photos courtesy Donald G. Barton

The International Arctic Buoy Programme

Buoys on Ice for Science and Operations

Chairman's and Coordinator's Report for DBCP 23nd Session

***Tim Goos* - Chairman IABP**

Meteorological Service of Canada, Environment Canada

***Ignatius Rigor* - Coordinator IABP**

Polar Science Center, University of Washington

Prepared by Edward Hudson, Tim Goos and Ignatius Rigor

IABP-17: Participants continue to meet annually

Members of the International Arctic Buoy Programme met 24-25 May 2007 in Washington, DC

- hosted by Commander Ray Chartier, Commanding Officer, US National Ice and Pablo Clemente-Colón, Chief Scientist, U.S. National Ice Center http://www.natice.noaa.gov/
- 20 attendees representing 11 of the 23 Participants.

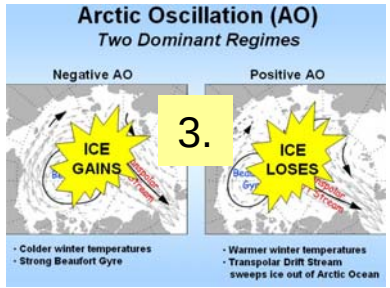
The meetings continue to provide a forum to:

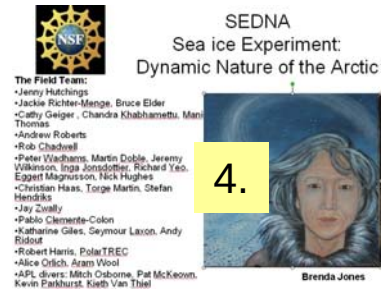
- Review existing program
- Plan for future
- Learn of each others activities through Participants Reports
- Map out areas of cooperation
- Learn of evolving buoy science
- Learn of host agency activities

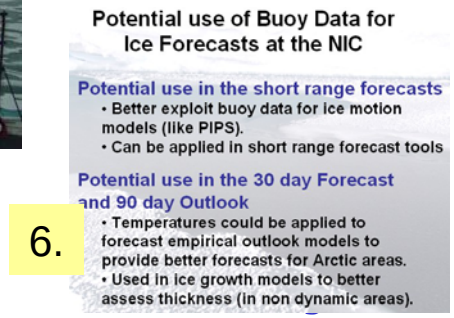
IABP-17: Science Briefings

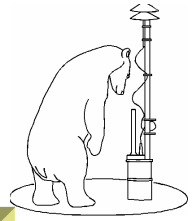
In addition to presentations which outlined Participant activities, there were presentations on science projects in the Arctic basin which included:

1. NIC Overview [J. Rice]
2. Arctic Observing Network (AON) [F. Korsmo]
3. State of the Arctic Ocean [J. Richter-Menge]
4. APL Ice Camp [J. Hutchings]
5. Much faster ice drift speed observed in recent years [T. Kikuchi]
6. Using Buoy Data for Ice Forecasts at NIC [S. Helfrich]
7. Outlook for Summer Sea Ice Extent [I. Rigor]

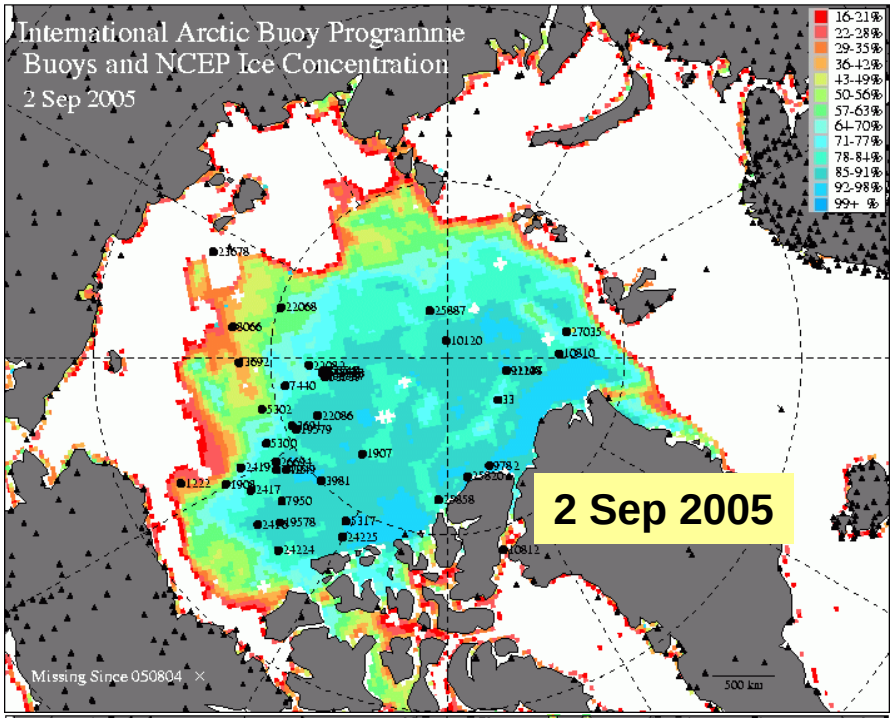




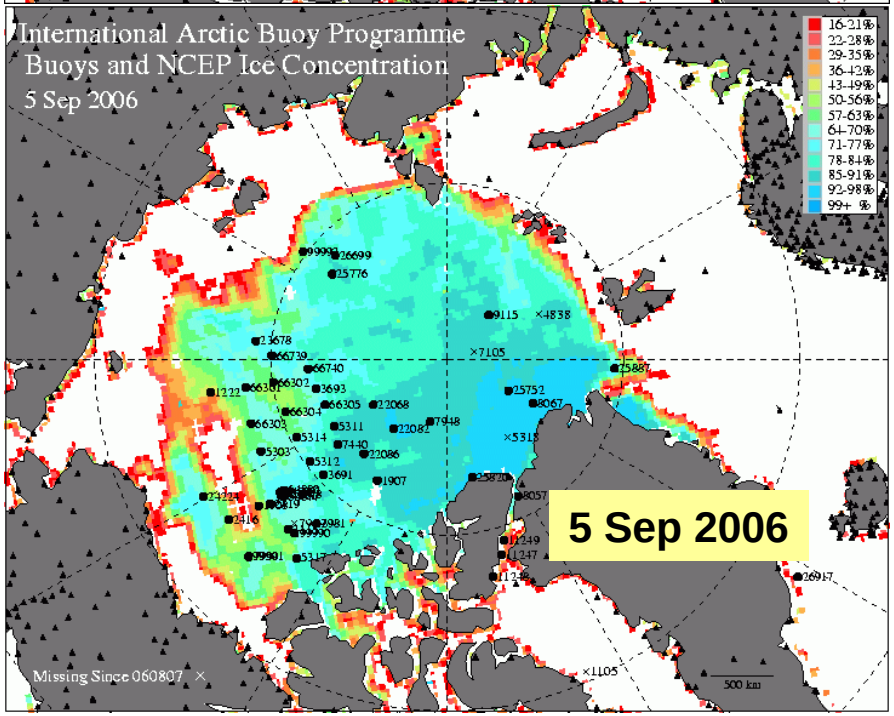




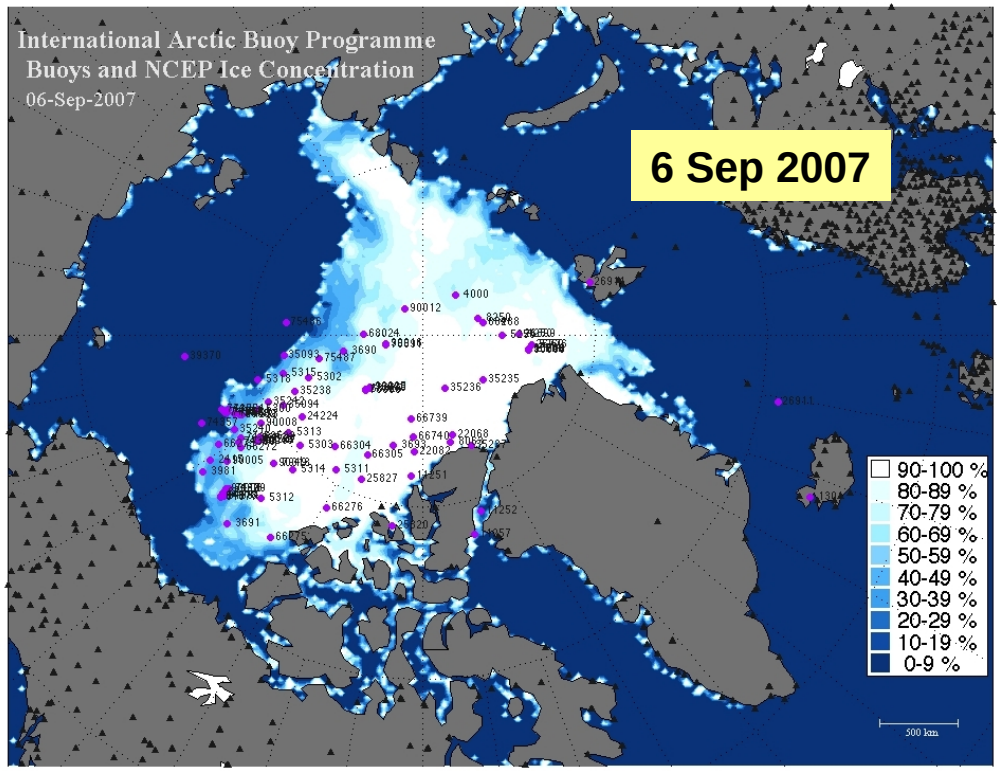
September Buoy Array: 2005 vs. 2006 vs. 2007



2 Sep 2005



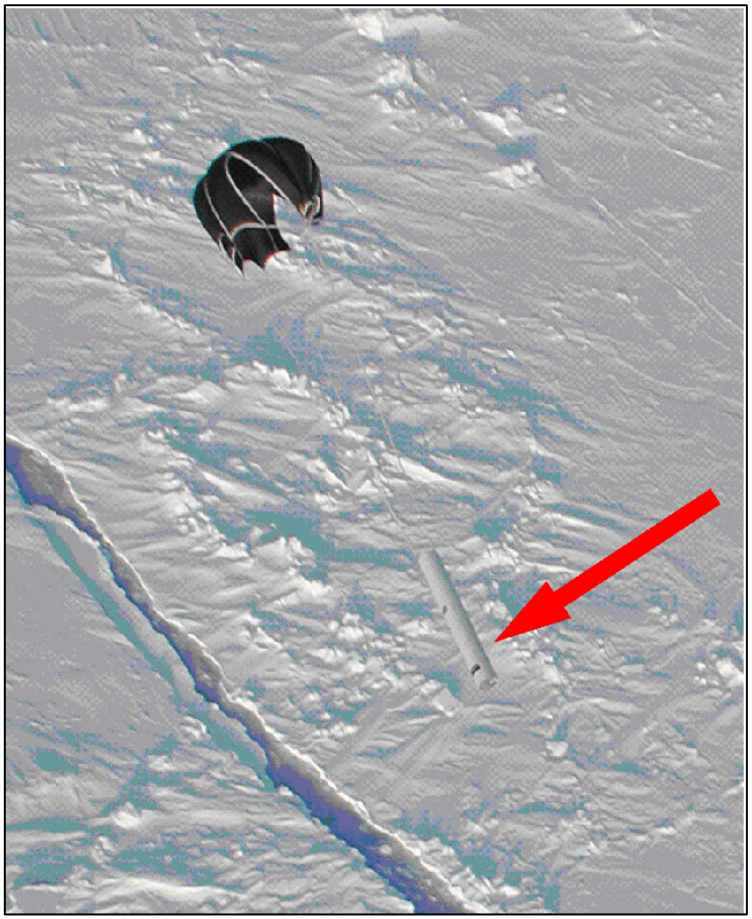
5 Sep 2006

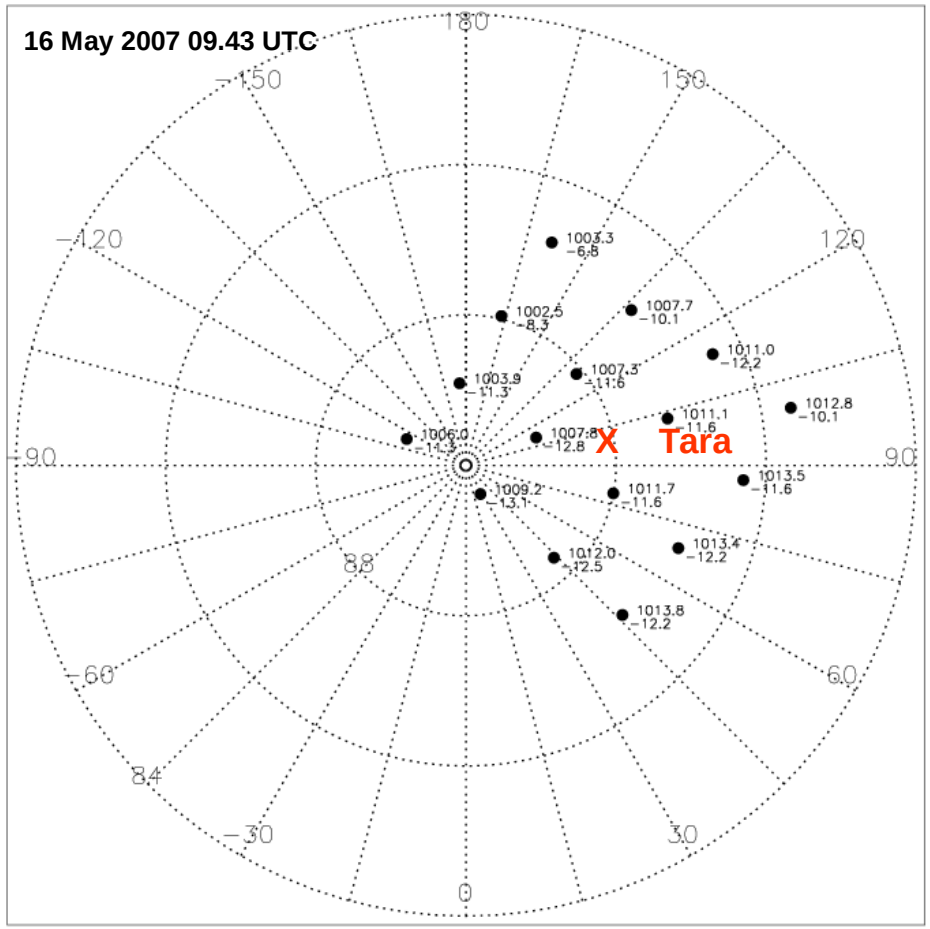


6 Sep 2007

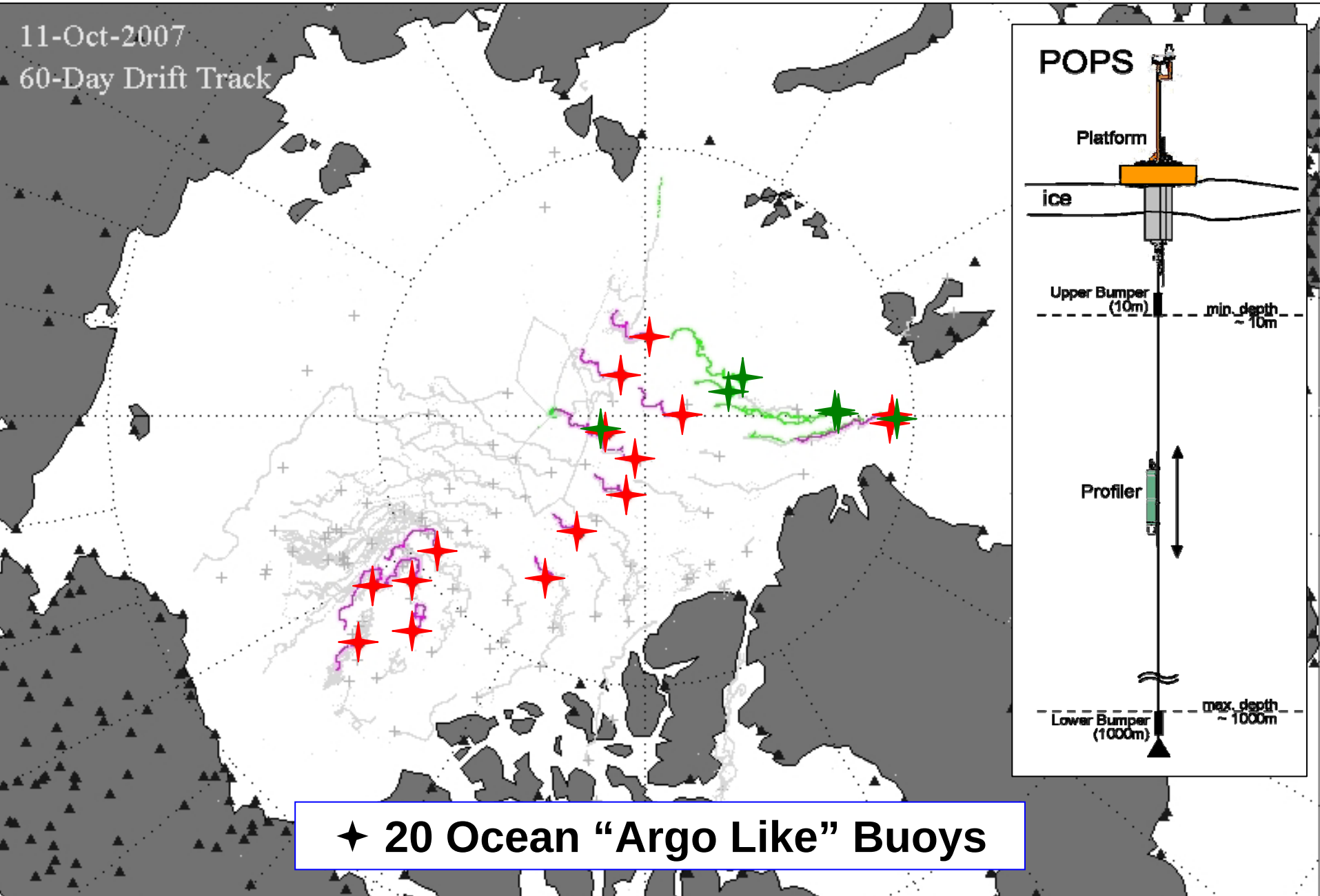
DAMOCLES Met. Buoy Arrays

- 16 CALIB buoys: SAT & SLP
- 16 CALIB, 4 XAN buoys deployed near Fram Strait.
- Study improvements to NWP, obs. not on GTS.

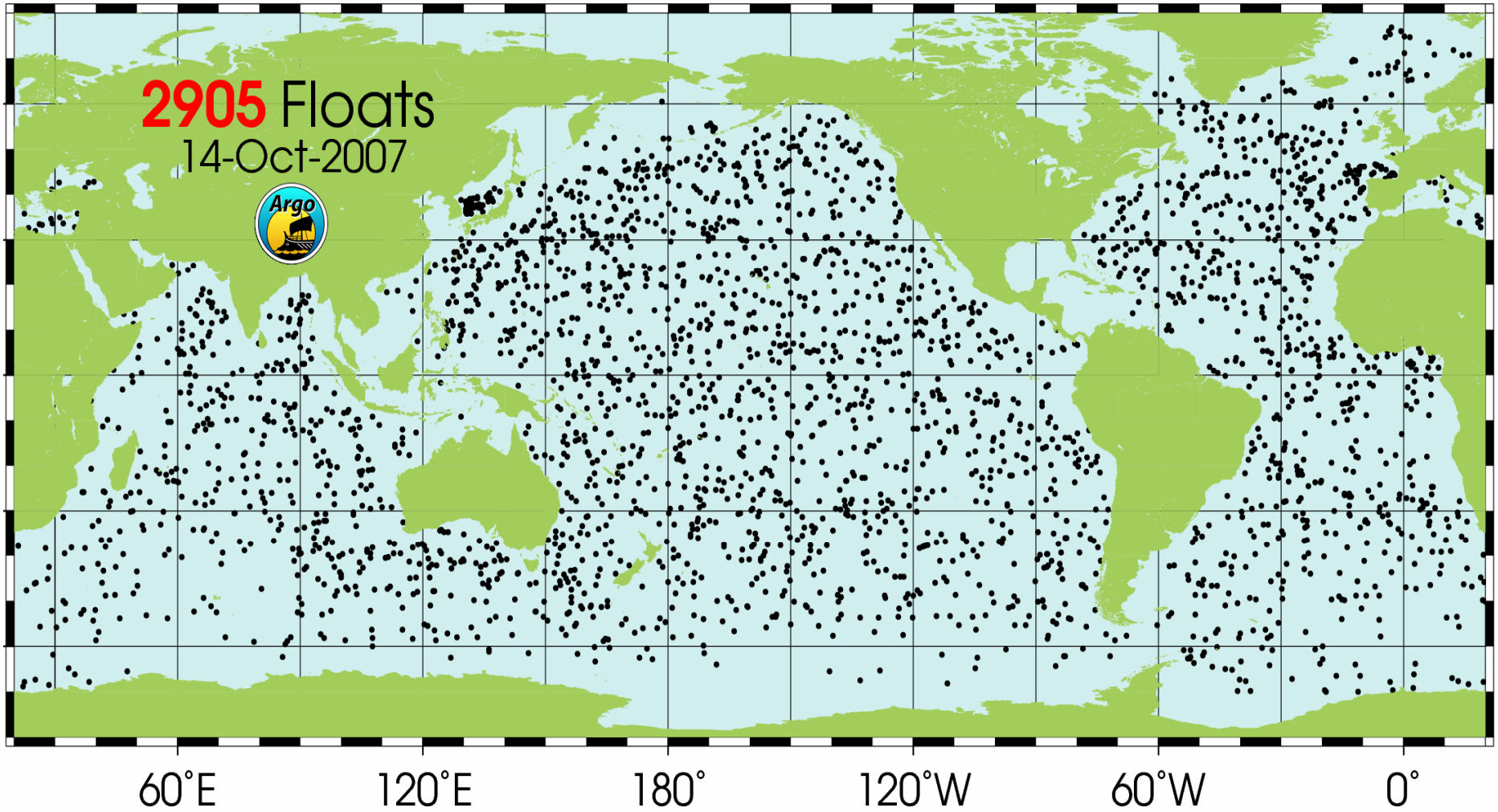




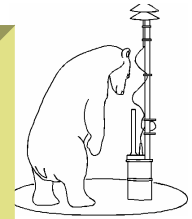
POPS and ITP Ocean Buoys



IABP Ocean Obs on GTS?



International Polar Year was expected to get more buoys than ever on ice the Arctic Basin… *It did !* ☺



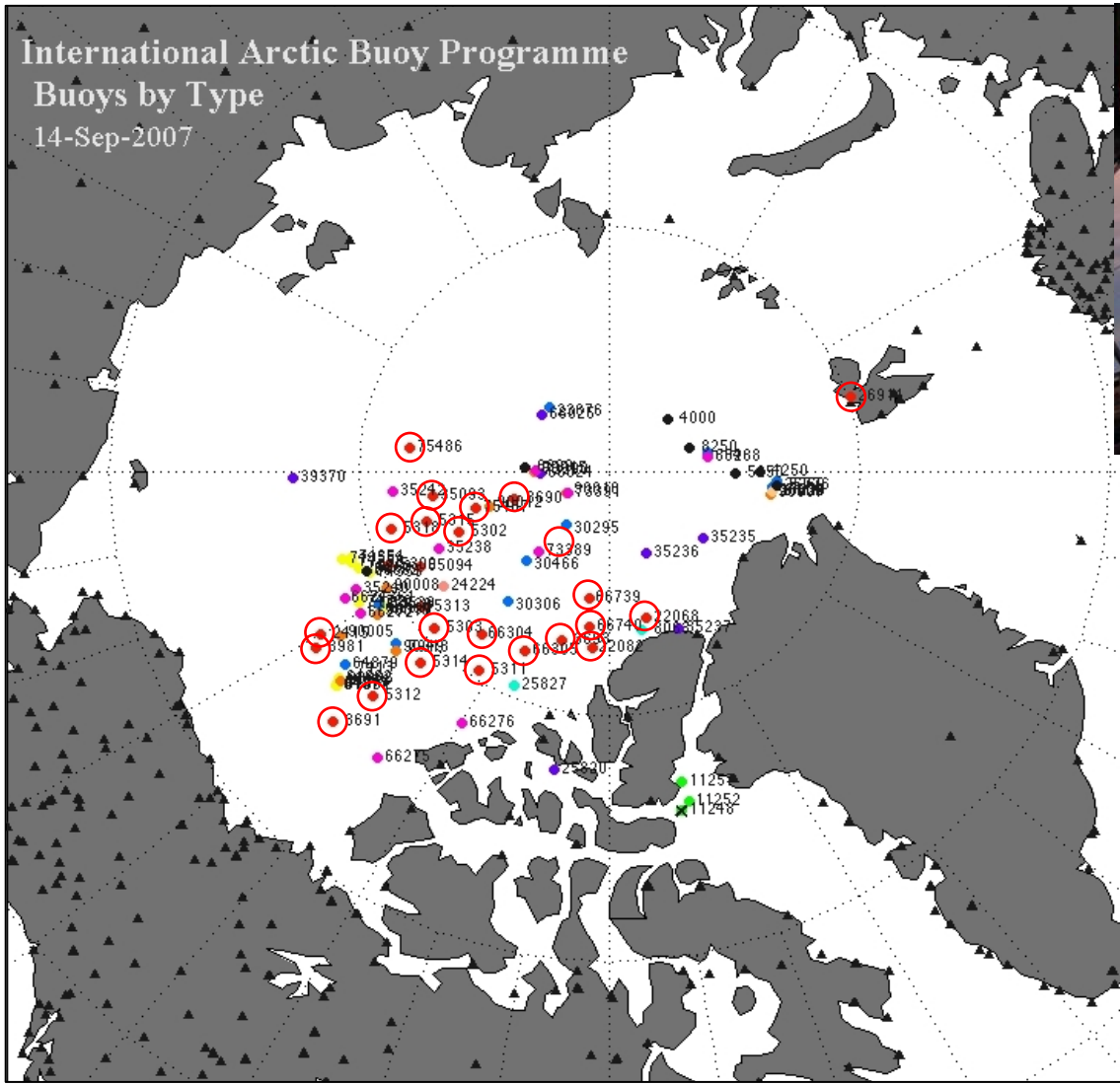
	Ice Mass Balance (also have T + P)	Ice Tethered Profiling or Polar Ocean Profiling [1]	T + P	T or P only [2]	Russian Manned Station	Position Only	Total Number
September 2005	6	1	27	5	NP33	8	**48**
September 2006	6	2	28	4		11	**51**
March 2007	6		18	3		8	**35**
October 2007	13	20	37	17	Planned	22	**120**[3,4]

Notes

1. The number of “enhanced” buoys such as oceanographic profiling buoys is increasing. Data on GTS?
2. SVP buoys have joined the array. See slide x.
3. Meteorological data from some buoys is not going on GTS… And we want it to!
4. Does not include 40 buoys deployed by DAMOCLES for Cyclone Study.

The US Naval Oceanographic Office White Trident air drop of ICEX buoys has been the back bone of the IABP annual deployments but..

2007 might have been the last one.



Pursue alternatives?

Move away from air deployments as more and more buoys require deployment by hand.

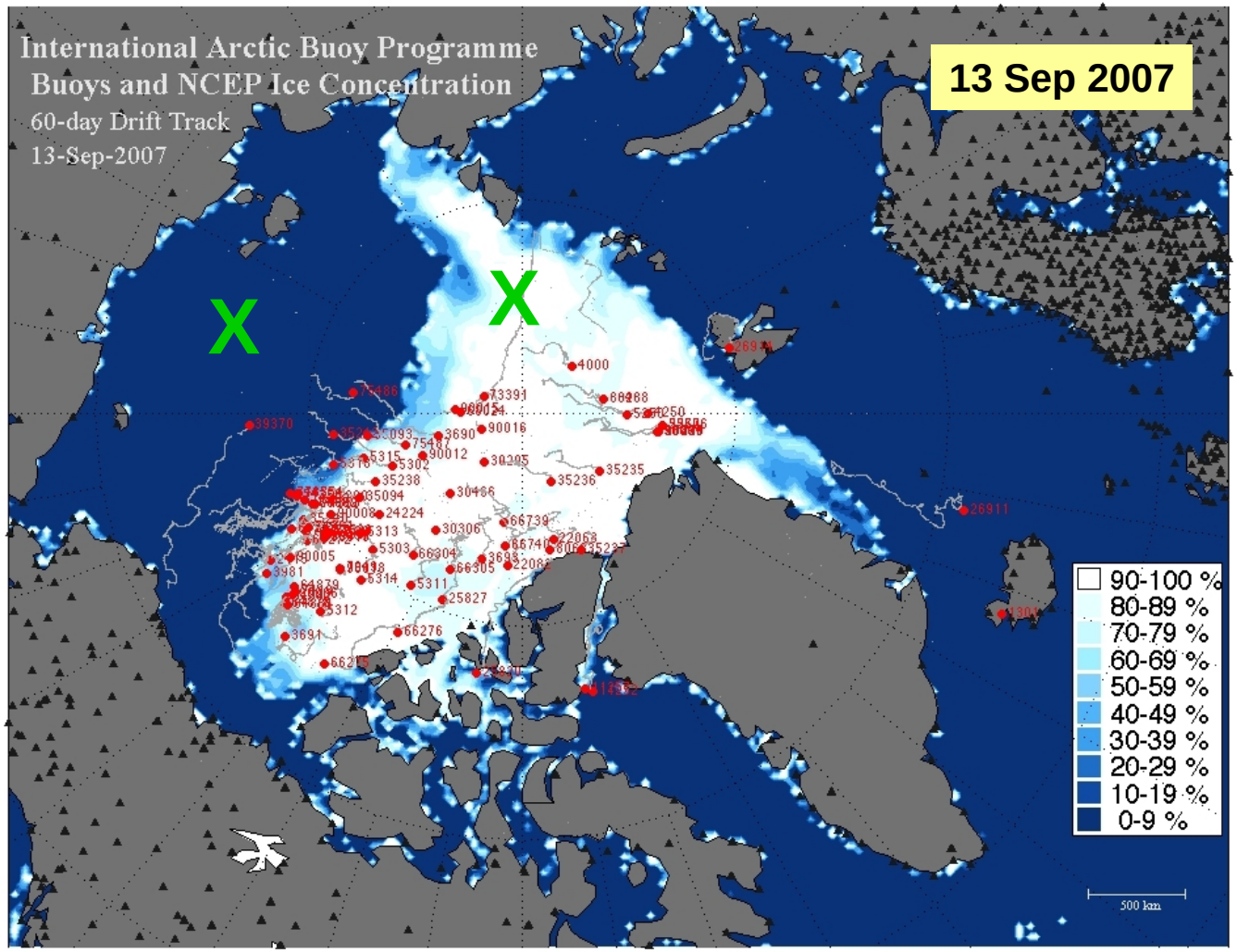
Ice is shrinking area-wise and thickness-wise. Will ships soon be able to do all deployments?

However…

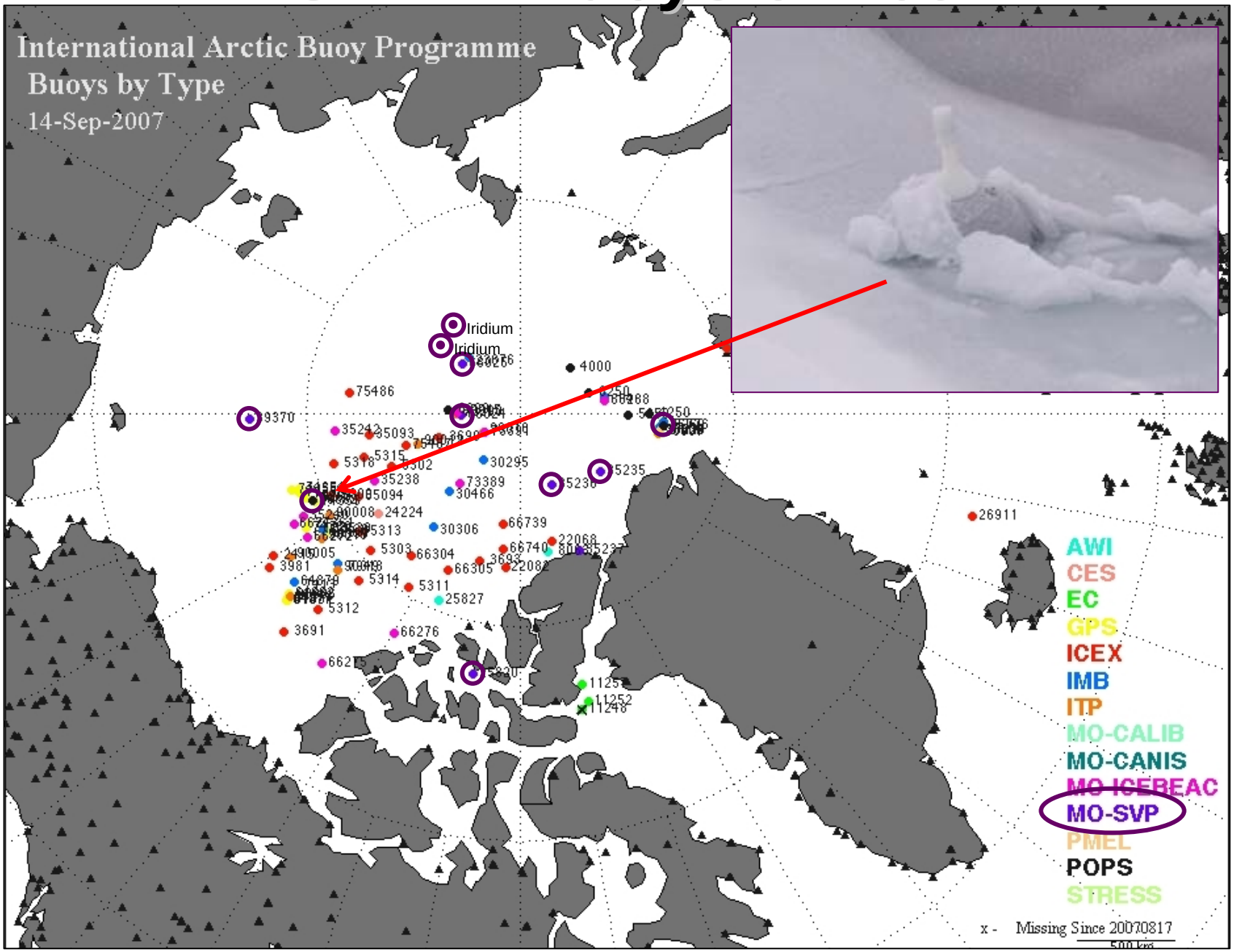
Many buoys are deployed in tight arrays (Automated Drifting Stations) such as Applied Physics Laboratory Ice Camp

There are some large holes in the array especially in Eurasian Arctic (X).

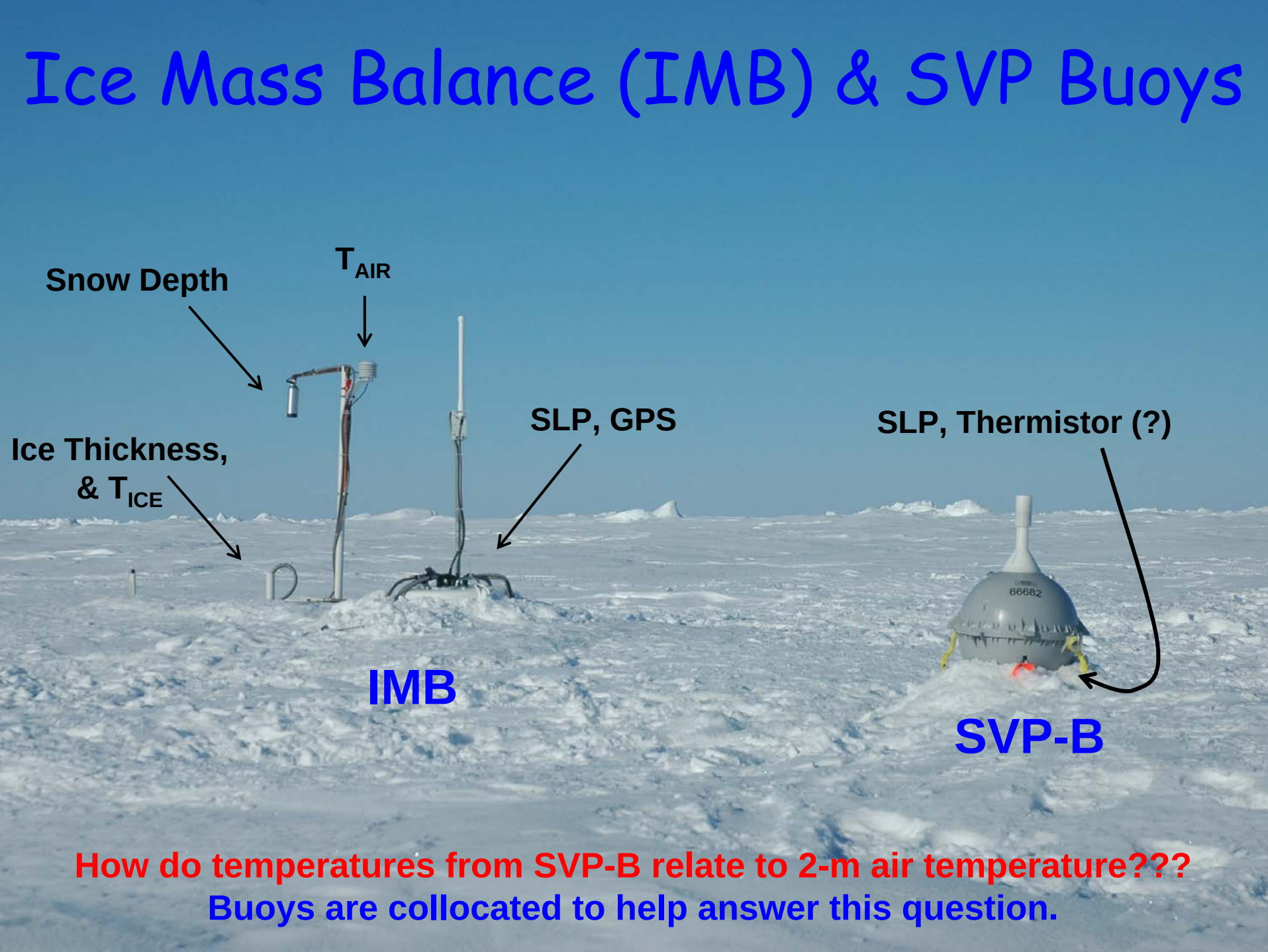
Ice "shrinkage" and a larger area of younger, thinner ice has taken a toll on IABP array, highlighting need for buoys which can survive in open water, survive freeze up, and pack ice conditions (i.e. seasonal ice buoys), especially in the Eurasian Arctic.



SVP-B Buoys on Ice

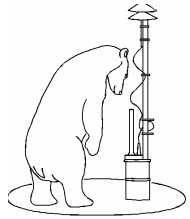


Ice Mass Balance (IMB) & SVP Buoys



How do temperatures from SVP-B relate to 2-m air temperature???
Buoys are collocated to help answer this question.

Are inexpensive Airborne Expendable Ice Buoys (AXIB) the future for the IABP?



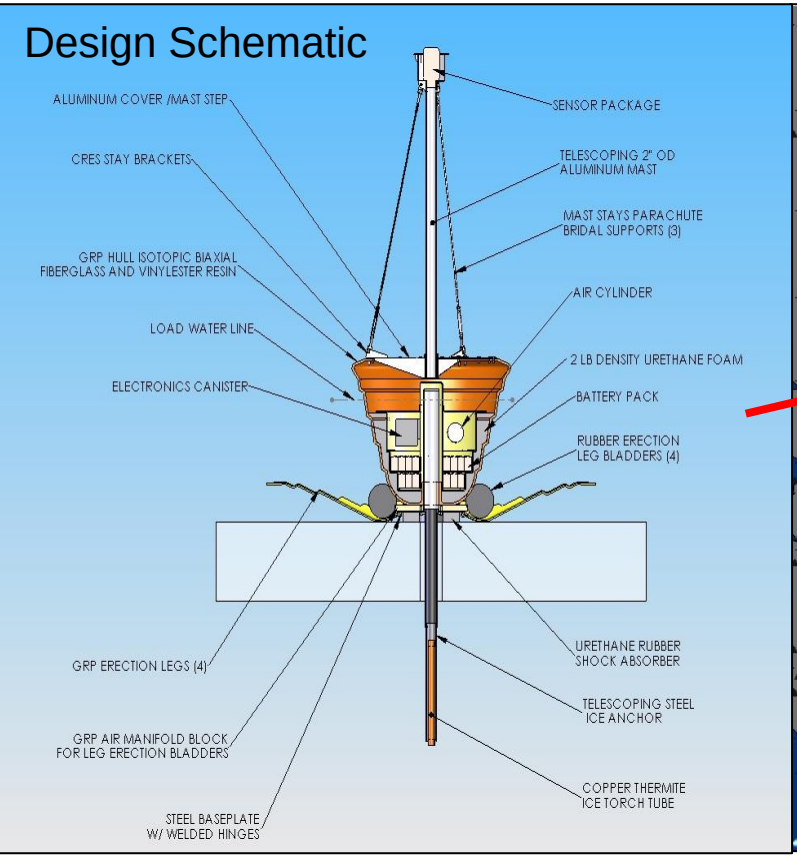
Low cost aircraft droppable buoy (with surface deployment capability)

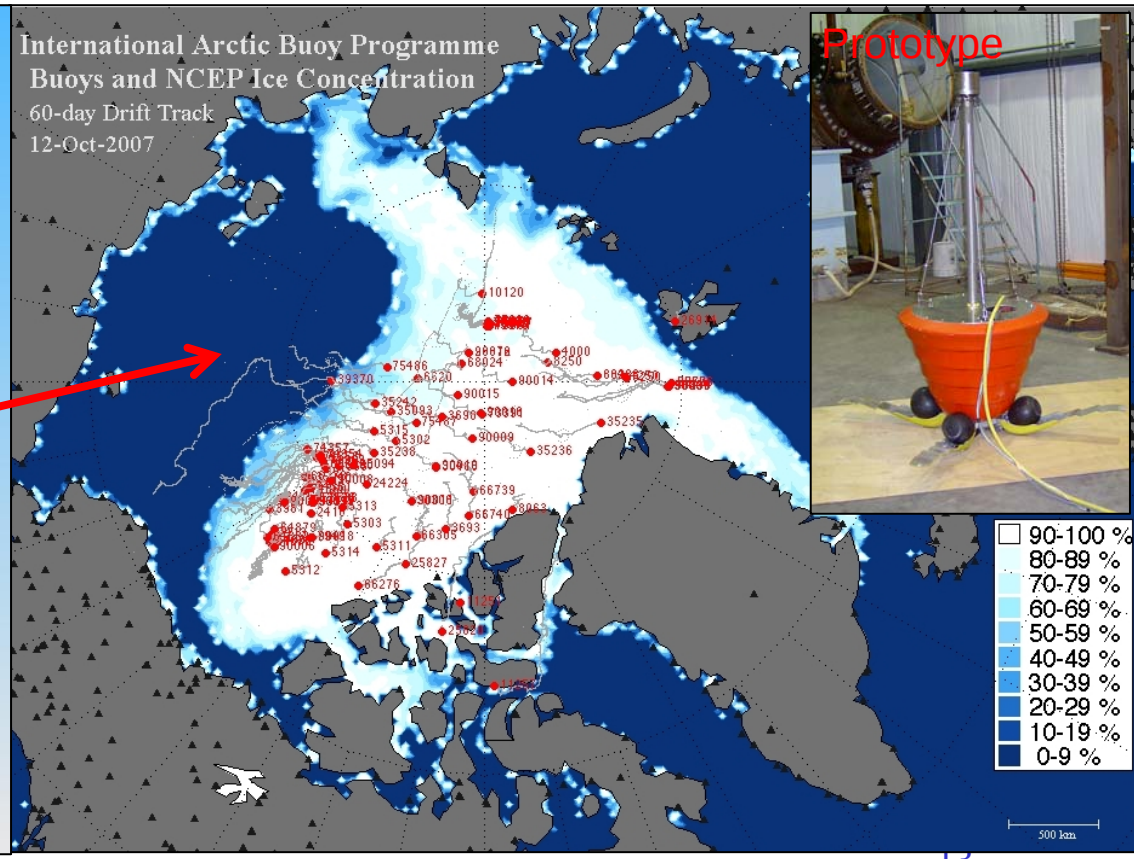
Sensors/measurements include surface air temperature, surface pressure, GPS location, and Argos transmitter

Capable of Operation in ice and open water through freeze/thaw cycles

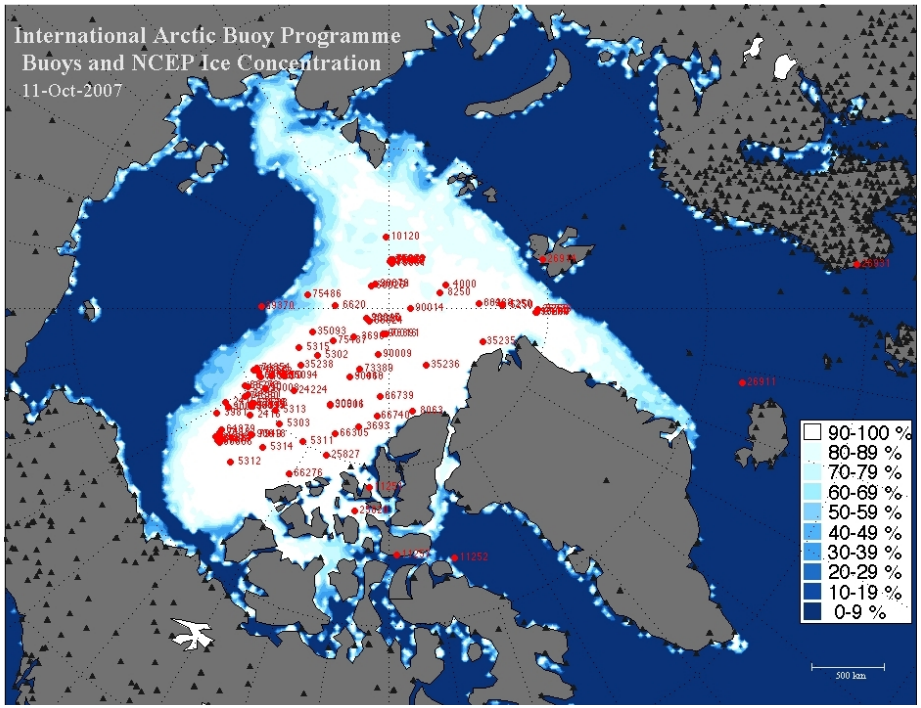
Prototypes may be test in 2008

Design Schematic



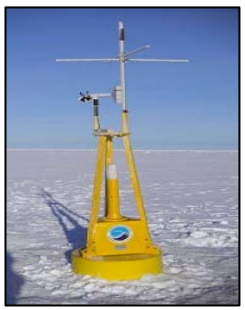


Summary



- Incremental opportunities are important to the IABP. The sum of these opportunities are significant.
  - There are a lot more buoys out this year *on a lot less ice*.
  - Not all buoy data is getting onto GTS. We'd like it to.
  - The IABP is evolving by producing new data products, and enhancing our Arctic observing system. E.G. Estimates of the age of sea ice as presented in Science and Technology Session, and Ice Mass Balance and Ocean Profiling Buoys.
  - Decrease in ice / increase in open water is pushing IABP to different buoys to maintain an array that provides the basics of position, surface air temperature, and surface air pressure.

Ocean Profiling Buoys



CRREL Ice Mass Balance Buoy (IMB)