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The Study Area



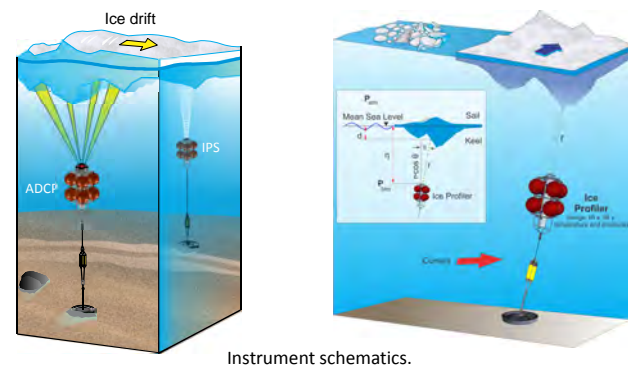
Location of Shell's moorings in the Beaufort (2005–2013) and Chukchi (2008–2016) Seas.

| Sea | Site | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--------------|-------------|------|------|------|------|------|------|------|------|------|
| Beaufort Sea | Site A | | | | | | | | | |
| | Site B | | | | | | | | | |
| | Site K | | | | | | | | | |
| | Site V | | | | | | | | | |
| | HB01 | | | | | | | | | |
| Chukchi Sea | Crackerjack | | | | | | | | | |
| | Burger | | | | | | | | | |
| | Shell05 | | | | | | | | | |
| | Shell06 | | | | | | | | | |
| | Shell07 | | | | | | | | | |
| | Shell08 | | | | | | | | | |
| | Shell09 | | | | | | | | | |
| | Shell10 | | | | | | | | | |

Site data recovery summary.

- 20 site years in Camden Bay (Sites A–V), including eight contiguous at a single site
- Two site years in Harrison Bay (HB01 and Hb02)
- 23 site years of data in the Chukchi Sea (Crackerjack, Burger, Shell05 to 08) including eight contiguous at Crackerjack and Burger
- Data up to the summer of 2014 is processed and publicly available with UAF as the repository
- UAF and ASL are processing most of the 2014–2015 data

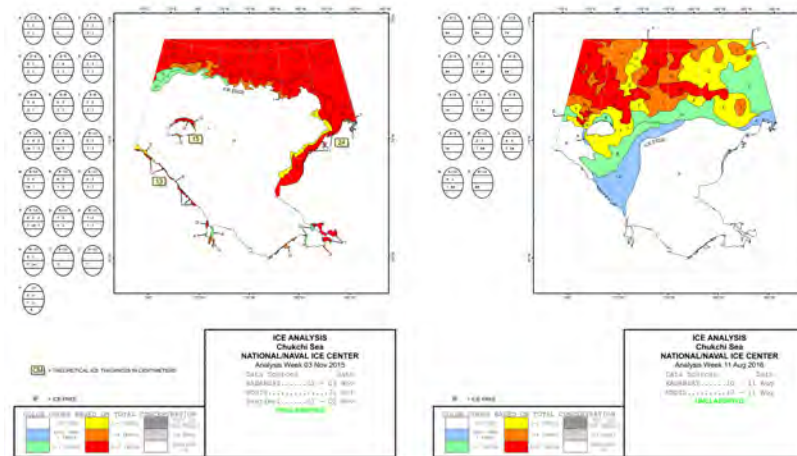
Measuring Currents, Ice Draft and Ice Drift



Instrument schematics.

- An Ice Profiling Sonar (IPS) is co-located with an Acoustic Doppler Current Profiler (ADCP)
- The ADCP provides time-series of current velocities through the water column and the ice drift velocity
- The difference between the pressure and the tilt corrected range provides the ice draft
- Ice drift velocities can be used to calculate the horizontal scale of ice features
- CT sensor for water properties, temperature, salinity, density and soundspeed

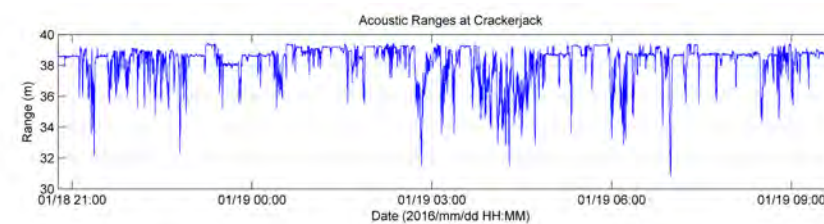
2015–2016 Ice Season



Ice concentration and type charts.

- Ice first started extending beyond the near-shore of the Chukchi in early November, 2015
- The majority of the ice had left the majority of the Chukchi by mid-August, 2016

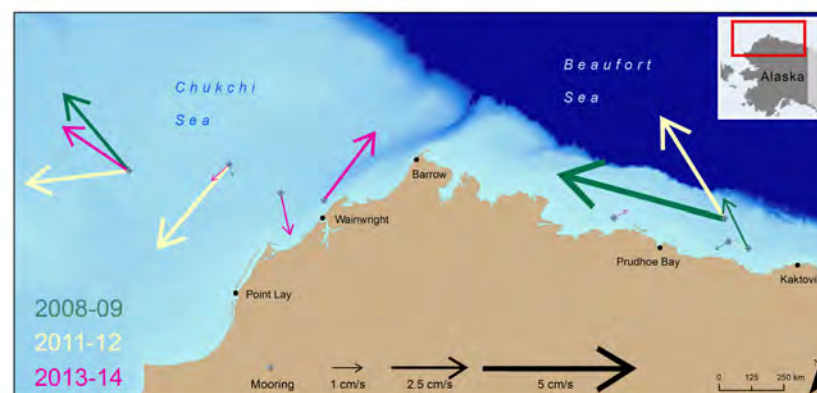
Example Acoustic Range Data (2015–2016)



Raw ice acoustic range time series.

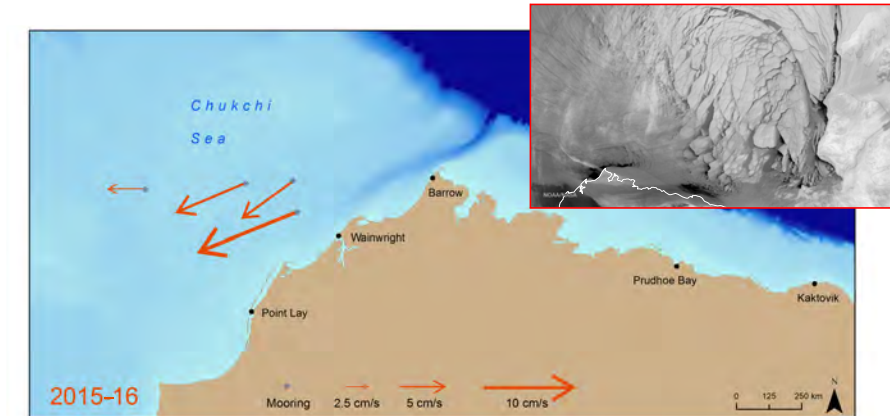
- 6–9 m keels are evident on January 19, 2016

Examples of Measured Annual Ice Drift



Ice drift vectors indicating annual ice drift magnitude and direction.

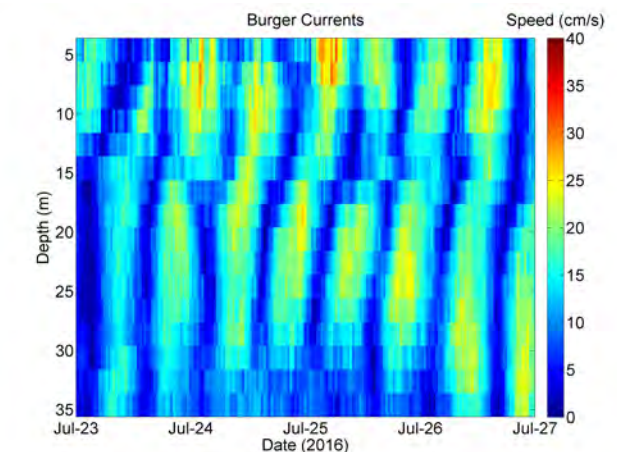
Preliminary Ice Drift from 2015–2016



Preliminary annual ice drift for 2015–2016 shown with an early ice breakup image (April 13, 2016) taken with a Visible Infrared Imaging Radiometer Suite (VIIRS). Image Credit: NOAA/NASA.

- 2015–2016 ice drifts (11.6 cm/s) among the largest of the entire 2008–2016 record
- 2012–2013 (2015–2016) speeds: Burger 5.5 (8.2) cm/s and Crackerjack 4.9 (4.0) cm/s

Current Measurements from Burger



Sample currents at Burger in the early summer showing baroclinic flow.

- 5.25 site years of IPS/ADCP/CT yet to process

Acknowledgements

We thank Shell for their many years of support in gathering ice and physical oceanographic data from the Chukchi and Beaufort Seas over long time scales. We also thank all those who made the measurements possible including Olgoonik-Fairweather and their various contractors as well as Dr. Melling at the Department of Fisheries and Oceans Canada. Michael Henley helped with mapping and Rob Bowen provided the graphical expertise which made this poster possible.