

# Measurements in the Atmospheric Column

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SHEBA acquired simultaneous measurements of many atmospheric parameters.

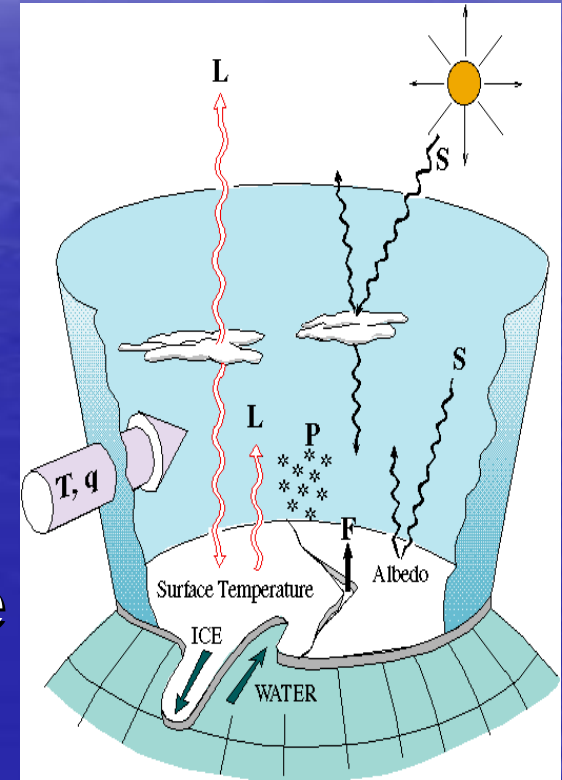
## SHEBA OBJECTIVES:

- Establish Data Set [**Full Year, OAI Column**]
- Characterize the OAI State & Structure
- Quantify the Heat, Ice, Moisture budgets
- Analyze, Interpret, Simulate Key Processes
- Evaluate Impact on Feedbacks & GCM's

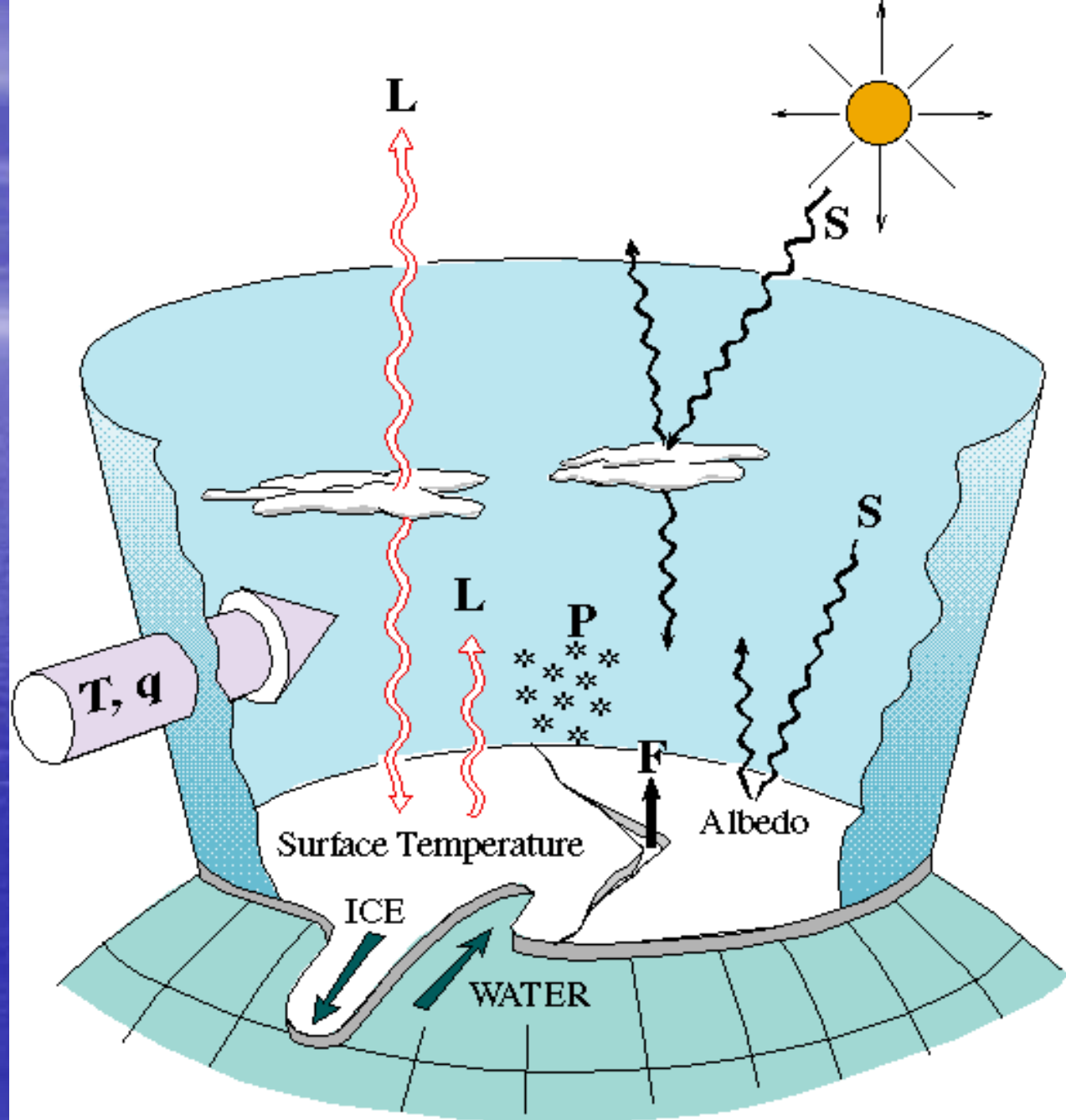
*"OAI" = Ocean-Atmosphere-Ice*

# SHEBA Experiment Design

- Environment: Multiyear pack ice
- Spatial Sampling: The OAI Column, Local & Aggregate Scales
- Temporal Sampling: Annual Cycle Core Time Series
- Process Studies and Intensive Observing Periods
- Budgets: Heat, Ice & Snow, Moisture
- Models: Process, SCM, Regional, GCM



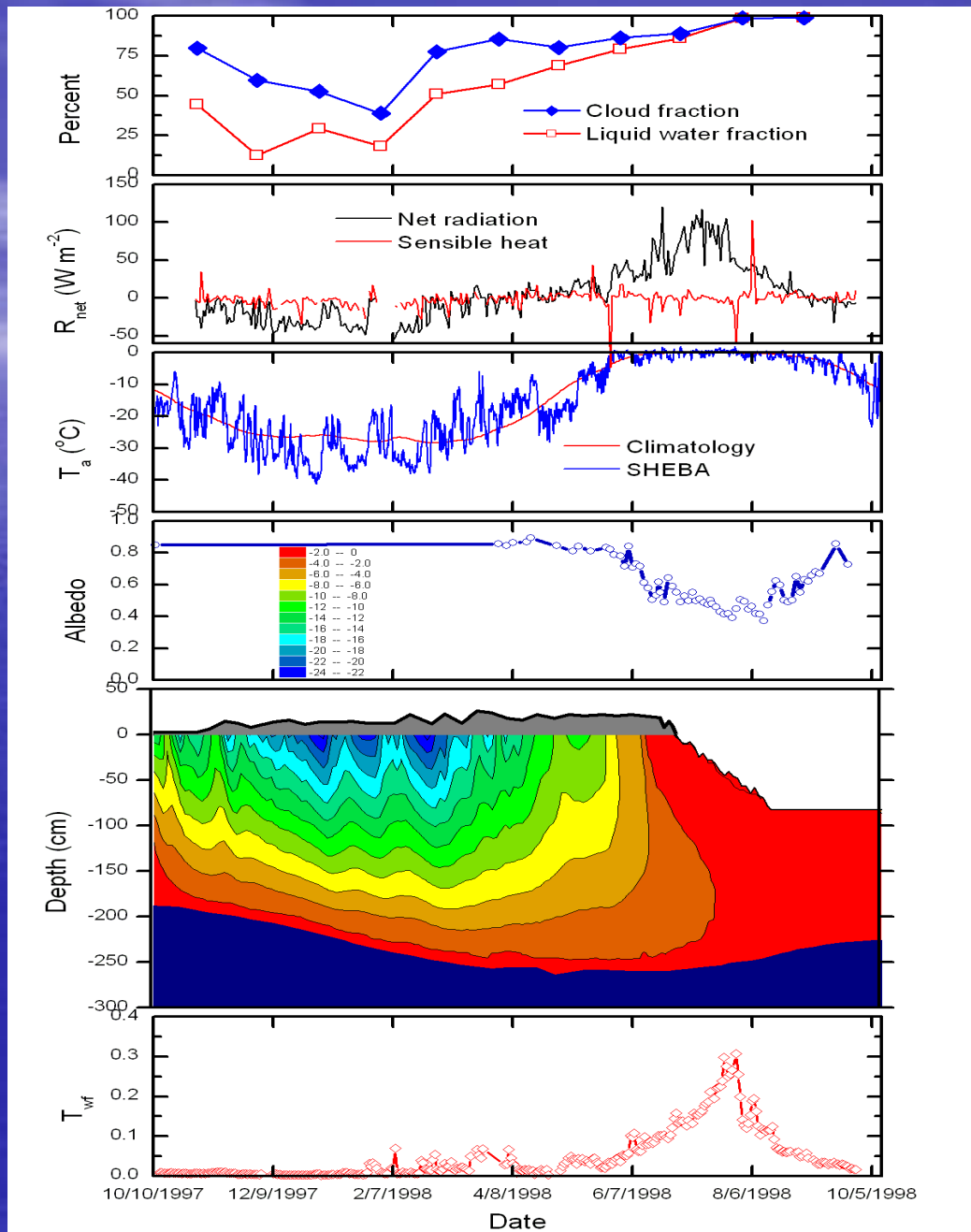
# OAI Column: Sampling Autonomously at More Than One Location for Many Years



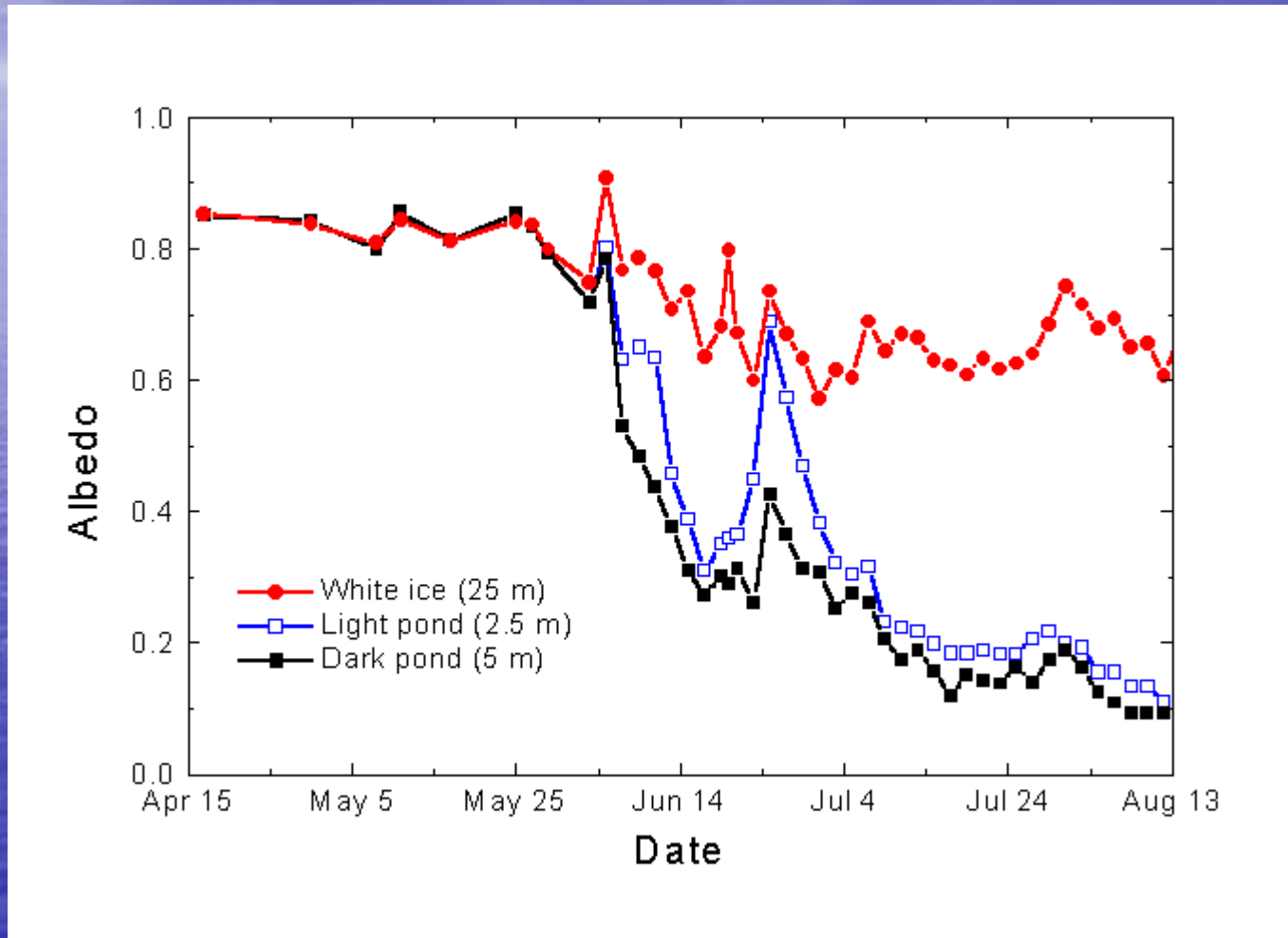
# Core Time Series



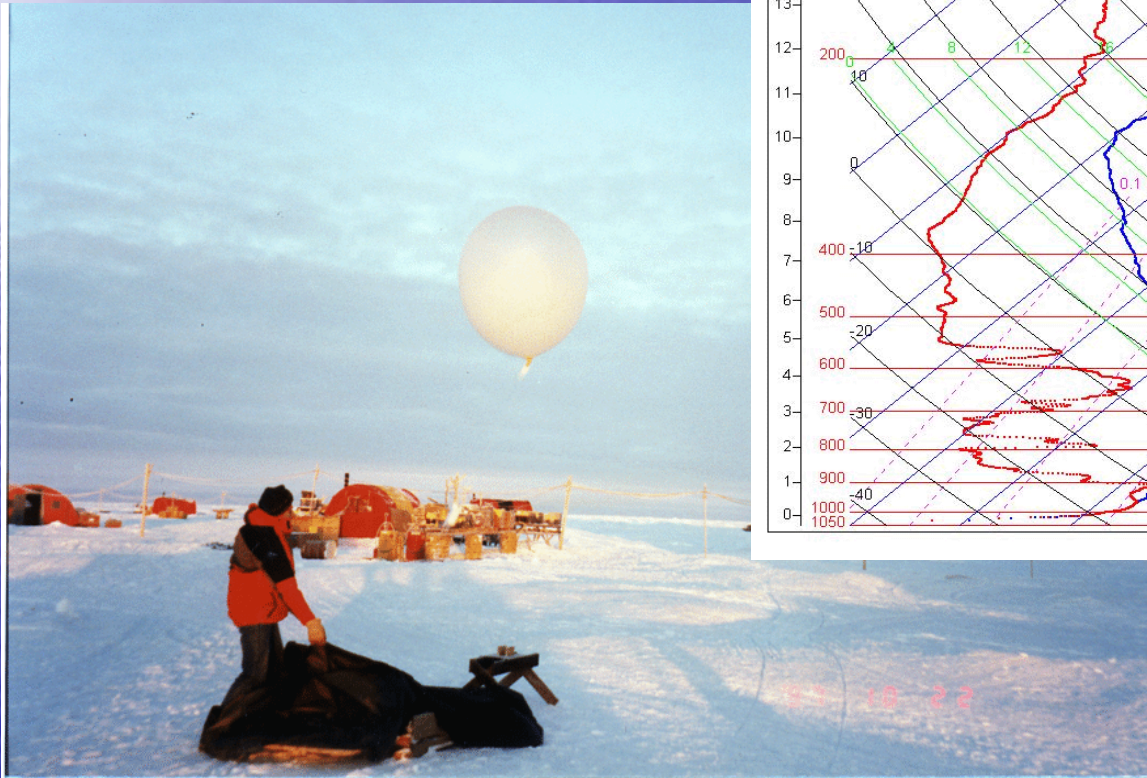
# Examples from the SHEBA Annual Dataset



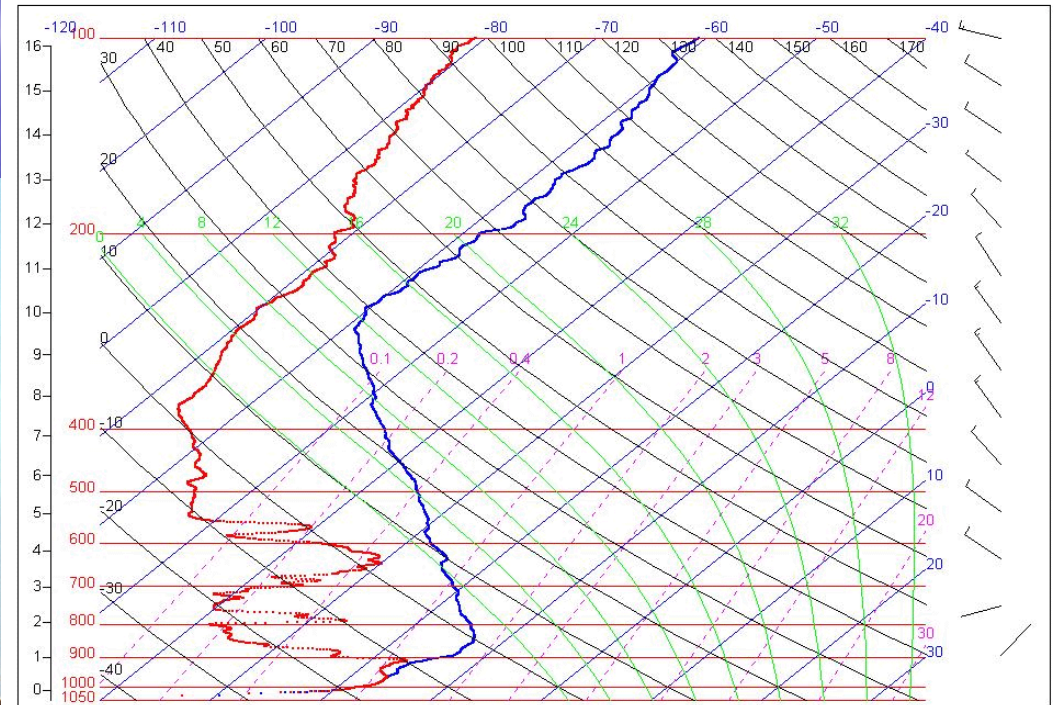
# Surface Albedo Time Series (Perovich, et al.)



# Atmospheric Structure (SPO/ATD)



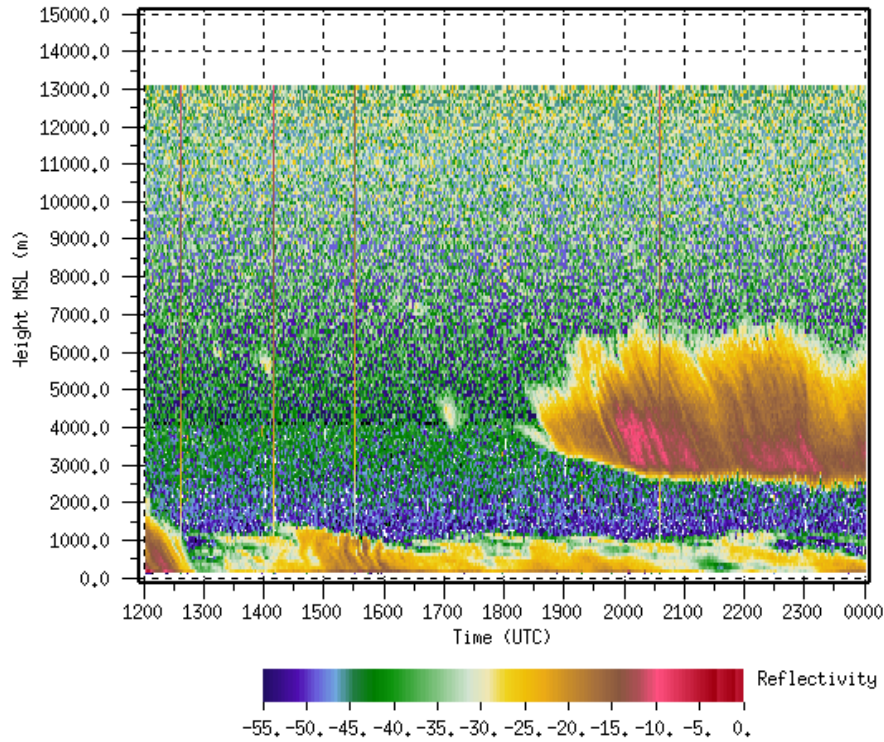
SHEBA--GPS Soundings in the Arctic Floe Fixed, SHE, 1997,11,17, 23:15:04



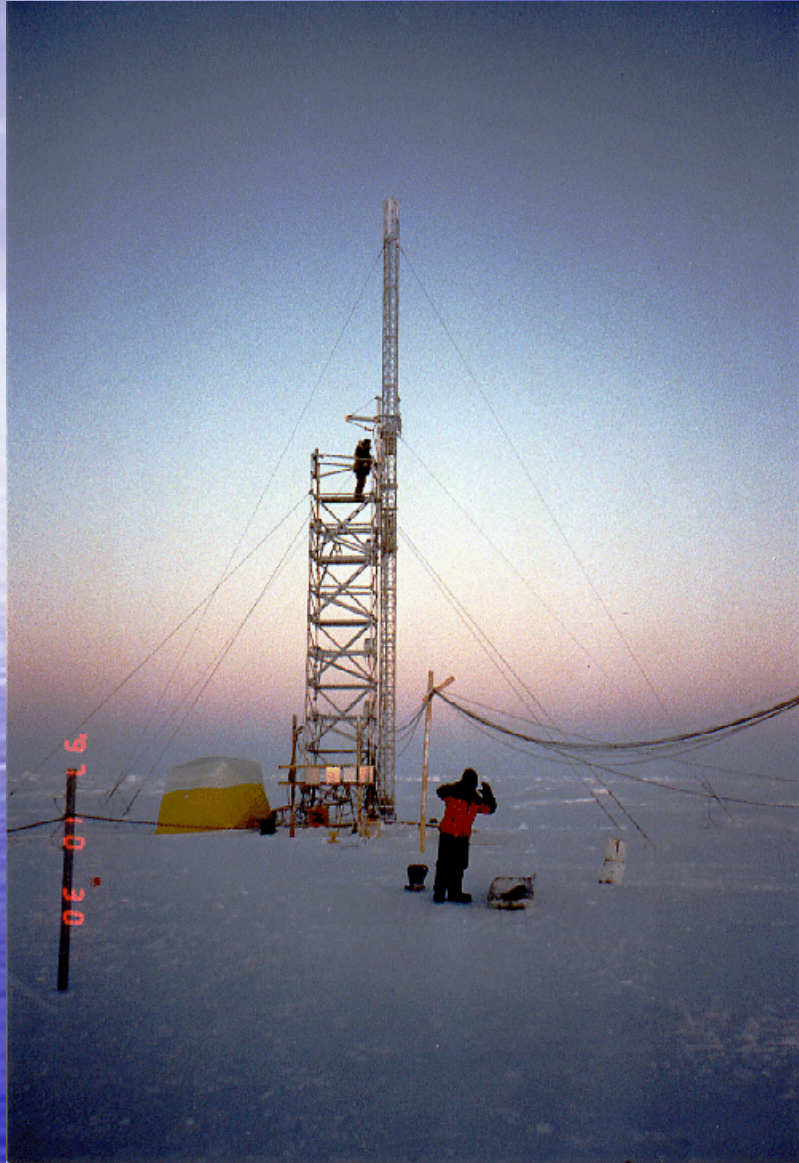


# Clouds and Precip (Uttal, et al.)

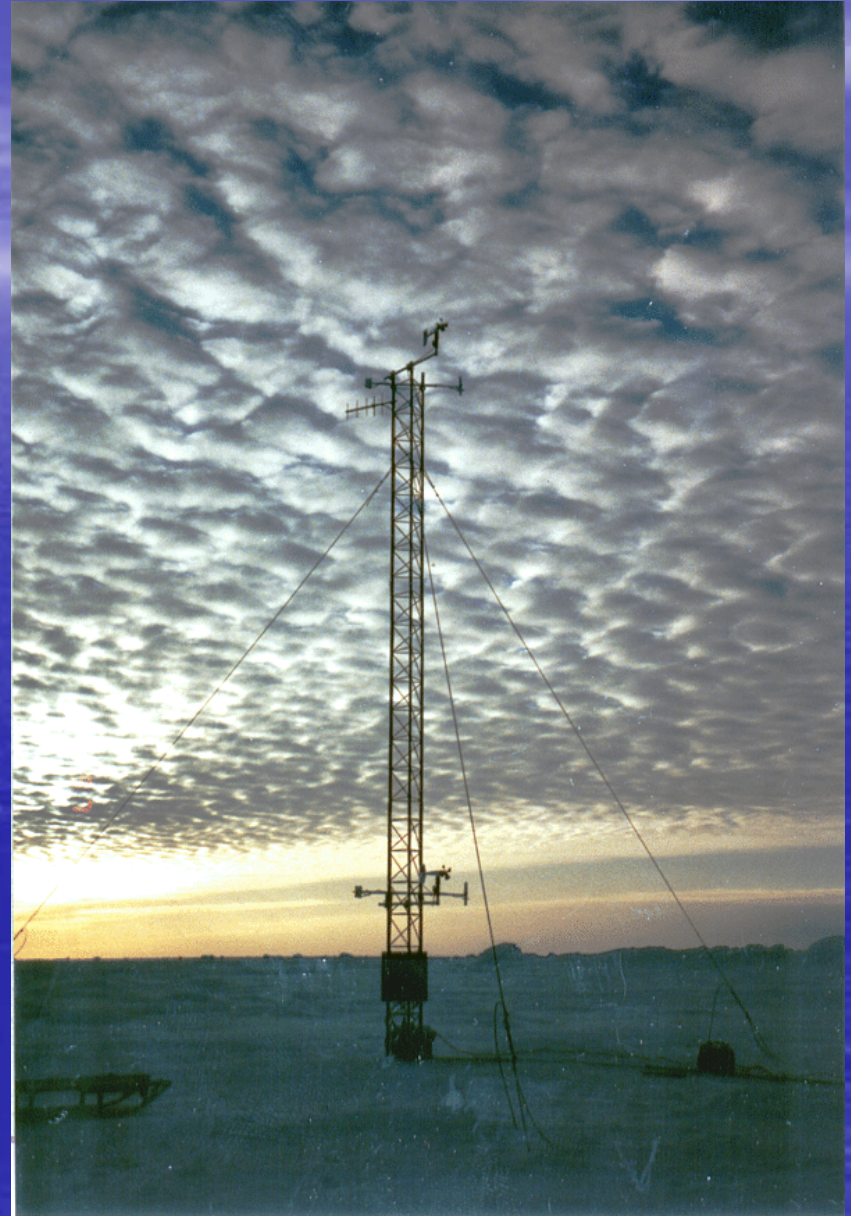
14nov1997,12:00-24:00,98.nc



# Atmospheric Fluxes (Andreas, et al.)



10/27/2004



ITP Workshop Atmosphere

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# Some Key Processes

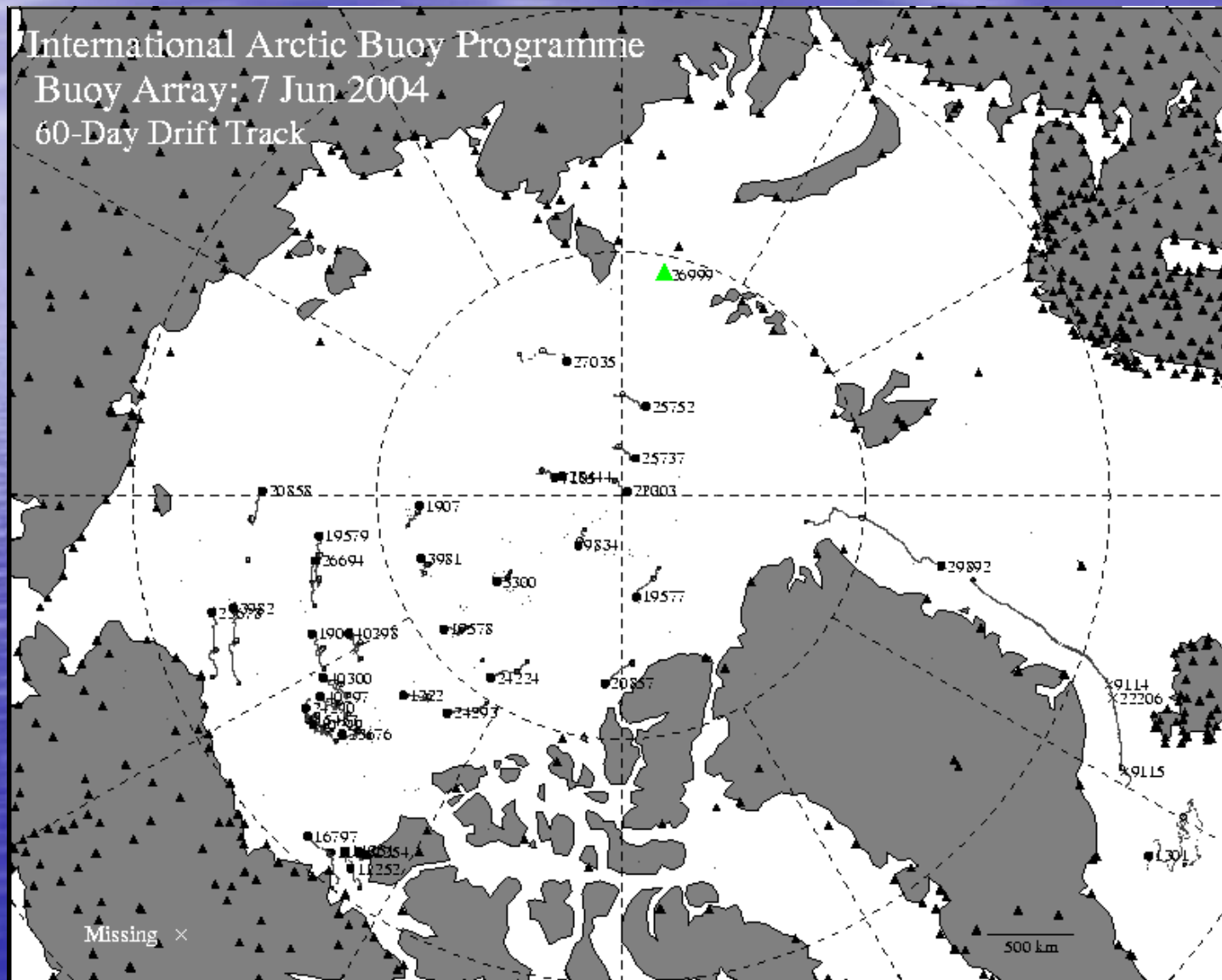
- Processes in the Sea Ice and Upper Ocean:
  - Disposition of shortwave radiation in the ice and upper ocean
  - Surface albedo and ablation as responses to energy input
  - Sea ice-upper ocean coupling
- Arctic Cloud Processes
  - Formation, maintenance, and dissipation of arctic clouds
  - Arctic cloud microphysics and relationships to atmospheric chemistry
  - Impact of clouds on radiation fluxes

Moving from single-point, process studies to a long term, spatial array requires that we consider:

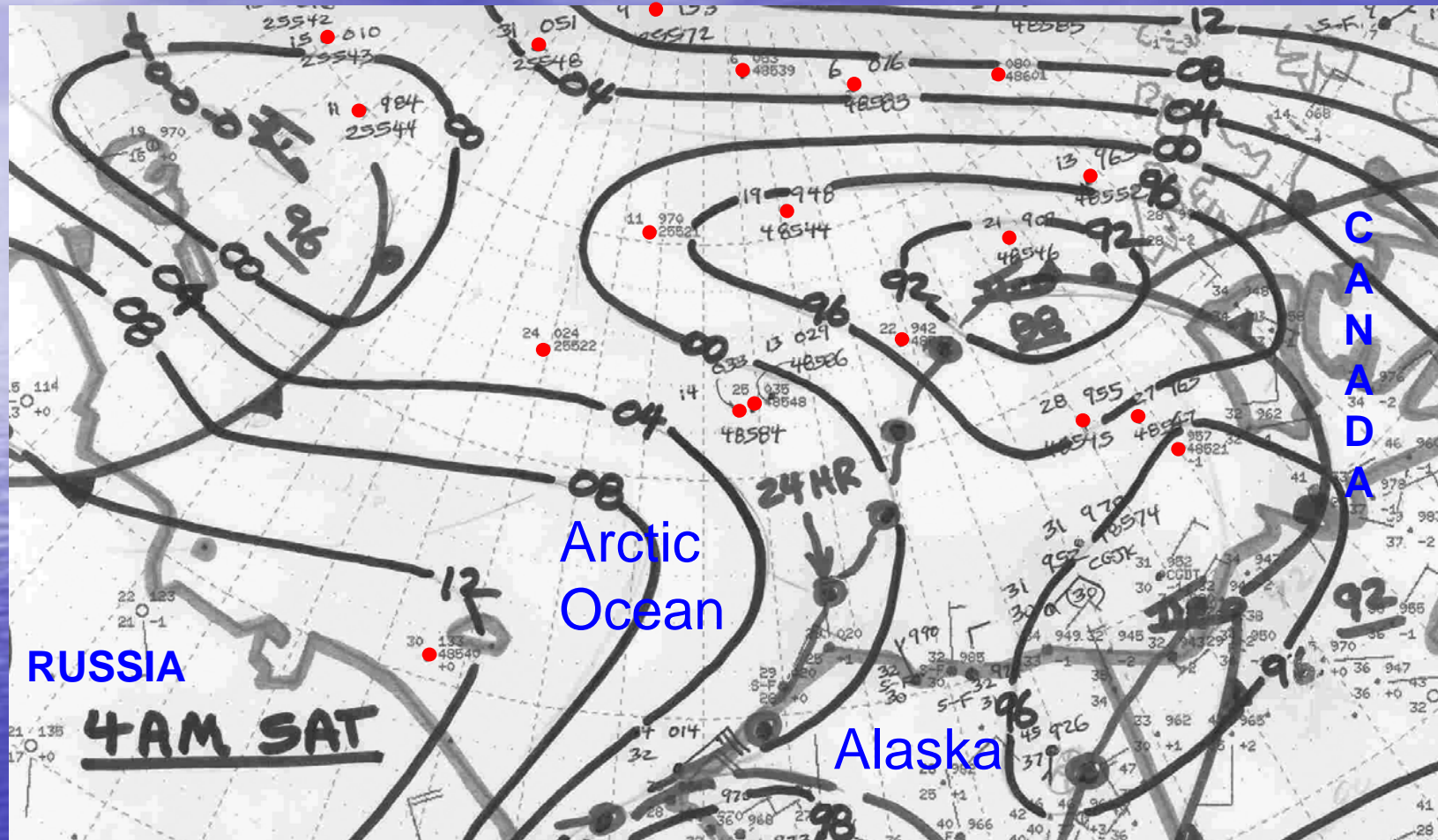
- \* Fields and Phenomena to be sampled
- \* Spatial and Temporal Scales to be resolved
- \* Required accuracy of the measurements

## **EXAMPLE: International Arctic Buoy Program**

# IABP Buoy Positions



# IABP Data & Weather Forecasting



The observations (red dots) from the IABP are essential for analyzing and forecasting weather features in the Arctic. In this example, we show storm approaching Alaska from the Arctic Ocean. The IABP observations are essential in detecting and determining the strength and trajectory of storms from the Arctic Ocean. (Figure provided by Eric Stevens, NWS/NOAA, Fairbanks, AK)

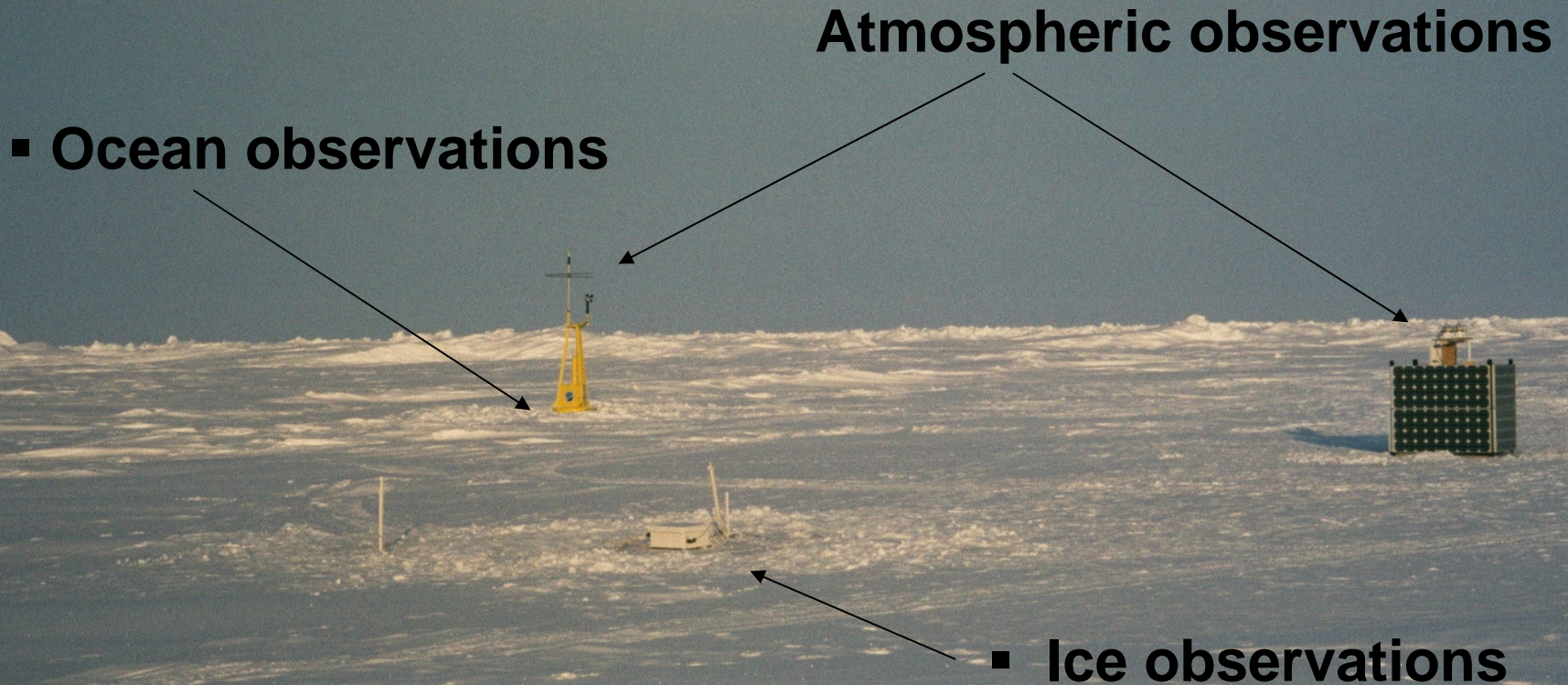
# IABP Type Platforms

- Surface atmospheric and ice properties
- Simple to deploy, preferably air-drop
- Light (multiple buoys or tasks per flight)

AWI IABP buoy being deployed during NPEO 2000 hydro survey

# Automated Drifting Station:

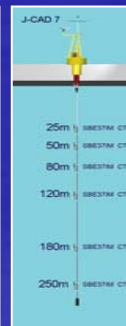
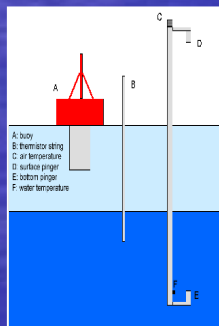
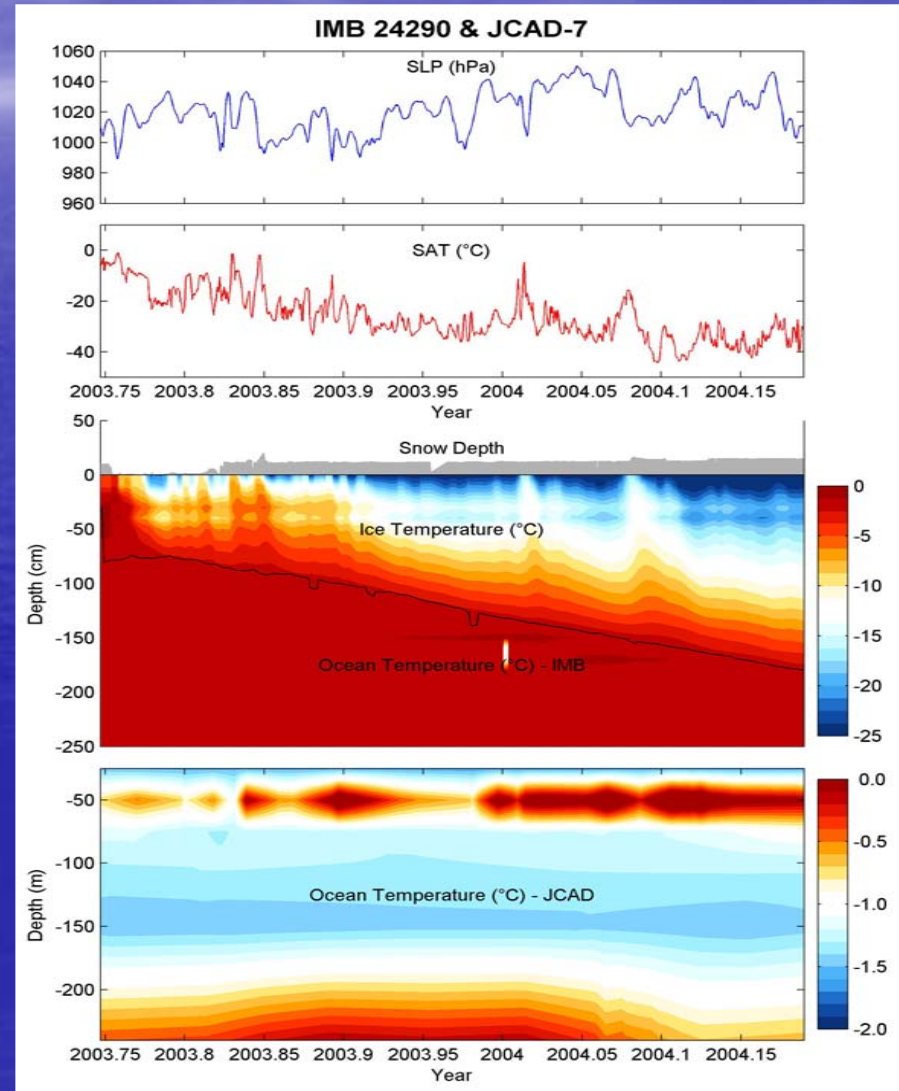
a constellation of drifting buoys, 50 m to 200 km in spread, doing the work of a manned-drifting station



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# Recent Progress Towards Establishing an Arctic Ocean Observing System





**THE END**