

MOSAiC



MOSAiC
Multidisciplinary drifting **O**bservatory
for the **S**tudy of **A**rctic **C**limate

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University of Colorado / NOAA-PSL
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MOSAIC

Sept 2019 – Oct 2020



21 Aug –
20 Sept 2020

4 Oct 2019

15 Sept 2020
Ice edge

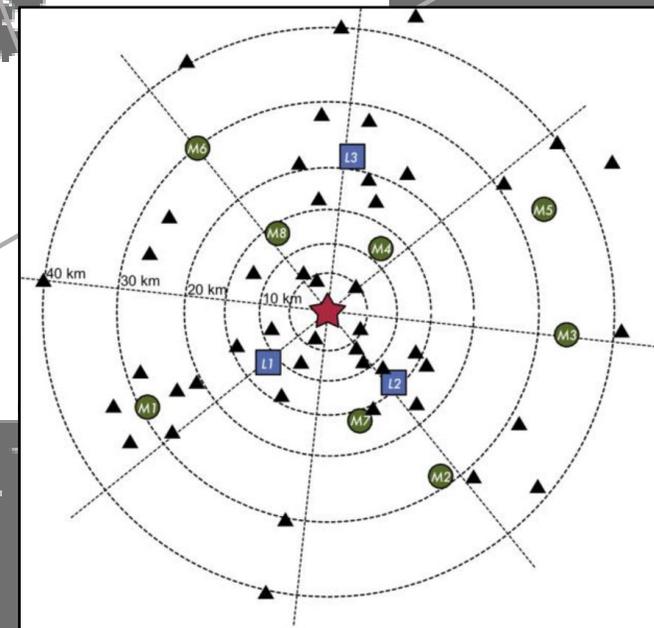
5 Mar 2020
Ice edge

31 July 2020

Ny'Alesund

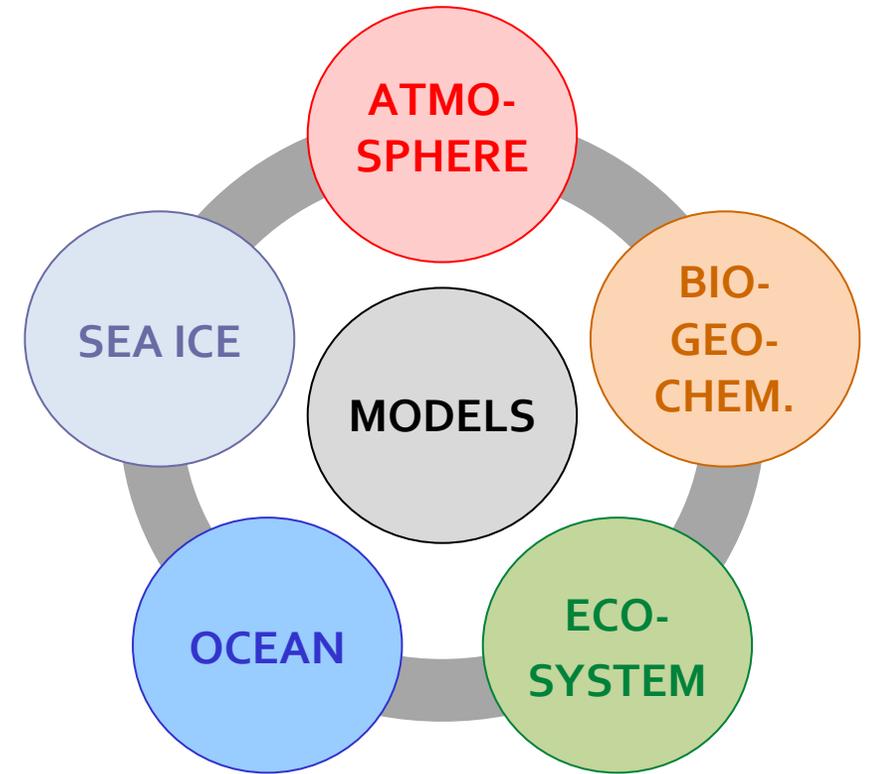
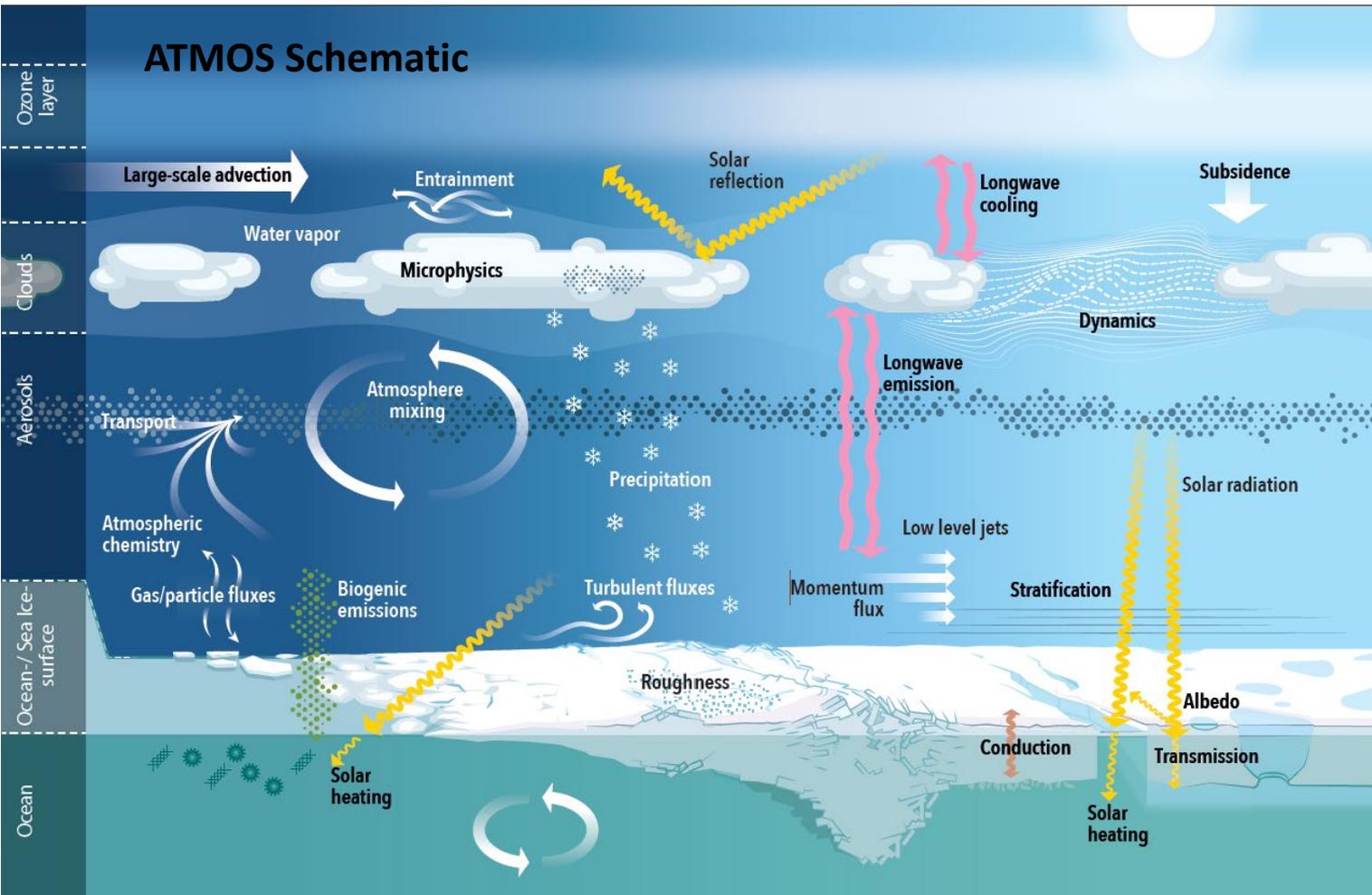
COMBLE

20 Nations (funding)
37 Nations (participants)
7 Icebreakers/ships
>80 Institutions
>400 field participants
>\$170M overall

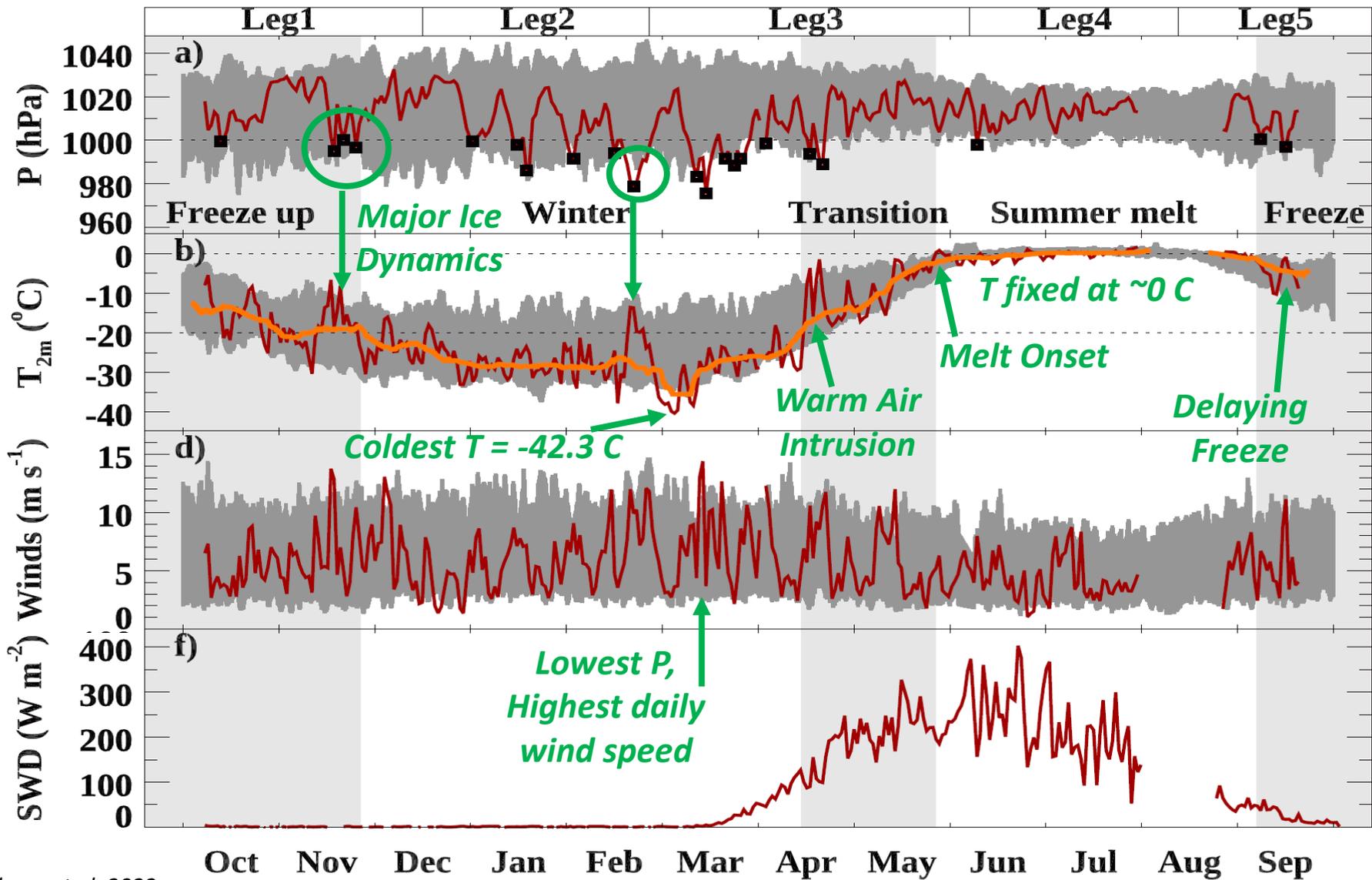


Science

What are the causes & consequences of an evolving & diminished Arctic sea ice cover?



A Year in the Arctic



Storms are Black Squares
 Gray is ERA5 reanalysis 5th-95th percentile for MOSAiC location

- **Winter-spring:** More frequent and stronger storms than typical
- **Storms in Nov, Feb, Apr** somewhat anomalous
- **Summer:** Warmer and wetter than normal
- **Few storms in summer**

Data

MOSAIC Data Policy: All data must be in publicly available archive by 1/2023!

ARM Archive has 90 data sets & growing!

Working on “Merged Observatory Data Files”

Data Available at:

- **DOE ARM Archive**
- **NSF Arctic Data Center**
- **PANGAEA Archive**
- **Some others**

Involvement data PIs!

The screenshot displays the ARM Data Search interface. At the top, there is a navigation bar with the ARM logo and links for HOME, DATA SEARCH, SUPPORT, ACCOUNT Login, and CART. Below the navigation bar, the search results are shown for the query 'MOSAIC (Drifting Obs - Study of Arctic Climate); Mobile Facility'. The interface includes a search bar, a date range selector, and a sidebar with filters for Categories (Aerosols, Atmospheric State, etc.), Measurements (54), and Sites (1). The main content area shows a table of data products with columns for Data Product, Description, and View Details & Get Data. The table lists several data products, including '30smplcmask1zwang', 'aoppsap1flynn1h', 'aoppsap1flynn1m', 'interpolatedsonde', and 'mwrret1liljclou'. A 'Feedback' button is visible on the right side of the interface.

Data Product	Description	View Details & Get Data
30smplcmask1zwang	MPL: 30-second cloud mask using the first Z. Wang, et al algorithm	▼
aoppsap1flynn1h	Aerosol Optical Properties (AOP) from PSAP using 1st Flynn Algorithm: 1-hour	▼
aoppsap1flynn1m	Aerosol Optical Properties (AOP) from PSAP using 1st Flynn Algorithm: 1-minute	▼
interpolatedsonde	Interpolated Sonde	▼
mwrret1liljclou	Microwave Radiometer Retrievals (MWRRET) of Cloud Liquid Water and Precipitable Water Vapor	▼

Science Possibilities

- Surface energy budget processes
- Dynamical drivers of ice motion
- ABL structure and processes
- Gas concentrations, fluxes, and cycles
- Aerosols, sources, and cloud processes
- Precipitation and snow on sea-ice
- Warm air advection and atmospheric rivers
- Light transmission through sea ice
- Ocean heat budgets and fluxes to the ice
- Physical system constraints on ecosystem
- Model assessments at many scales
- High-res cloud modeling



2nd International
MOSAiC Science Conference

13-17 February 2023 University of Colorado Boulder, Colorado, USA

Cross-cutting science to advance modeling capabilities

For information, session descriptions, and abstract submissions:

<https://mosaic.colorado.edu/second-science-conference>

Key Dates

12 Oct: Session announcement

18 Nov: Abstract due date

16 Dec: Full program released

11 Jan: Registration deadline

Today's Session Plan

5min + 2min

Damao Zhang / Laura Riihimaki - Status on ARM products

Jian Wang / Xianda Gong - Sea salt aerosols in the winter/spring Arctic

Kerri Pratt - Individual aerosol sources and composition during MOSAiC

Jessie Creamean - Annual cycle of INPs in the central Arctic during MOSAiC

Sergey Matrosov - Measurements of snowfall during MOSAiC

Israel Silber - Sources and formation mechanisms of liquid-bearing clouds over MOSAiC

Matthew Shupe - Cloud impacts on the surface energy budget

Anne Sledd - Snow thermal conductivity & conductive flux variability during MOSAiC winter

Ola Persson - Observations of dynamic air-ice-ocean interaction events during MOSAiC

Amy Solomon - Using observations from MOSAiC to evaluate and improve simulations of the coupled cloud-atmosphere-surface system

Andrew Dzambo - Disentangling the roles of large-scale subsidence, moisture flux, and aerosol effects on Arctic cloud lifetime

General Discussion – Pathways forward, model foci, more



Thanks