Upper Ocean Observations from Ice-Anchored Buoys

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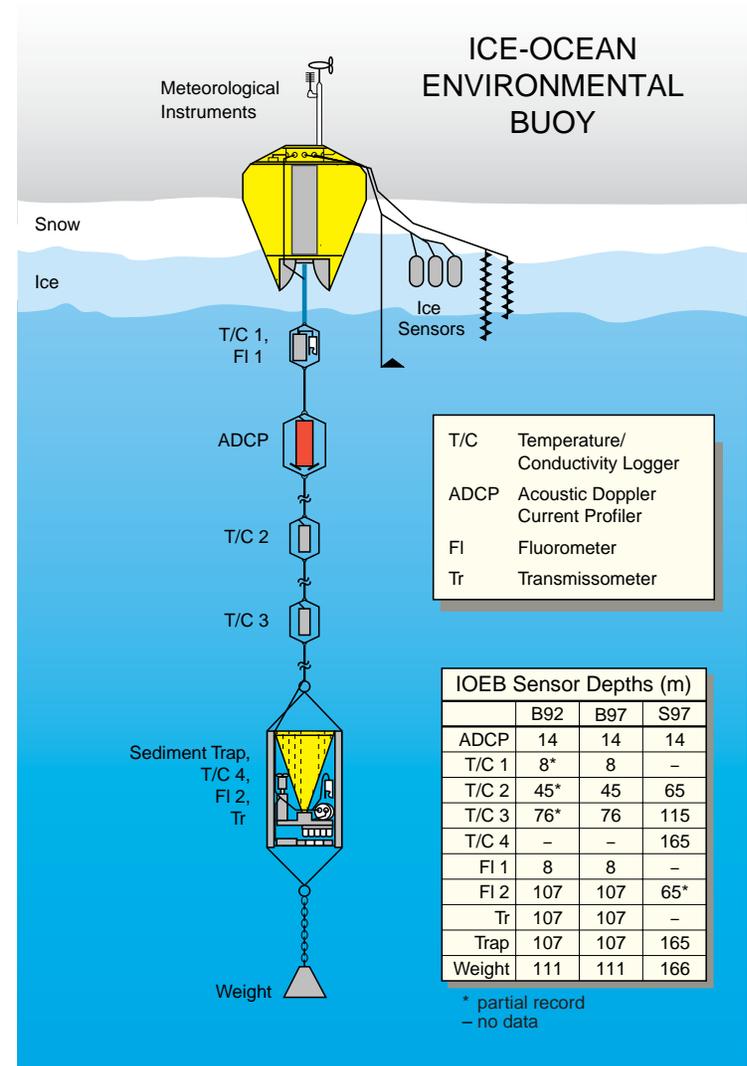Department of Geology and Geophysics

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The Platform

IOEB: Ice-Ocean Environmental Buoy

- Surlyn foam collar surrounds electronics cylinder: 124 cm diam, 680 kg buoyancy
- Air, ice and ocean sensors with real-time data acquisition and telemetry

ADCP

- profiles from ~30m to 300 m
- nominal resolution of 8 m
- 44 months of data from multiple deployments

ICE-OCEAN ENVIRONMENTAL BUOY

T/C	Temperature/ Conductivity Logger
ADCP	Acoustic Doppler Current Profiler
Fl	Fluorometer
Tr	Transmissometer

| IOEB Sensor Depths (m)			
	B92	B97	S97
ADCP	14	14	14
T/C 1	8*	8	–
T/C 2	45*	45	65
T/C 3	76*	76	115
T/C 4	–	–	165
Fl 1	8	8	–
Fl 2	107	107	65*
Tr	107	107	–
Trap	107	107	165
Weight	111	111	166

* partial record
– no data

IOEBs in the pack ice

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- The buoy apex caps the hole and is allowed to freeze in, serving as an "ice anchor" for the instrument string.
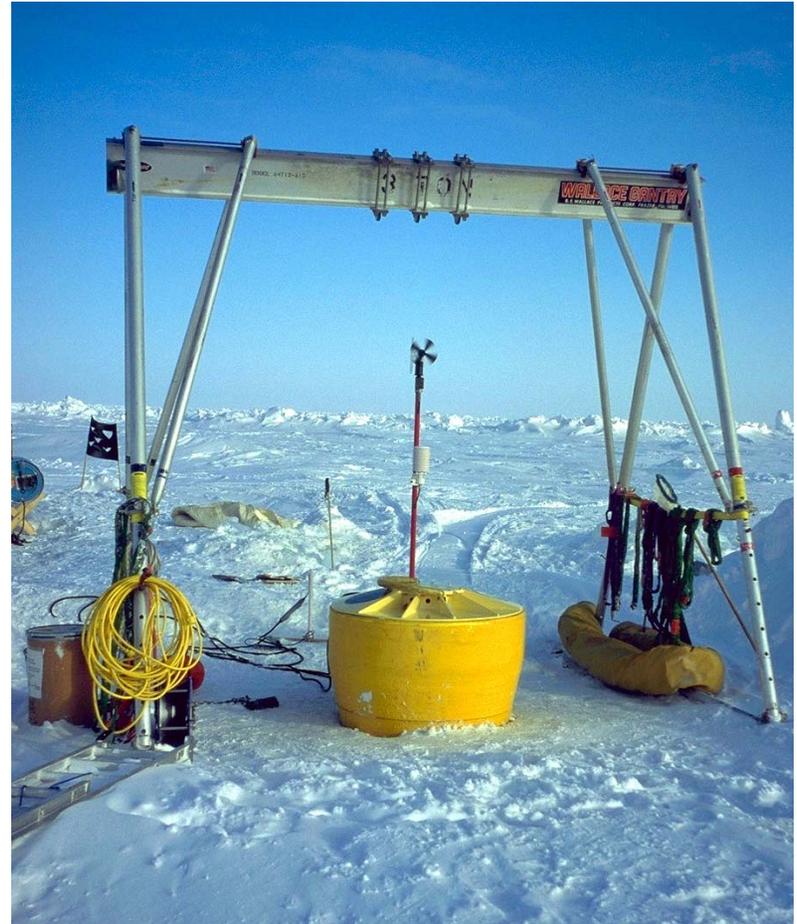
IOEBs in the pack ice

- Instrumentation is deployed through an ice hole using a gantry.
- The buoy apex caps the hole and is allowed to freeze in, serving as an "ice anchor" for the instrument string.
- The buoys are meant to survive in pack ice, ridged ice, or open water, can operate unattended for months to years.
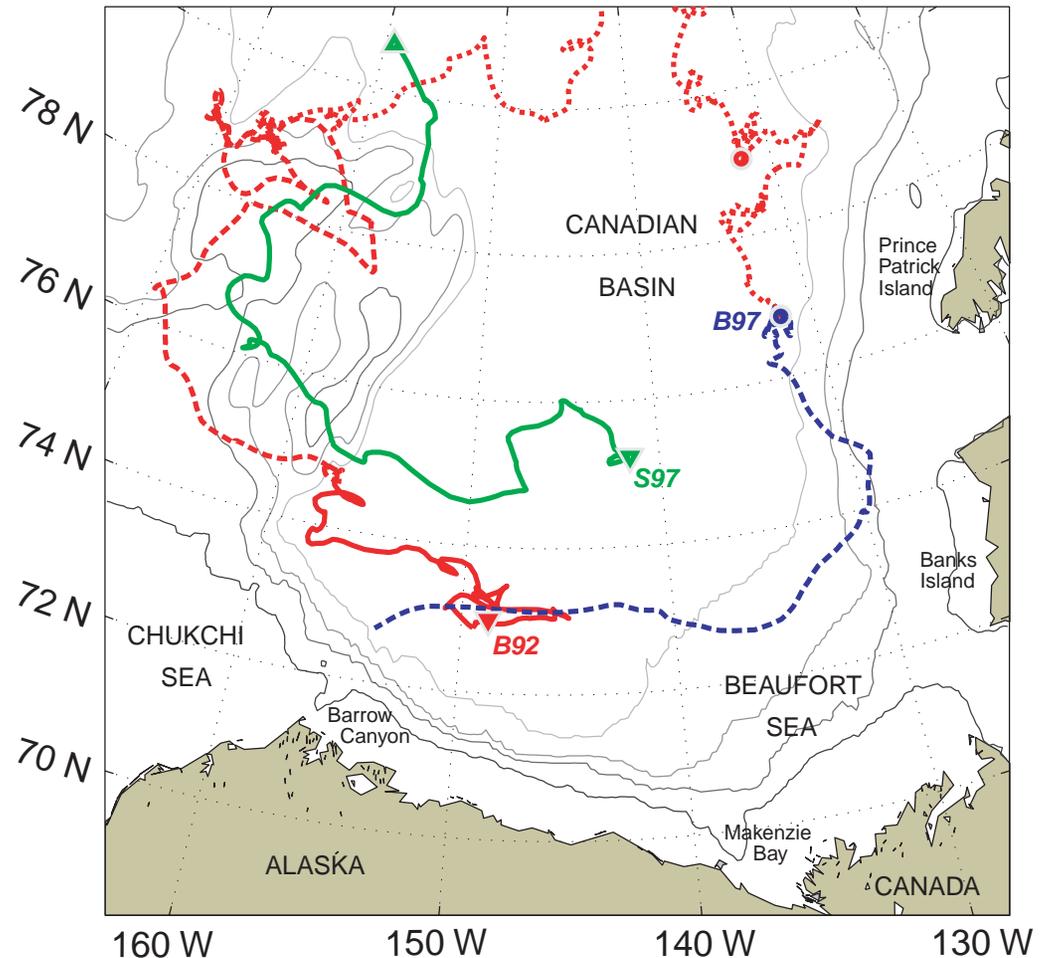- Can be recovered, or refurbished in the field and redeployed.

IOEB drifts: 1992 - 1997

Two different IOEBs were
    deployed four times during
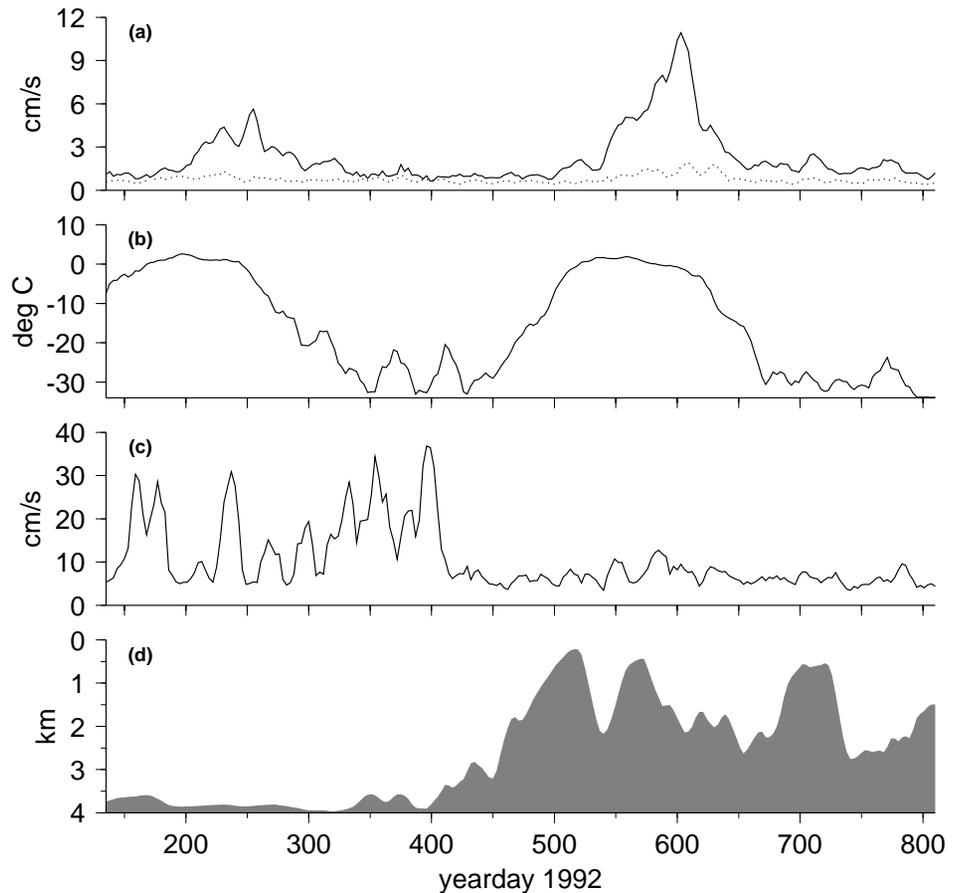   1992-1997.

Drift segments with ADCP data
    were from 265-392 days in
    duration.

The combined drift segments
    covered over 10,000 km at
   an average speed of about
    10 cm/s

Space-Time Variability

- Inertial band amplitudes in the upper 100 m (anticyclonic, solid; cyclonic, dotted)

- Surface air temperature

- Eddy band amplitudes between 100-150 m depth

- Water depth

Eddy Encounters

- The majority of HKE in the upper 250 m is in the form of isolated, subsurface velocity anomalies (eddies).

- 95 eddies were encountered in the four drift segments.

Strong (red),
Weak (blue),
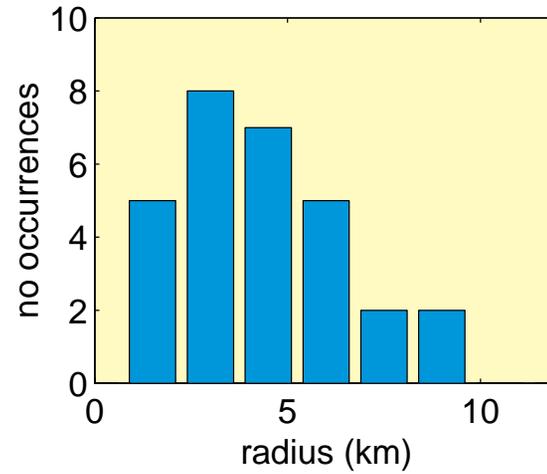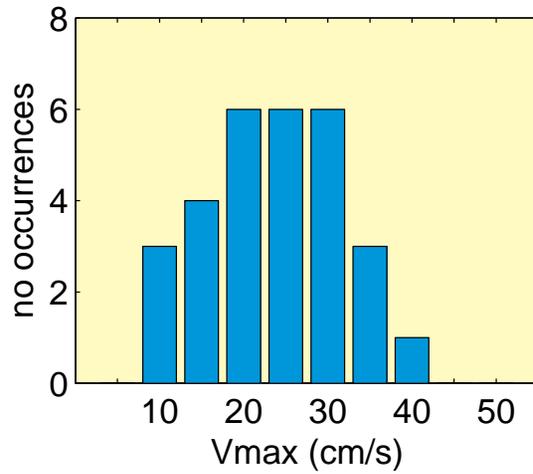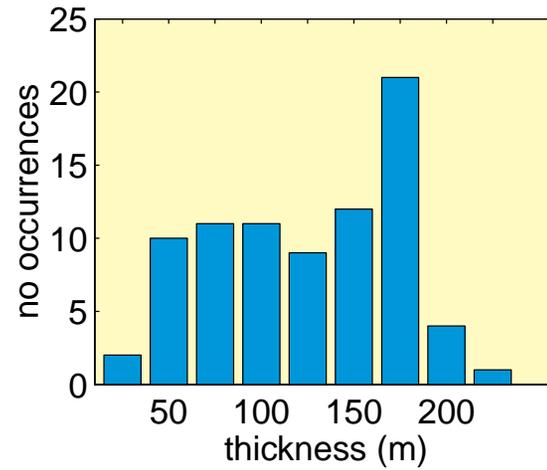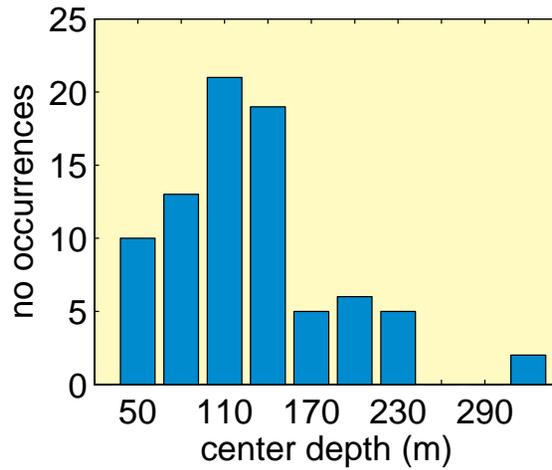Shallow (green)
Deep (white)
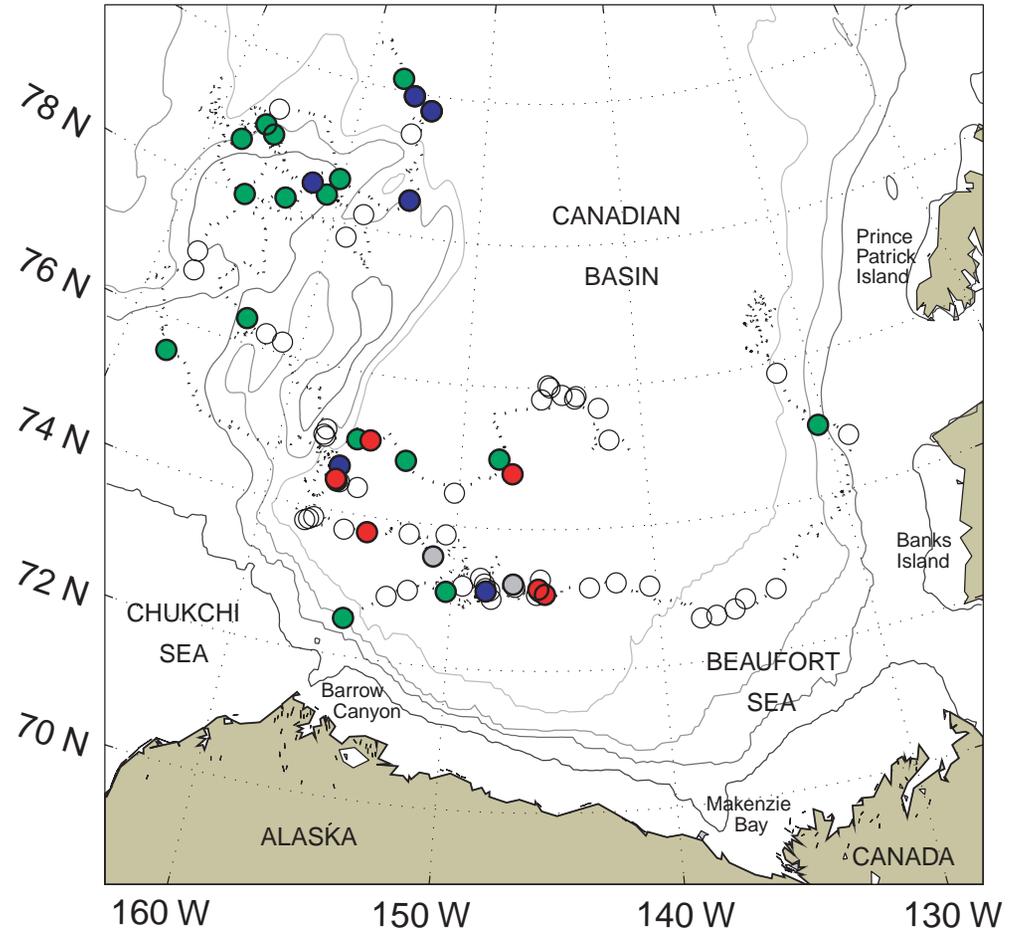
Physical Properties

- Depth
- Thickness
- Center location
- Strength (Vmax)
- Radius
- Sense of rotation
- Translation speed

Dynamical Properties

- Relative Vorticity
- Rate of Strain
- Kinetic Energy
- Rossby Number

Properties: Histograms

Properties: Scatter Plots