

Short Term Variability of Sea Ice Thickness in the Beaufort Sea

Introduction

Using the Applied Physics Laboratory Ice Station (APLIS) in the Beaufort Sea as a operational basis, sea ice thickness data was collected with an airborne electromagnetic device in April 2007. The goal was to investigate spatial and temporal changes of sea ice thickness with respect to sea ice dynamics and external forces like wind stress and air temperature. In total 11 flights were performed ranging from the coast of Barrow at 71.2°N up to 75°N in a time span of two weeks. Real time position data from 12 drifting GPS buoys were used to calculate waypoints for repeated surveys of the same sea ice profiles in the vicinity of the camp.

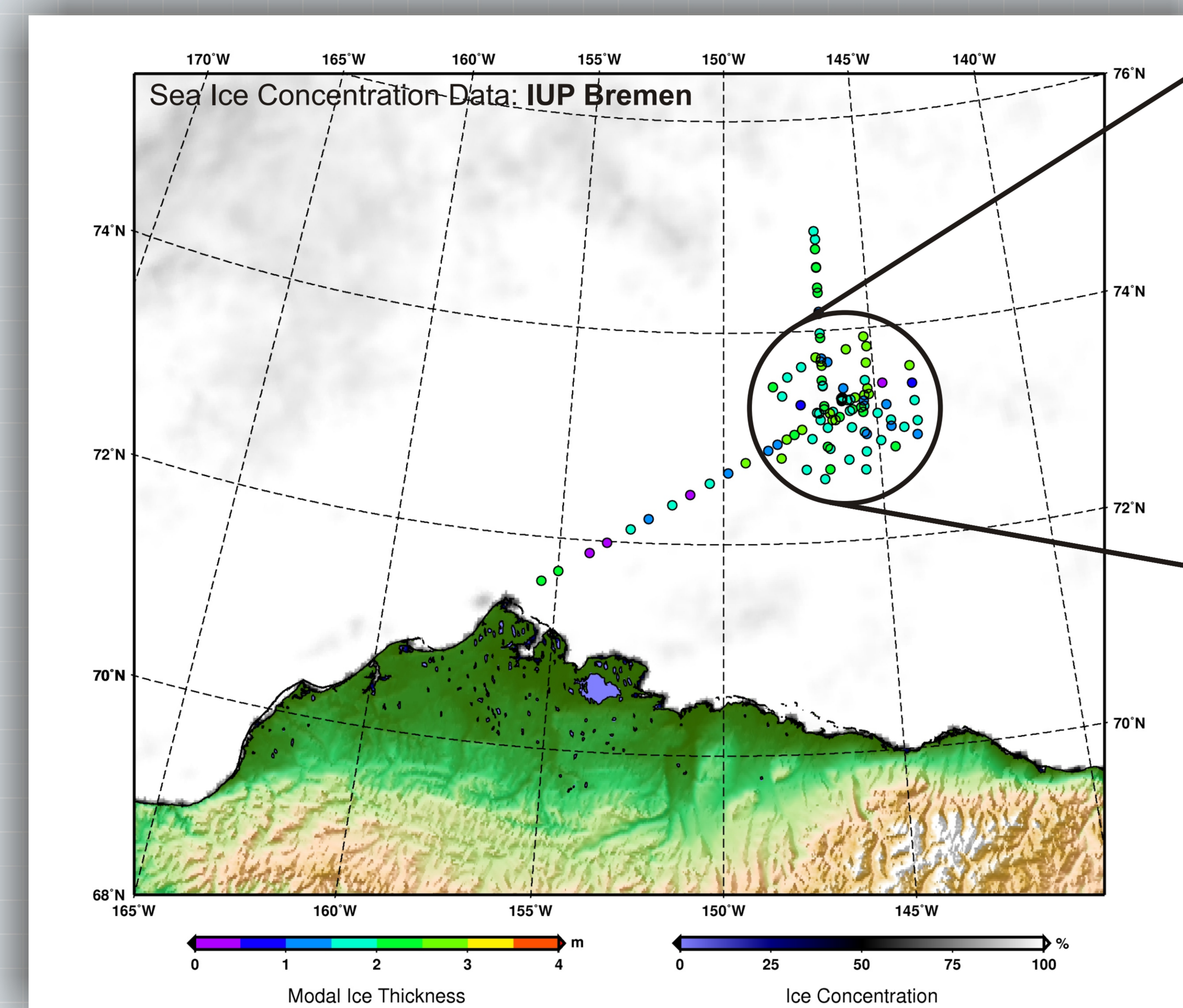
Instrument

Sea ice thickness was measured by a electromagnetic induction device [Haas et al., 2007] towed by a helicopter operating from the ice camp. The system comprises a differential GPS capable georeferencing system and a laser altimeter. Both systems can be combined to retrieve snow freeboard for satellite validation.

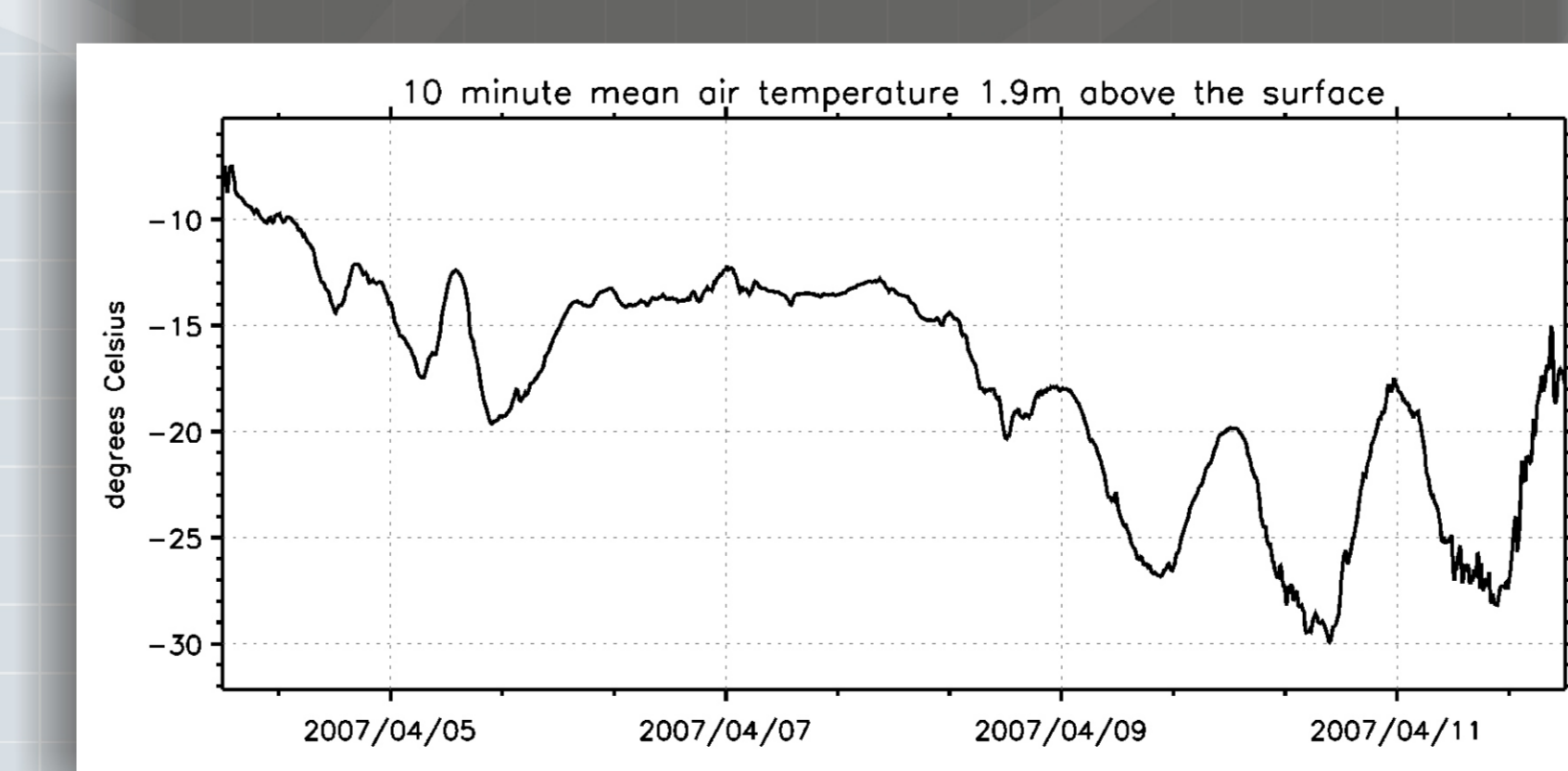
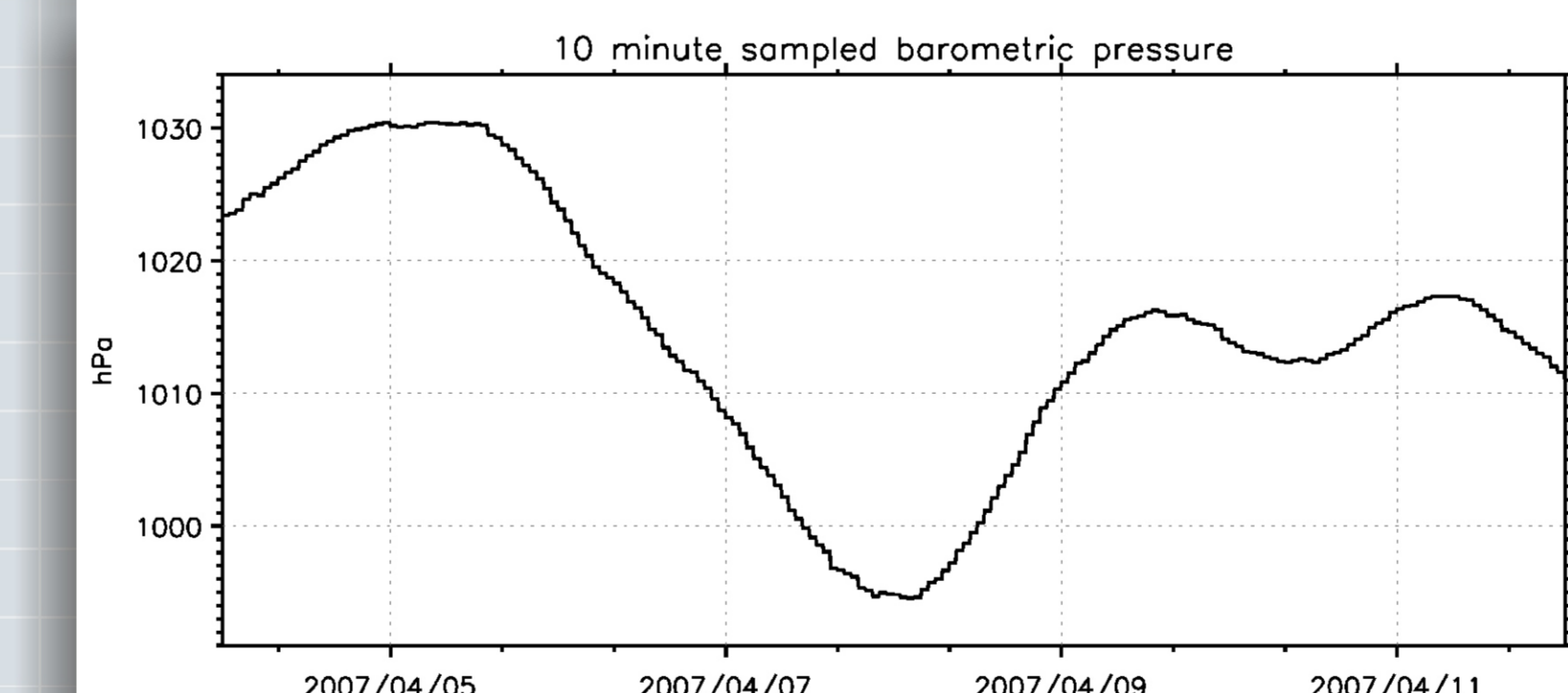
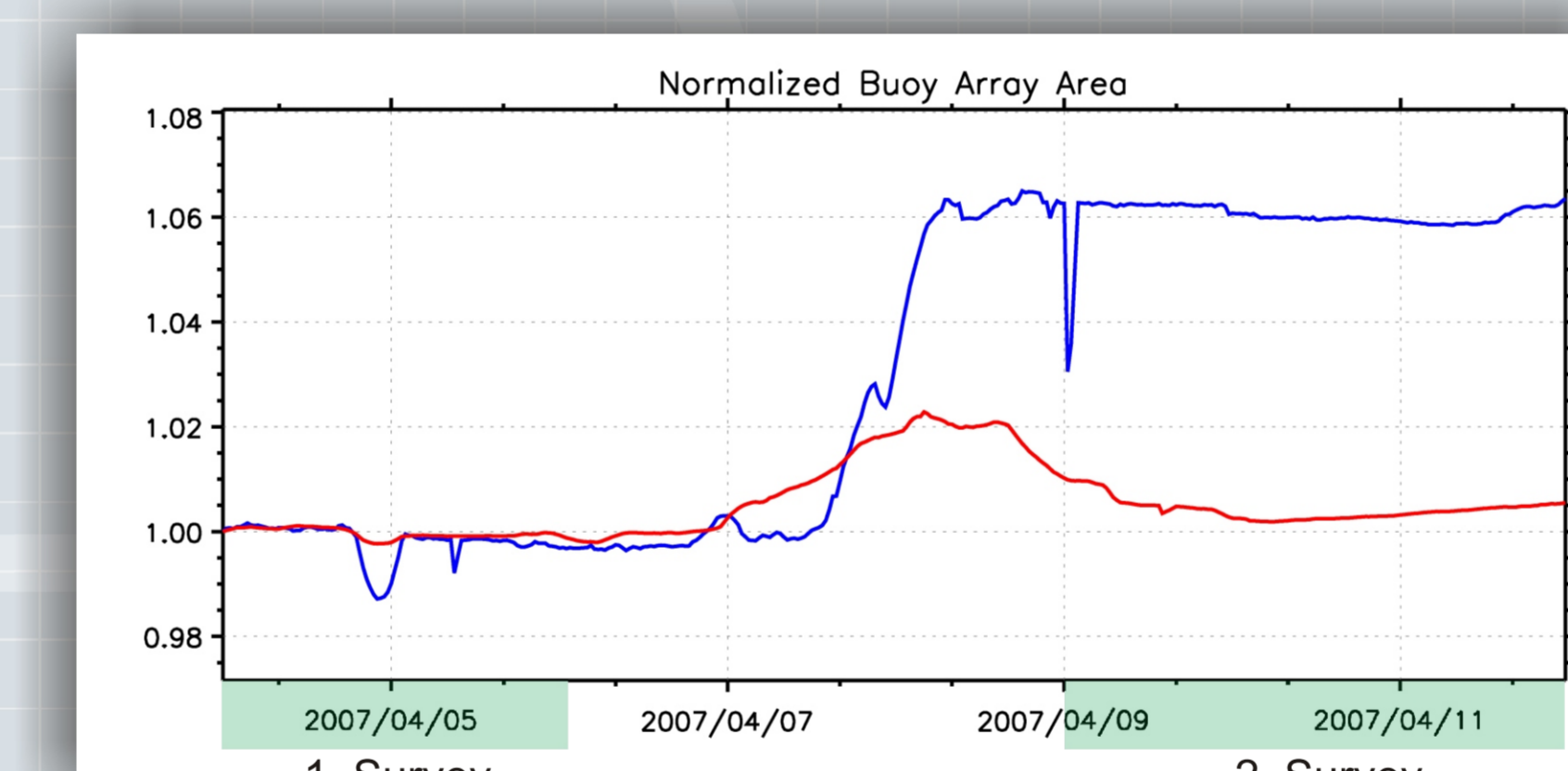
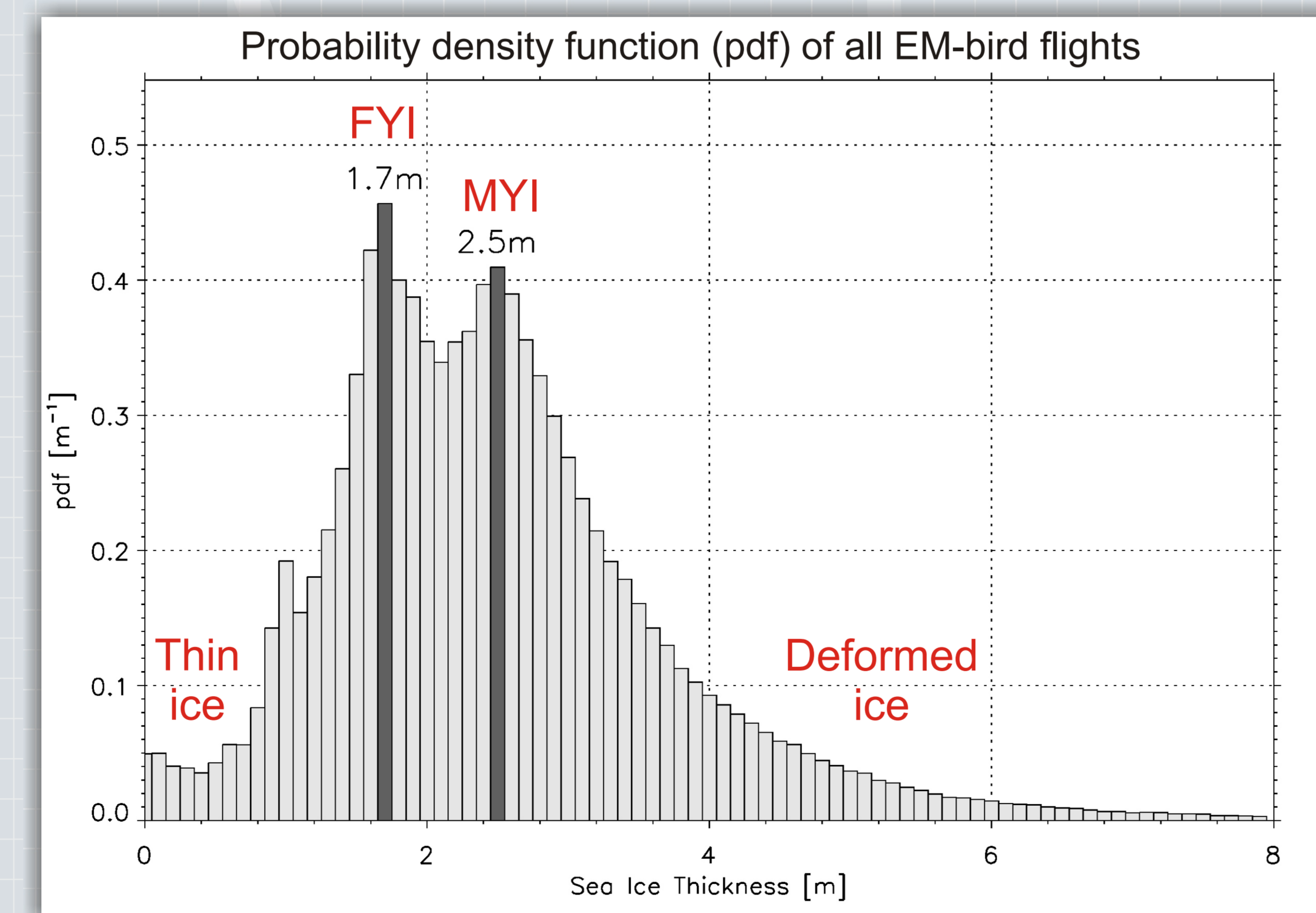
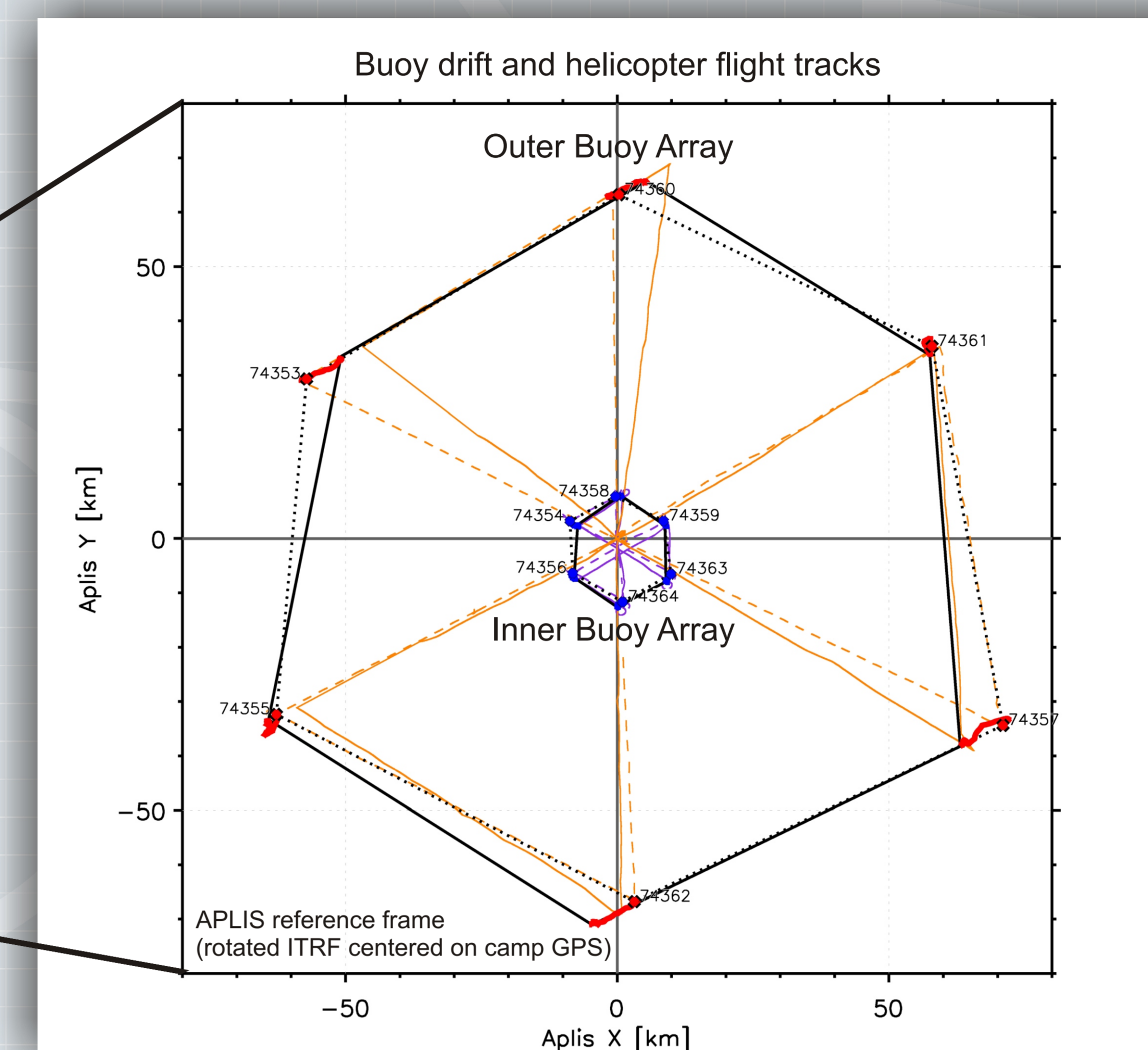


Sea Ice Thickness

Sea ice thickness data was collected on 11 flights with a profile length of > 2100 km in total. The data acquisition process was coordinated with airborne laserscanning (C21C-05) and underwater sonar profiling (C22A-05) at certain locations.



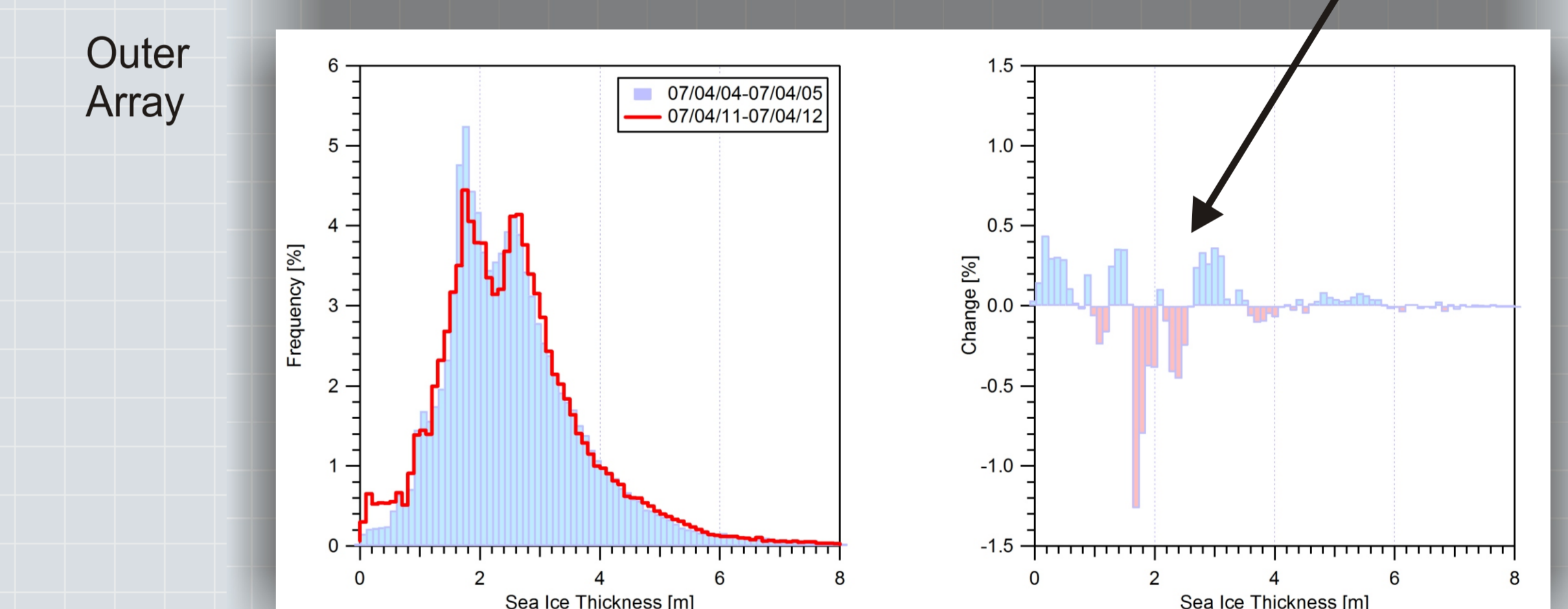
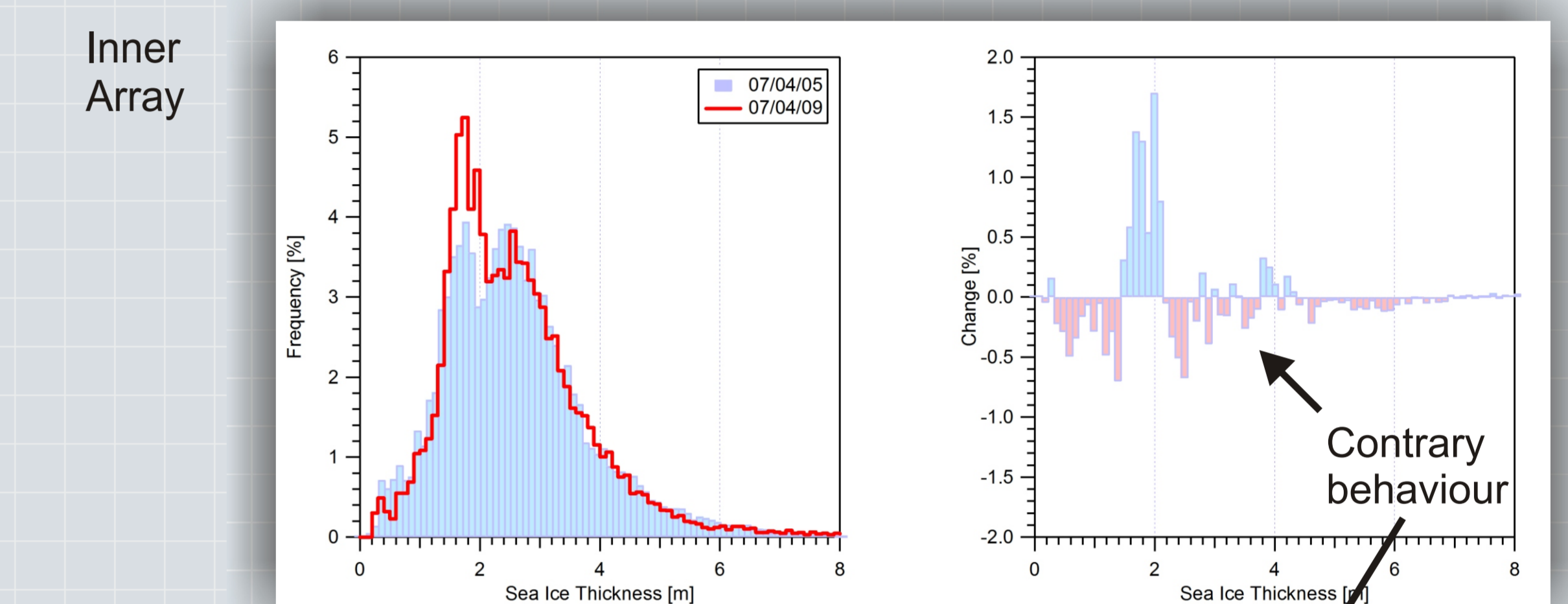
Regional Dynamics Study



Ice Thickness Variability

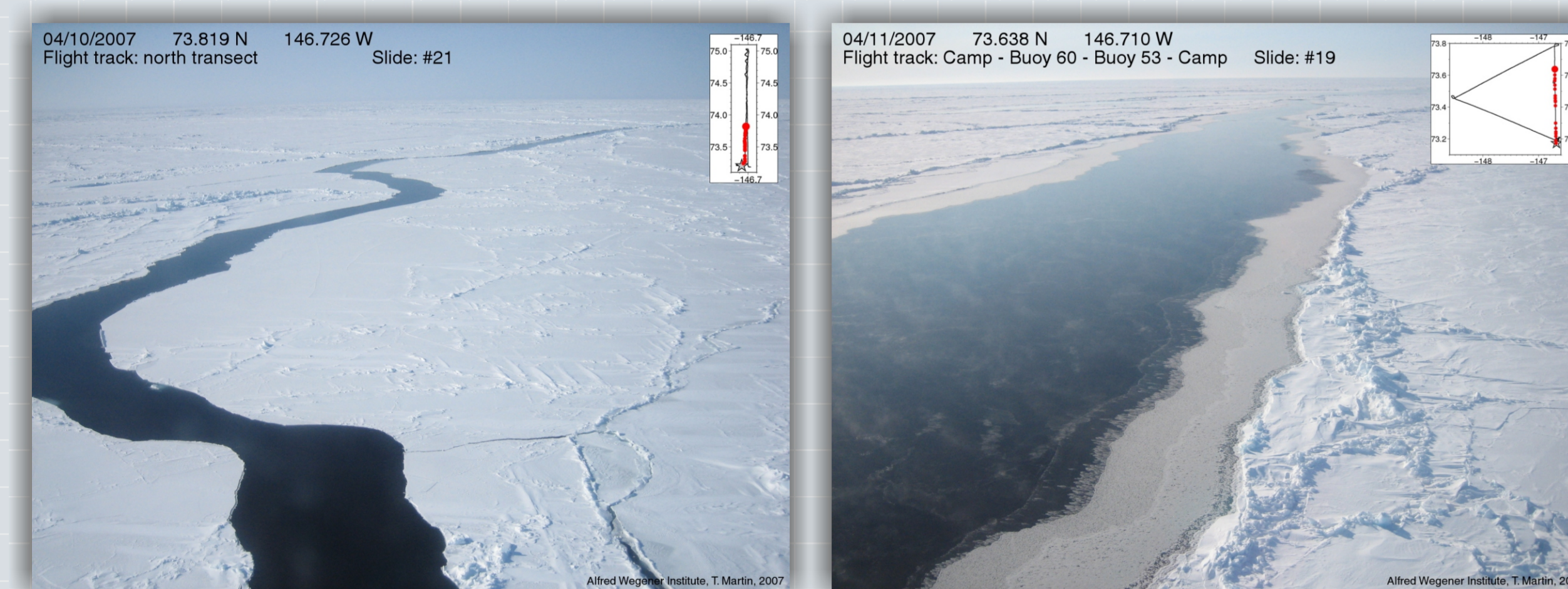
Both pdf's of the early and late flights show only minor changes in the frequency of certain ice thickness values. The values for modal ice thickness remains unchanged.

	Inner Array	Outer Array
Mean Sea Ice Thickness	2.61 m 2.59 m	2.70 m 2.59 m
Standard Deviation	1.24 m 1.23 m	1.26 m 1.42 m
Area	255.30 km ² 270.91 km ²	14165.54 km ² 14228.52 km ²
	▼-0.6 % ▼-0.5 %	▼-4.1 % ▲+12.8 %
	▲+6.1 %	▲+0.4 %



Data Products

Available are sea ice thickness datasets linked with georeferenced aerial photography on the APLIS website.



Literature & Links

Haas, C. et al., *Helicopter-borne measurements of sea ice thickness, using a small and lightweight, digital EM bird*, submitted to J. Appl. Geophys., 2007

Hutchings, J. et al. *International Polar Year Sea Ice Experiment: Dynamic Nature of the Arctic (SEDNA)*, EOS, in prep.

AWI Sea Ice Group <http://www.awi.de/en/go/seaice>
APLIS Homepage <http://aplis07.iarc.uaf.edu/index.php/>
SEDNA Homepage <http://research.iarc.uaf.edu/SEDNA/>
Sea Ice Maps <http://iup.physik.uni-bremen.de:8084/>

Acknowledgements

We thank ERA helicopters for excellent cooperation and the APL team for logistical support. The field work was funded by the NSF within the SEDNA project.