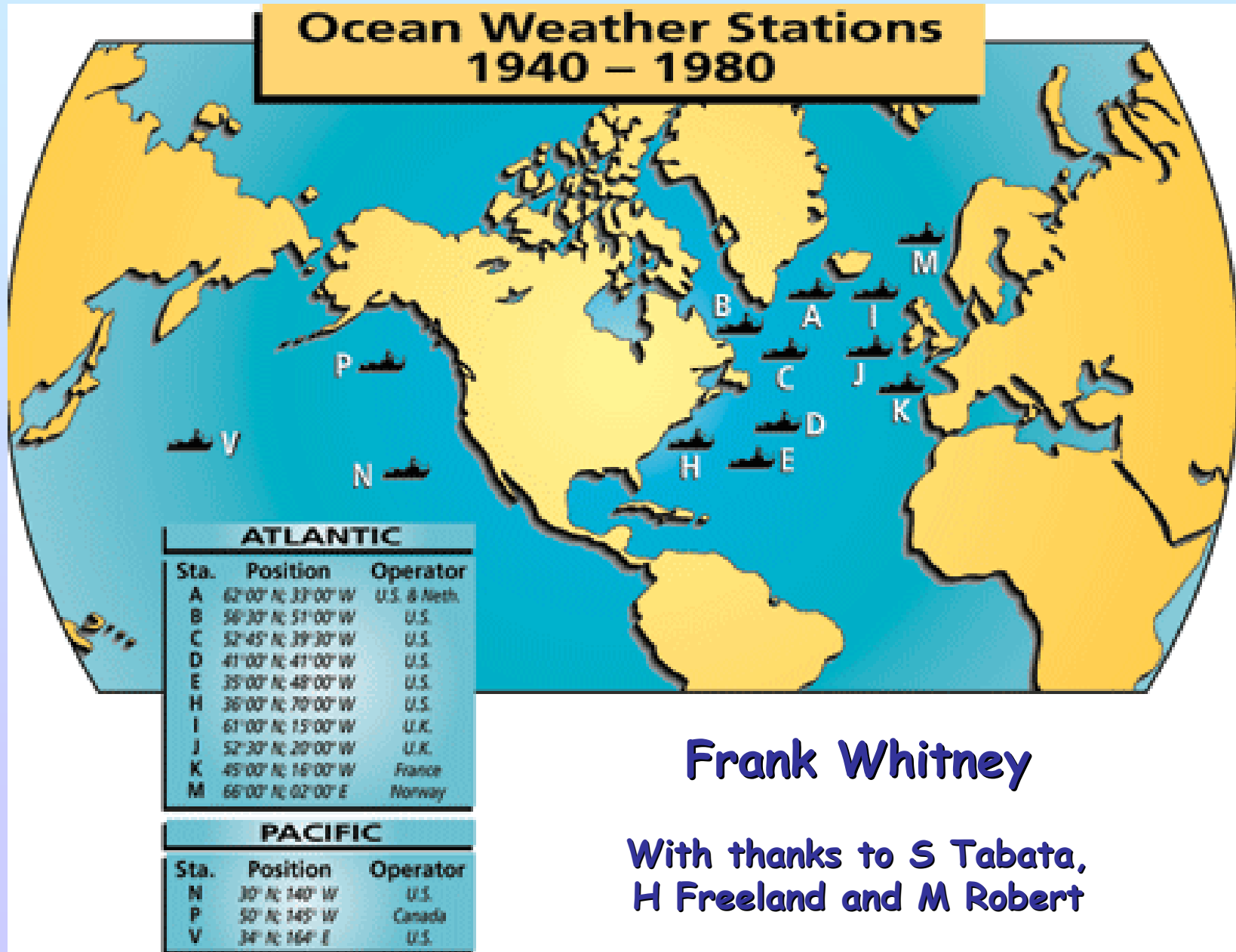


A Brief History of Ocean Station P/Line P



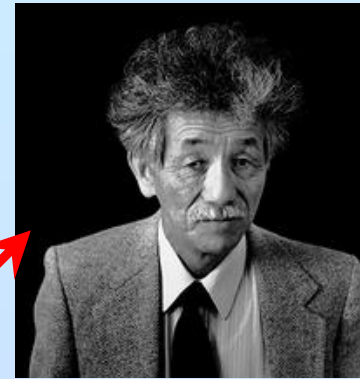
Frank Whitney

With thanks to S Tabata,
H Freeland and M Robert

Some major contributors to OSP and Line P



Pacific Oceanographic Group *circa* 1955



Sus Tabata – 1956
(C McAllister)



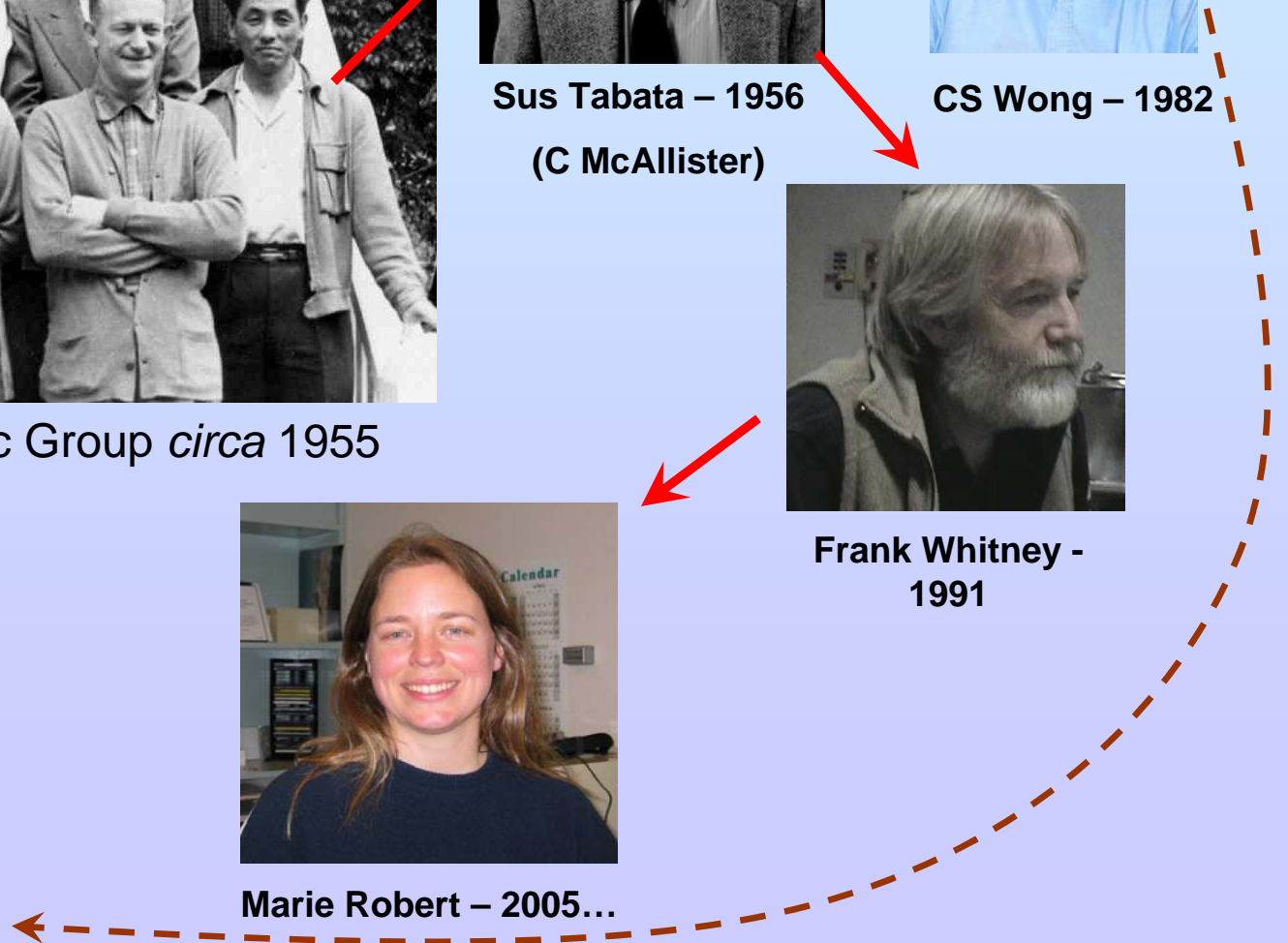
CS Wong – 1982



Frank Whitney -
1991



Marie Robert – 2005...



Outline of Ocean Station Papa and Line P history:

- 1940s - Weather stations designated in N. Pacific
- As **Station Dog** (pre 1947), then **Able** (1947), then **Peter** (1949), station was in operation by U.S.
- Jul 1949 - U.S. collected BT records of temperature (10 depths to 450 feet, T read to 0.1° F)
- Nov 1950 - OSP taken over by Canada, Weatherships constantly on station



CCGS Stonetown and St. Catharines

- Jul 1952 - BT casts started by POG to 450 ft
- **Apr 1956 - hydrographic casts and plankton tows at OSP**
- Jan 1959 - sampling initiated along Line P
- Jan 1969 - new weatherships started duty
- Jun 1981 - Weathership era ended, ship-of-opportunity sampling began with increased sampling along Line P



CCGS Vancouver (and sister ship Quadra)

- Sept 1982 - sediment traps moored at OSP, subsequently at P4 (Wong and Honjo)
- 1984-88 - SUPER program (Subarctic Pacific Ecosystem Research)
- 1991-97 - WOCE (World Ocean Circulation Experiment) era when sampling and analyses were modernized (rosettes, automated titrations)
- 1992-97 - JGOFS (Joint Global Ocean Flux Study) era, intense biological measurements
- 2001 - Argo began providing data
- 2002 - SERIES (Subarctic Ecosystem Response to Iron Enrichment Study)



CSS Parizeau



CCGS John P Tully during SERIES

The International Union of Geodesy and Geophysics, Hamburg 1983:

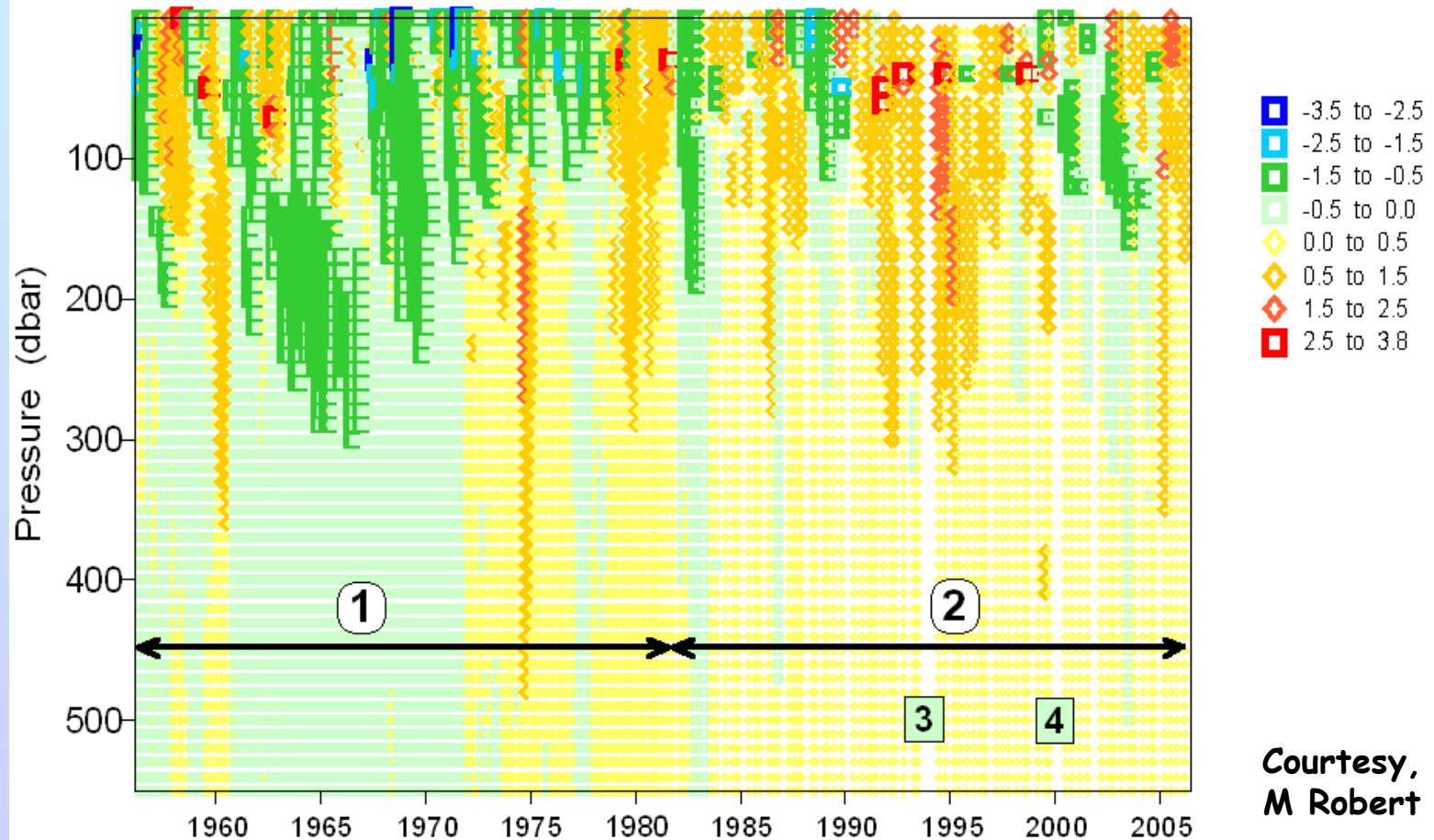
Recognizing

- 1) That the WCRP requires atmospheric and oceanographic measurements over oceans, and that termination of Ocean station Papa in 1981 constitutes a serious loss to the climatic record, to atmospheric and oceanographic activities, and to operational weather forecasting, ...

Commends the efforts of Canada and other cooperating countries in undertaking to develop a ship-of-opportunity observing system for the North Pacific, ...

Temperature Anomalies at Station Papa

May 1956 to February 2006



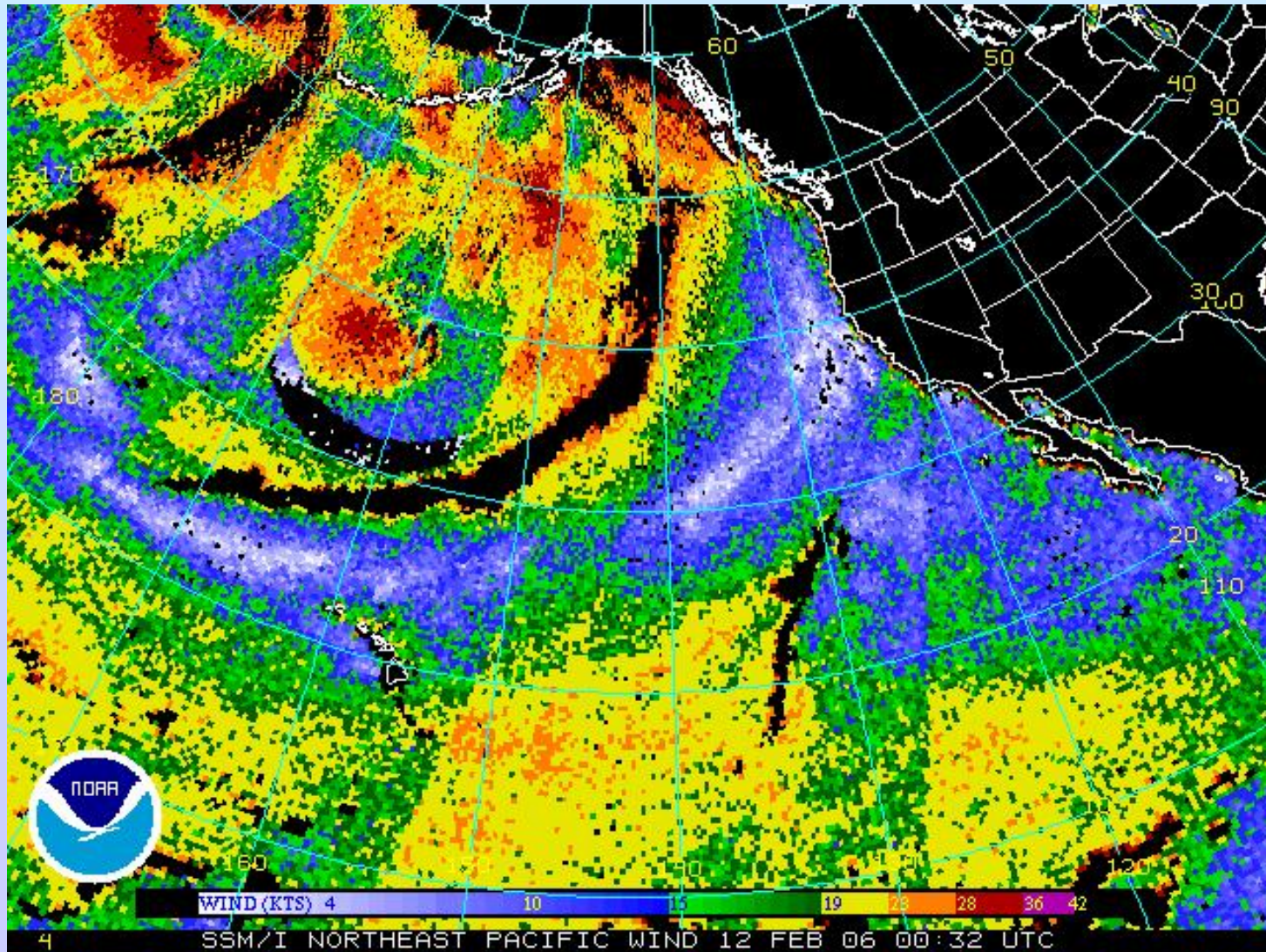
1. Weatherships on station, 1956-1981
2. Research cruises to Station Papa
3. Only vessel to Arctic summer '03, then weather prohibitive Feb '04
4. Only vessel needed for coastal Search and Rescue, winter '02

Data improvements

1990s were "for better or for WOCE"

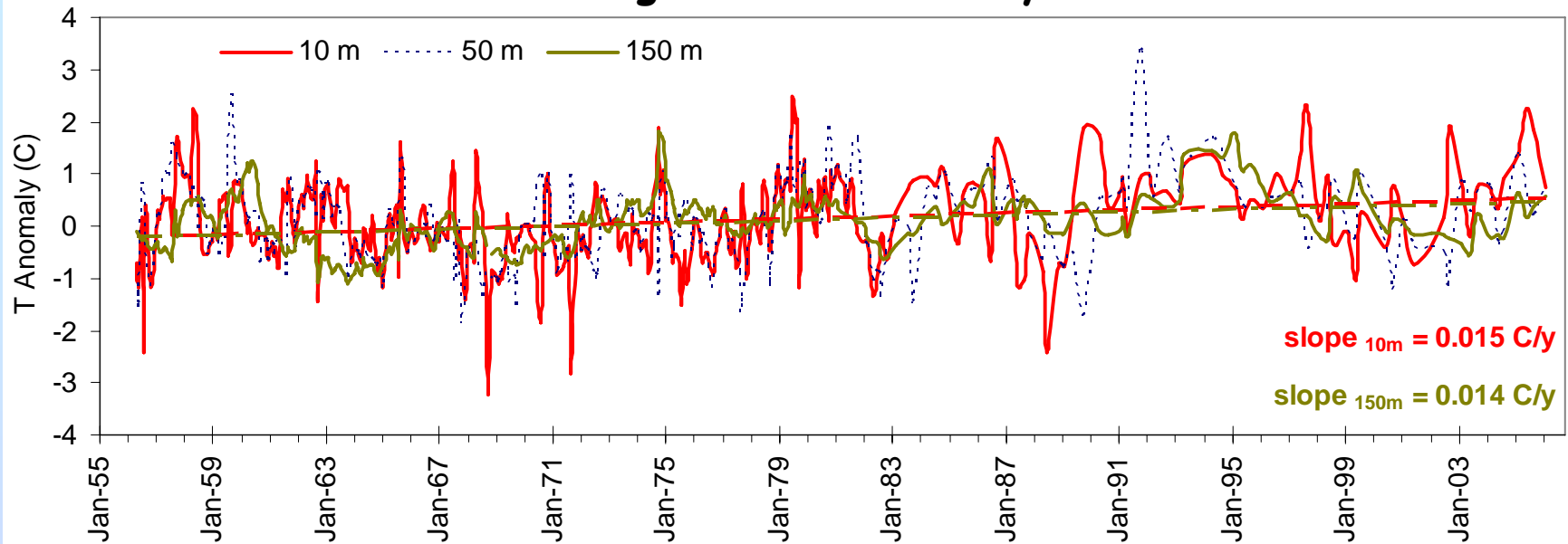
	1960s	1990s
Location	+/- 10 km	+/- 100 m
Depth (m)	+/- 10 m	+/- 1 m
Temperature (C)	+/- 0.02	+/- 0.002
Salinity	+/- 0.01	+/- 0.002
Oxygen ($\mu\text{mol/kg}$)	?	+/- 1
Nitrate ($\mu\text{mol/l}$)	+/- 3	+/- 0.3
Plant pigments	Chl a	Many - HPLC
Zooplankton	Net tows	Acoustics
DIC ($\mu\text{mol/kg}$)	+/- 50	+/- 5

What has 50 years of fieldwork told us?

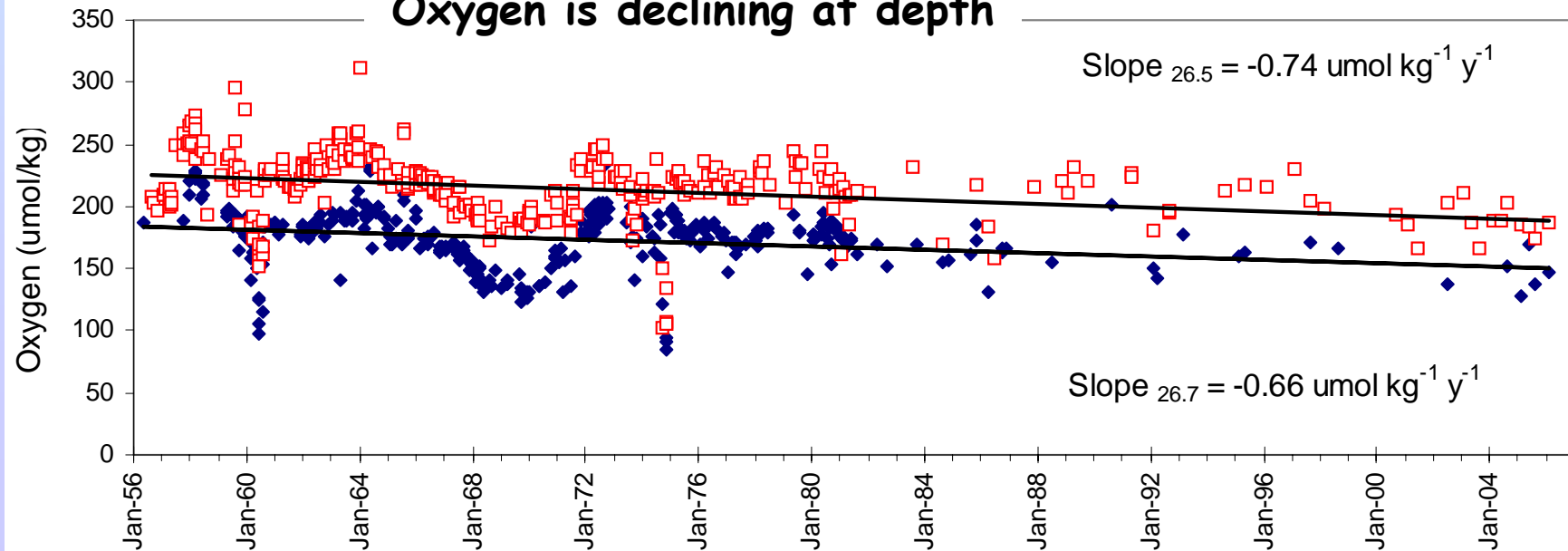


- other than not to go out in a storm!

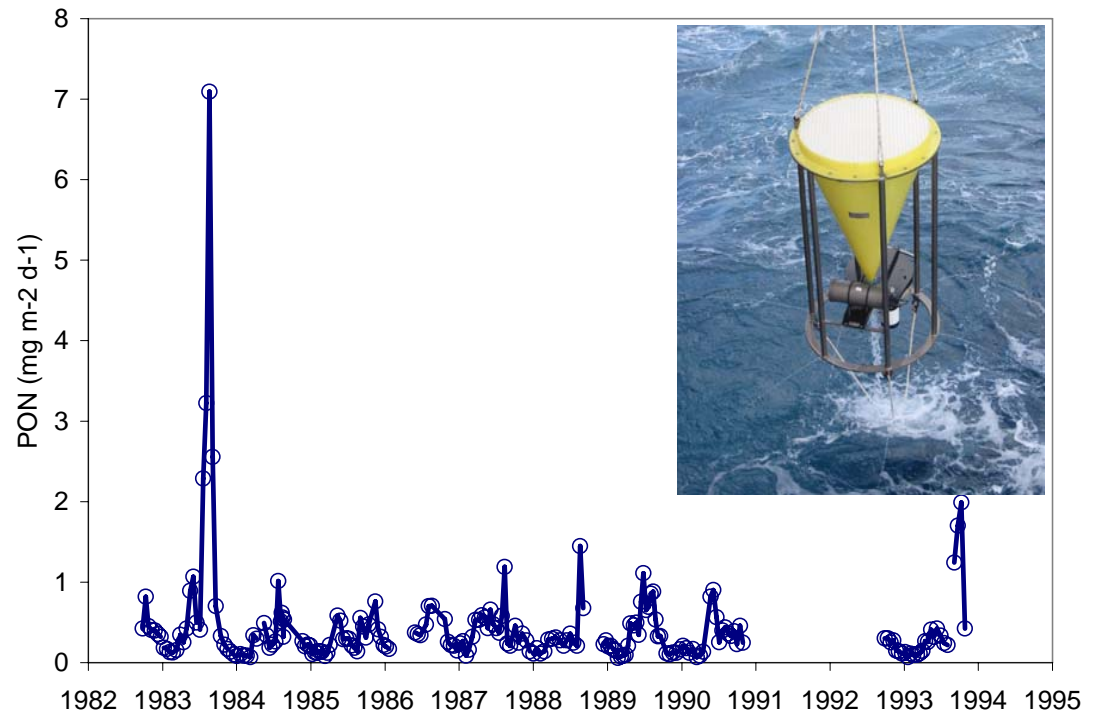
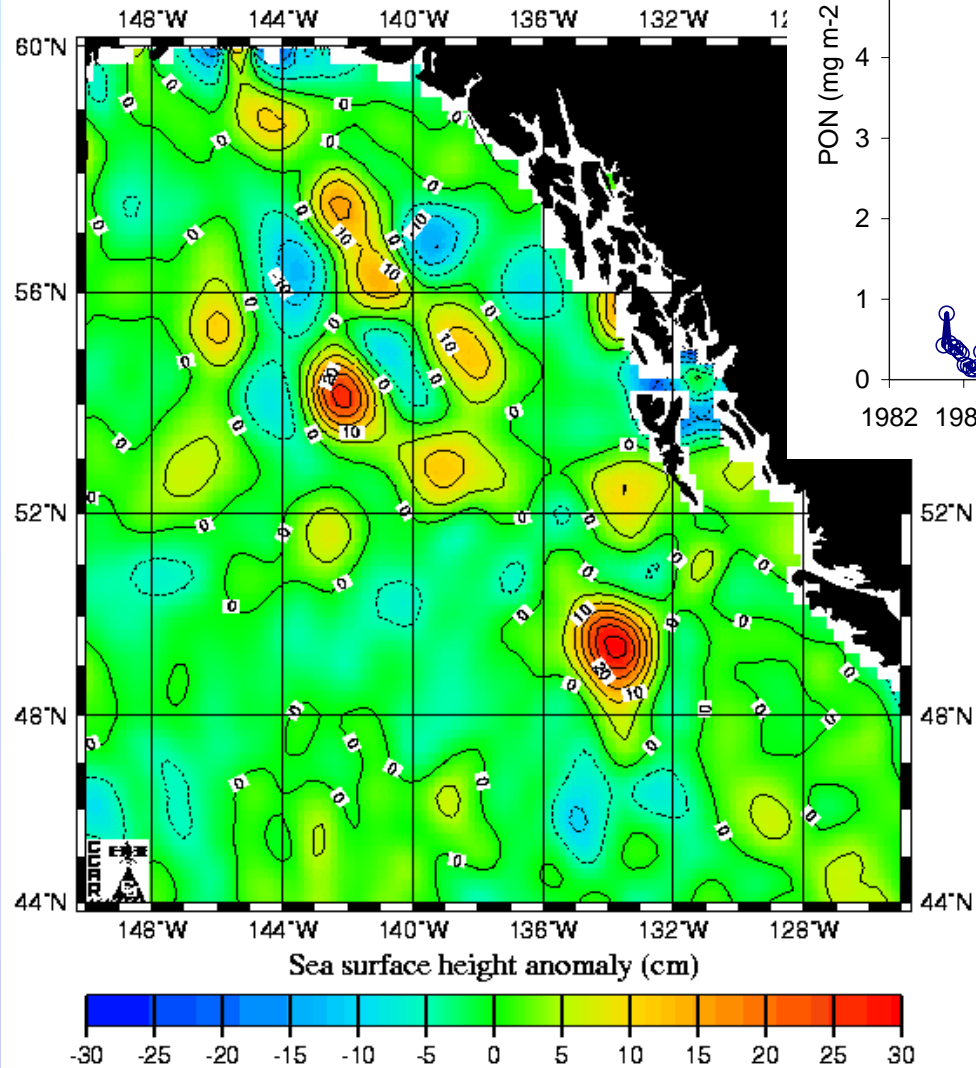
Heat is entering ocean effectively



Oxygen is declining at depth

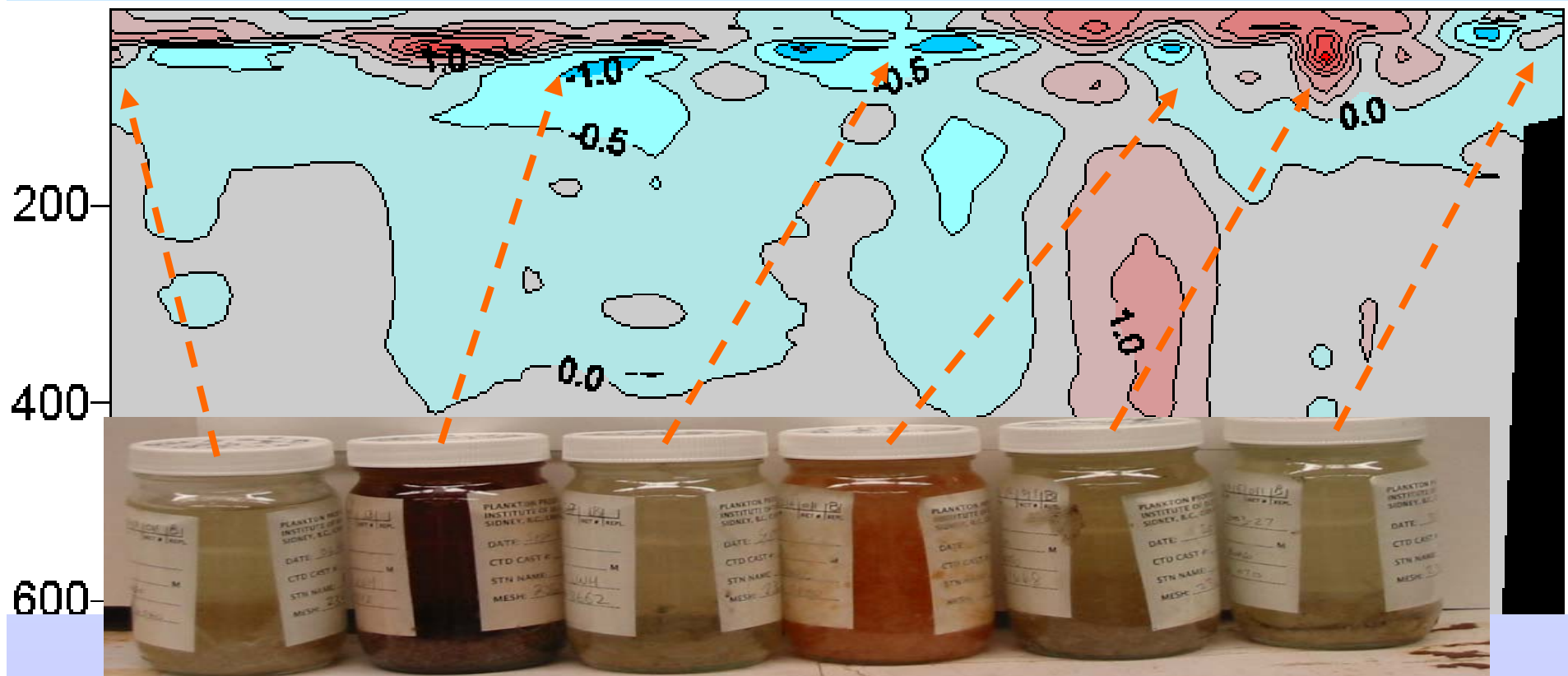


Eddies are everywhere



**Some years are different -
Particulate Nitrogen flux to
3800 m at OSP**

Zooplankton describe water masses



P26

**Typical
Oceanic,
abundant
diatoms**

P20

***Clio* sp.,
(pteropod)
southern
oceanic
(California)**

P16

**Salps,
Northern
oceanic, to
Bering Sea**

P12

**Eddy edge,
Doliolids,
southern
oceanic
(California)**

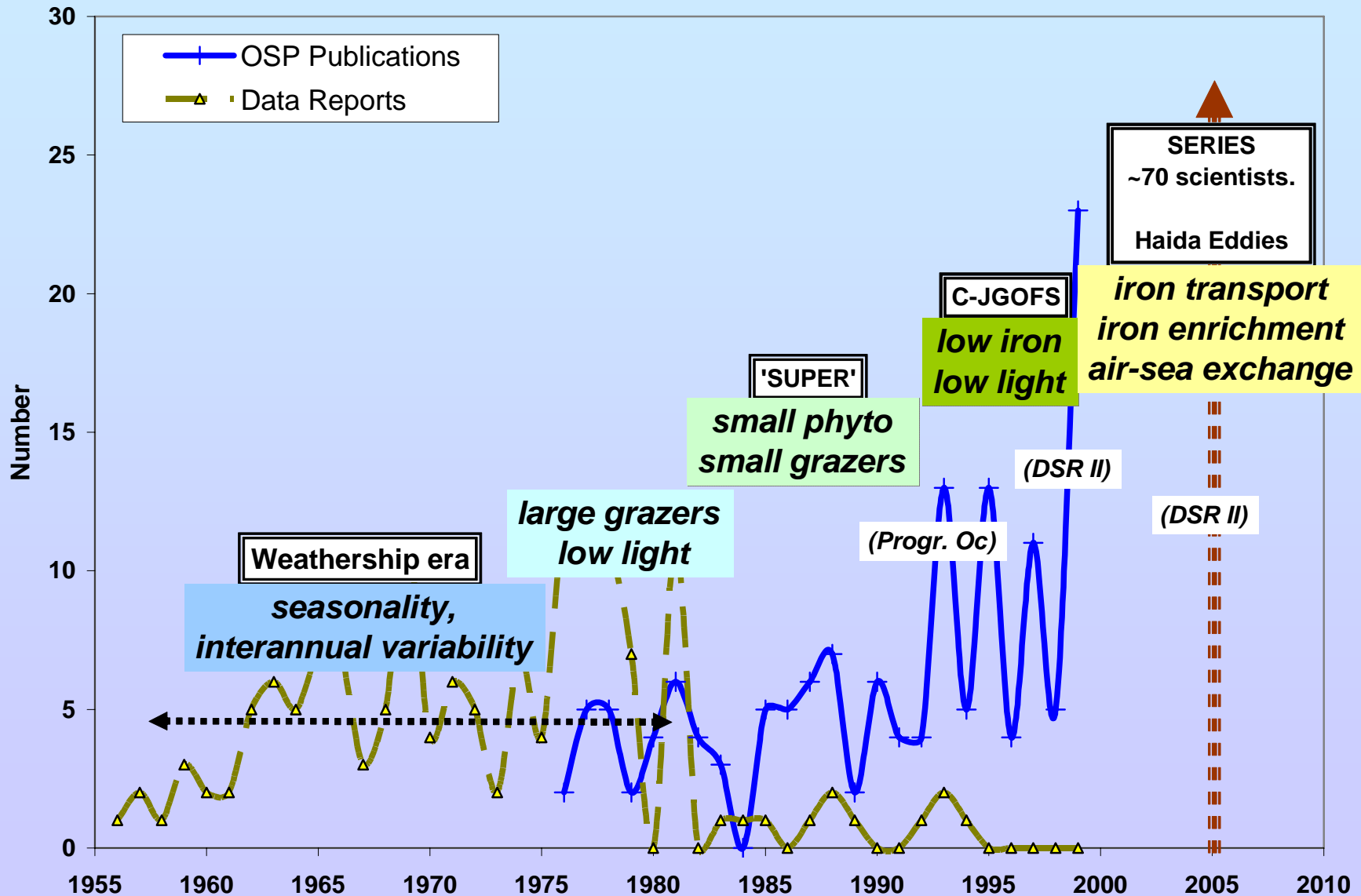
P8

**Copepods
southern
shelf
(California)**

P2

**Typical BC
Shelf**

Collaboration is essential





1956 to 2004 Participant list

Ackley Adly Agawin Anderson Anderson Andreev Arminini Arychuk Ashton Atkinson Baird Barwell-Clarke Batchelder Bellegay Bennett Bentley Bernard Berrang Berube Bigham Binks Bishop Blower Booth Bornhold Bouillon Boyd Bradley Breault Brown Burns Burrige Butters Bychkov Campbell Candela Canning Chichkin Coates Colegrave Collins Conway Coombs Cooper Coronini Cox Crawford Crawford Crocker Curran Damtoft Davelaar de Jong de Lange Boom Demsey Denman Desmeules Dobson Doherty Duffy Earme Eek Engemoen Ferrier Fok Forbes Forgie Forsland Freeland Fukami Gantzer Garrett Glennie Goldberg Goldblatt Granger Grant Hall-Patch Hanks Hansen Healey Henry Hill Hofland Huggett Huyer Hwang Ibadulayev Iseki Ivanochko Jackson Jeong Jewsbury Joergensen Johnson Johnstone Juhasz Karowe Kiyosawa Knox Lam Law Leaitch Lefebvre Lipsen Loewen Lohan Love Lu Lund Macdonald Mackas Maclean Maldonado Manganini Marchetti Marles Marshall Matthews McAllister McIntosh McKinnon McLean Meikle Merzouk Michaud Mildenberger Minkely Moat Moore Morgan Mudge Mugo Mullin Munro Nishioka O'Connell Olsen Osterman Panchyson Pannekoek Pariniuk Parsons Pavlova Peers Pena Perkin Peterson Phinney Plath Poillard Powell Powers Price Putland Quay Quenneville Quinn Rebele Rendell Richardson Ridal Riske Rivkin Robert Robertson Rome Roy Rudge Ruiz Rupp Sastri Scarratt Schmidt Schmitt Schneider Schultz Shantz Sherlock Sherry Simmons Sirios Smith Smith Smyth Soon Soutar Spear Spearing Spencer Stewart Stewart Stickland Strickland Strzepak Stucchi Sutherland Swartz Sybrandy Szabo Tabata Takeda Tappa Taufen Tenorio Thibault Thornton Timmermans Timothy Tippet Tishchenko Toews Tortell Tremblay Trentin Trick Tripe Tripp Tuele Twaites Vagle Vandergugten Varela Vermeer Vestfals Wadleigh Waring Welch Wen Westlake White Whitehouse Whitney Wilke Wong Wood Wu Yelland Yu Zakreski Zheng Zheng Ziolkowski Zudaire