The Circumpolar Flaw Lead (CFL) system study

D.G. Barber, G. Stern J. Deming
and over 370 investigators from 27 countries.

CEOS, University of Manitoba
FWI, Fisheries and Oceans
University of Washington

ArcticNet
The Circumpolar Flaw Lead (CFL) system study

We are unique on many fronts:

- Two Ways of Knowing
- Open water annual cycle
- Full evaluation of the system
- Context of change and variability

(CASES and ArcticNet)
IPY-CFL (2007-2011)
Big Science........

Countries with Institutions participating in CFL:

- Canada, USA, China, Spain, Germany, Sweden, Norway, Russia, Belgium, France, Great Britain, Netherlands

- $40M, 4 years
- $11M in new CFI funds
- International lead- Pan-AME
- Strong northern partnerships
- 11 month field program
- First time!

- 370 investigators
- 102 Senior Scientists
- 122 graduate students
- 46 technicians
- 35 Schools on Board
- 41 media

Countries of origin of CFL researchers and media:
Connection to circumpolar polynyas programs
System Study of the CFL

A - landfast ice camp
B - Ship program
C – TK study
The Team

1) Physical oceanography (Gratton);
2) Ocean-sea ice-atmosphere processes (Barber);
3) Light, nutrients and primary productivity (Gosselin);
4) Pelagic and benthic foodwebs (Fortier);
5) Marine mammals and sea birds (Ferguson);
6) Gas fluxes (Papakyriakou);
7) Carbon and nutrient fluxes (Tremblay);
8) Contaminants (Stern);
9) Physical - biological modelling (Hanesiak);
10) Inuit Knowledge (Meakin/Smith)
Winter mooring observations centered on February 12, 2008

MMP and ADCP
12 synoptic types identified through PCA

Asplin et al. 2009

Seasonality of these types
Controls on primary production

- Light availability
- Remote sensing
- Landfast ice
- Flaw lead
- Pack-ice
- Ice algae
- Viruses
- Phytoplankton
- Particles from melting ice
- Microfauna and meiofauna
- Nutrient flux
Arctic cod biomass based on acoustic data
High nutrient concentrations were confined to the Pacific halocline. Vertical mixing and nutrient replenishment at surface were modest in winter, even if stretches of open water were exposed to strong winds.

The seasonal drawdown of nitrate and silicate by diatoms began in May at the surface and continued in the subsurface chlorophyll maximum until August.
Frost flowers: newly discovered habitats for microbial extremophiles

(From Deming, 2010)
Atmosphere-Surface Modeling
Implementation of New CMC Ice Analysis over Leads

Model domain and topography

Specific humidity ($x \times 10^{-3}$ kg/kg)

Temperature ($^\circ$C)

GEM-LAM
Dec 25, 2007

Deacu, Hanesiak, Zadra
## Traditional Knowledge

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<th>Community</th>
<th>N</th>
<th>Males</th>
<th>Females</th>
<th>Mean Age</th>
<th>Mean # yrs experience on the land</th>
<th>Cumulative # yrs experience</th>
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Special Issues

- Polar Biology (Fortier, Deming eds)

- Geophysical Research - Oceans: (Papakyriakou, Stern, eds)

Thanks

2007-2008

 Officers and Crew of the NGCC Amundsen

ArcticNet

www.ipy-cfl.ca