...) and supply cruises
- Aircraft (Polar 5,6, Halo), ocean gliders
- Satellites
- Data assimilation studies
- Arctic regional & global models  $> 1000 \text{ km}$



# Modelling Strategy



# Atmosphere program MOSAiC

## Sounding program

- Vertical profiling radiosondes: 4/day
- Ozone sondes: 1/week
- CFH/Cobalt sondes: 1/month

## Tethered balloon

## Meteorological mast (10-20 m)

## Eddy-Covariance

## Aerosol measurements

## Wind profiling Lidar

## Cloud/Precip profiling Radar

## Autonomous weather stations in Distributed Network



# Connection GRUAN – MOSAiC



4 x daily radiosondes for the entire period

**PI:** Marion Maturilli (GRUAN site Ny-Ålesund)

- standard humidity chamber
- storing of raw sounding data and meta data with RSLaunchClient
- post-processing by GRUAN LC

Why is this of interest to GRUAN ?

## GCOS Reference Upper-Air Network



# Connection GRUAN – MOSAiC

Why is this of interest to GRUAN ?



- filling a spatial gap
- no long-term observations, but of interest for e.g. satellite community



# Questions

