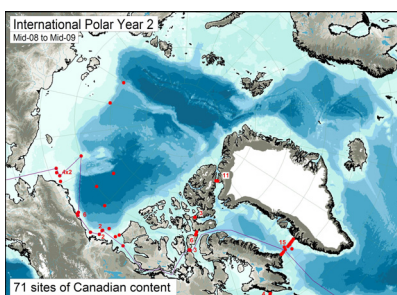


Instrumented oceanographic moorings as year-round observatories in C30

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IPY Project CC-138: Canada's Three Oceans (C30)

1: The Canada's Three Oceans Concept
Long-term, affordable monitoring of the oceans that surround Canada
Incremental science tasking of CCG icebreakers heading north on annual Arctic patrols from Victoria BC & St John's NF
1st element: Observations on route (July & October) to map ocean features & to determine physical, chemical & biological characteristics
2nd element: Continuous observations by autonomous instruments on sub-sea moorings to document conditions year-round at key locations



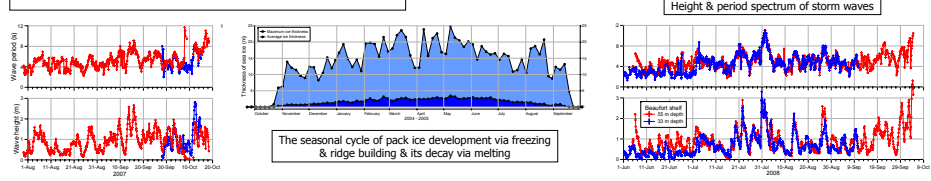
2: The Rationale for Moorings in C30
Seasonal variations in the ocean environment & ecosystem are dramatic
Biological populations either adapt to wintertime conditions, or migrate
Important events in the oceans' ecological year occur at times and in places where human access is impractical



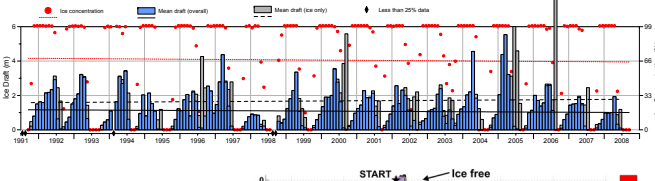
3: Autonomous Moored Instruments are C30's Sleepless Eyes in the Ocean
The schematic diagram to the right depicts the installation of monitoring instruments on a C30 moored ocean observatory

IPY Canada Early Results Workshop, Ottawa, 16-18 February 2010

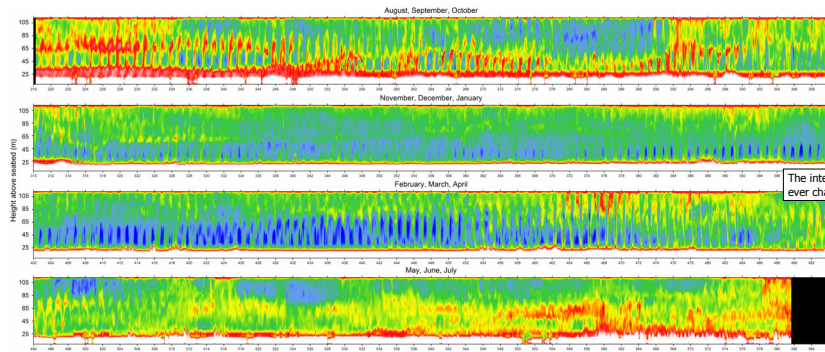
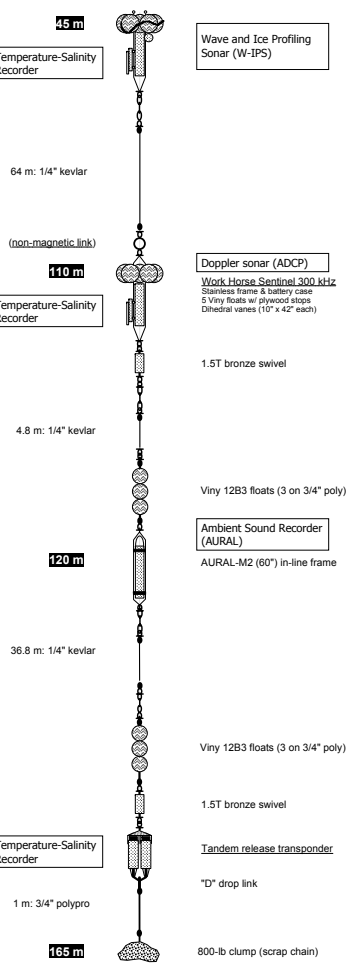
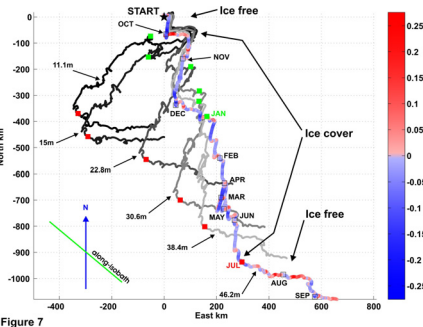
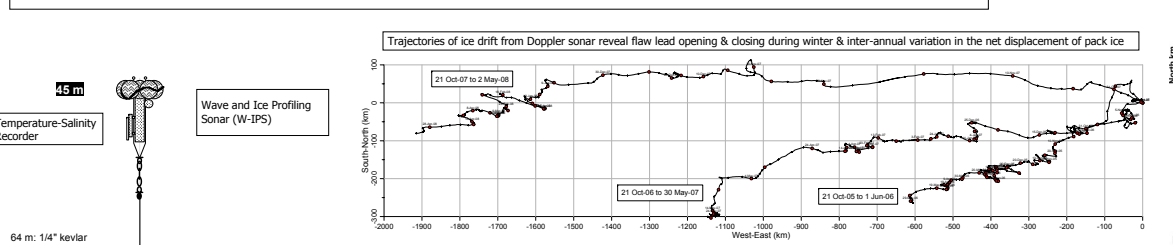
4: Wave & ice profiling sonar provides ...



Plus ... detailed topographic data on ice ridges, multi-year floes, leads - useful for offshore engineering & ecological studies



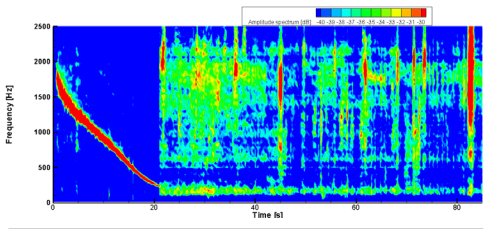
5: Doppler sonar measures ice drift, ocean current & the strength of echoes from zooplankton, at all depths



Full-depth currents from Doppler sonar reveal topographically channeled upwelling of nutrient rich water in Kugmallit sea valley north of Tuktoyaktuk.
The figure shows progressive vector plots of current, with that at the deepest level measurement coloured to indicate the wind direction. Upwelling (flow to the south) occurs predominately with east wind (blue)

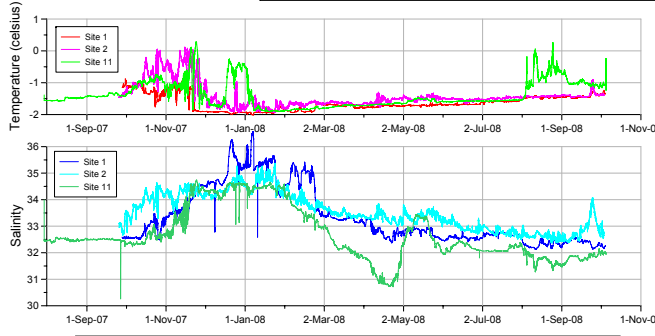
6: AURAL records ambient sound which reveals ...

The presence of marine mammals (e.g. bowhead, beluga, bearded seal, walrus)
The occurrence of human activity (e.g. aircraft, ships, distant seismic survey)
Information on natural processes (ice fracture, ridge building, blowing snow, wind waves)



7: Temperature-salinity sensors record ...

Cycles in seawater properties driven by heating, cooling, freezing & weather events



The figure shows an anomalous hyper-saline event on the Beaufort shelf driven by unusually strong & sustained upwelling throughout 2007, amplified in autumn by brine rejection from newly formed ice