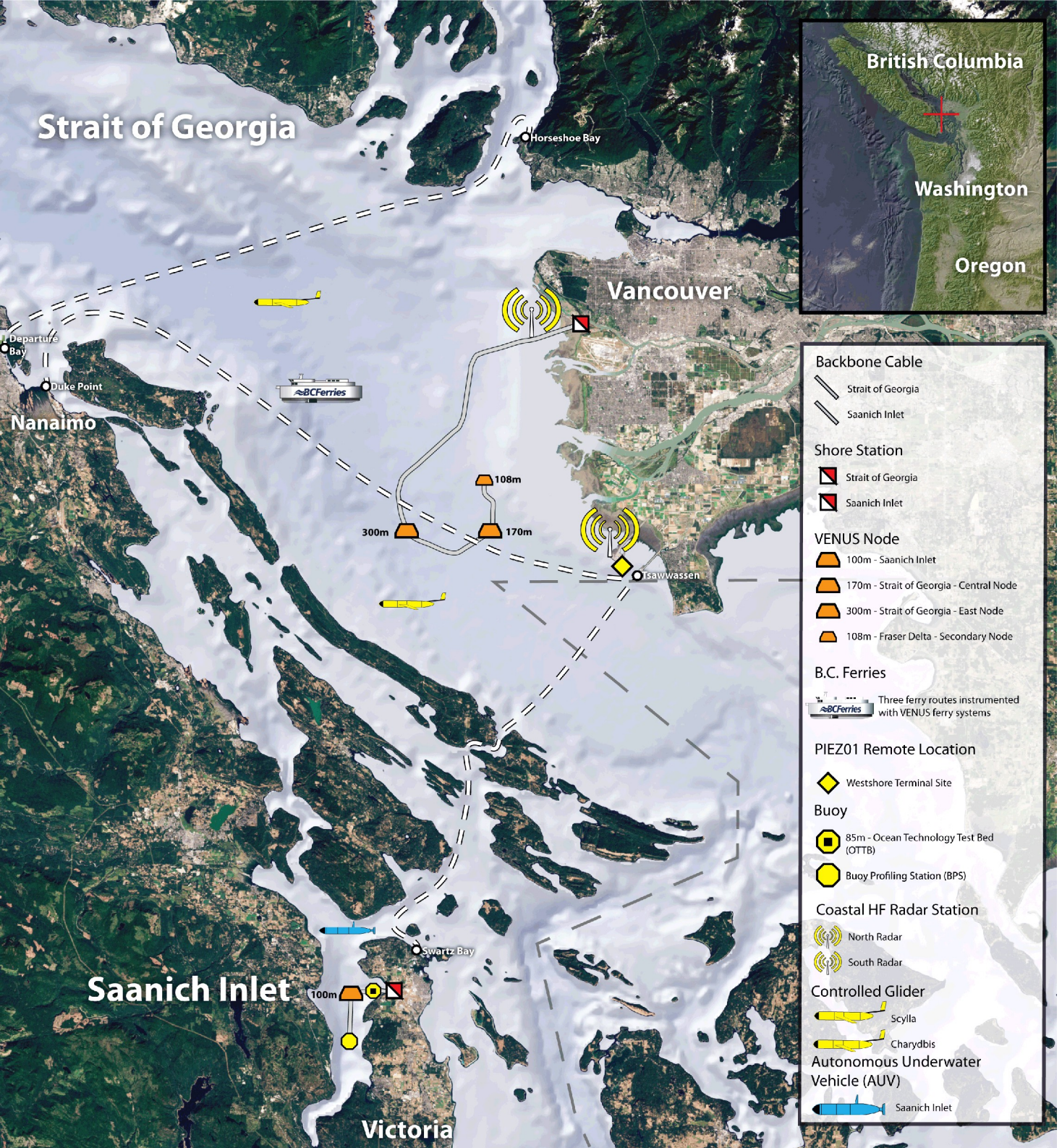
Strait of Georgia Modelling and Assimilation

Susan Allen with Rich Pawlowicz

Outline

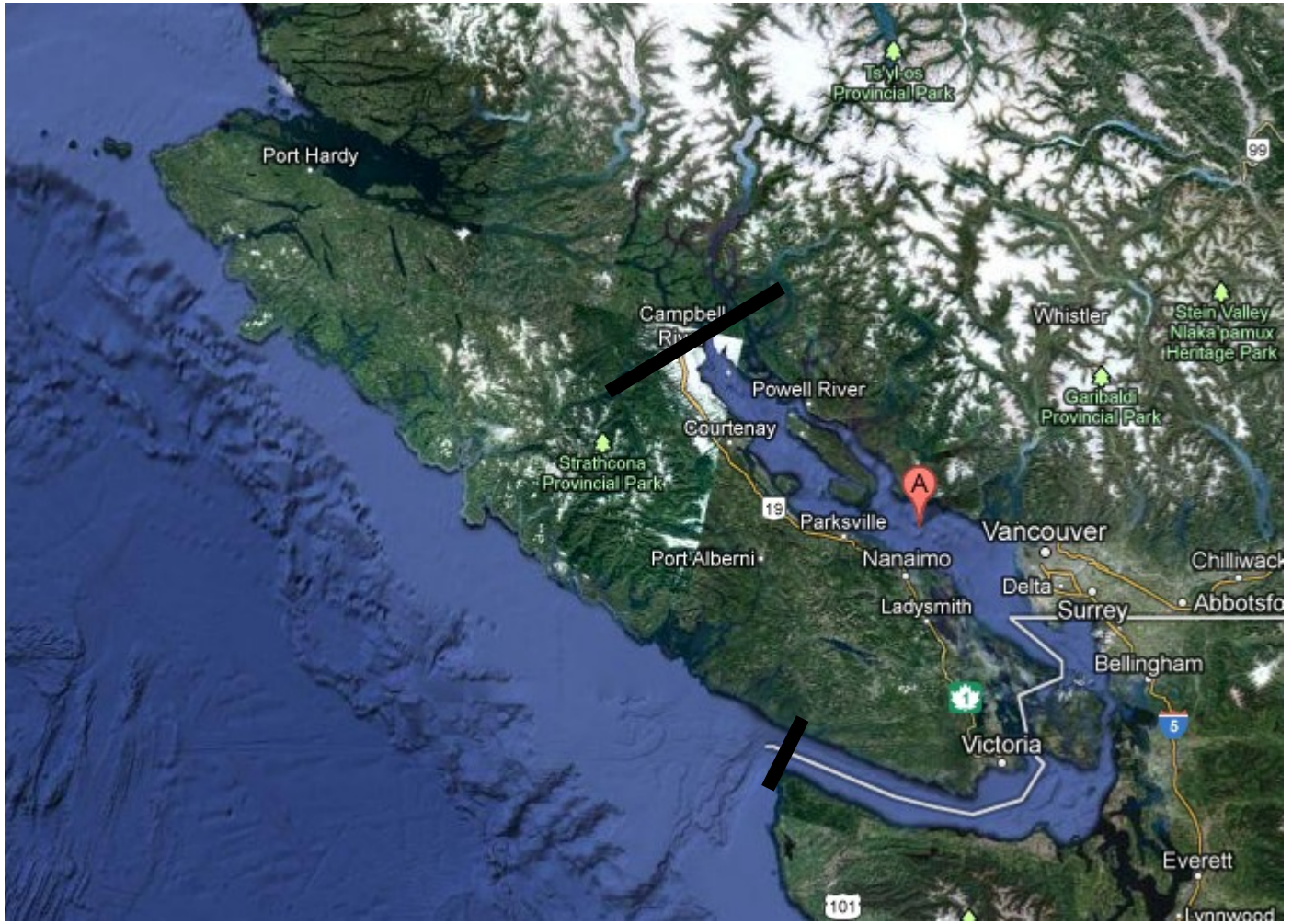
- Domain, model, data for assimilation
- State of modelling in the Strait
- What my group has done
- What we plan to do



Data

Venus Canada

Domain



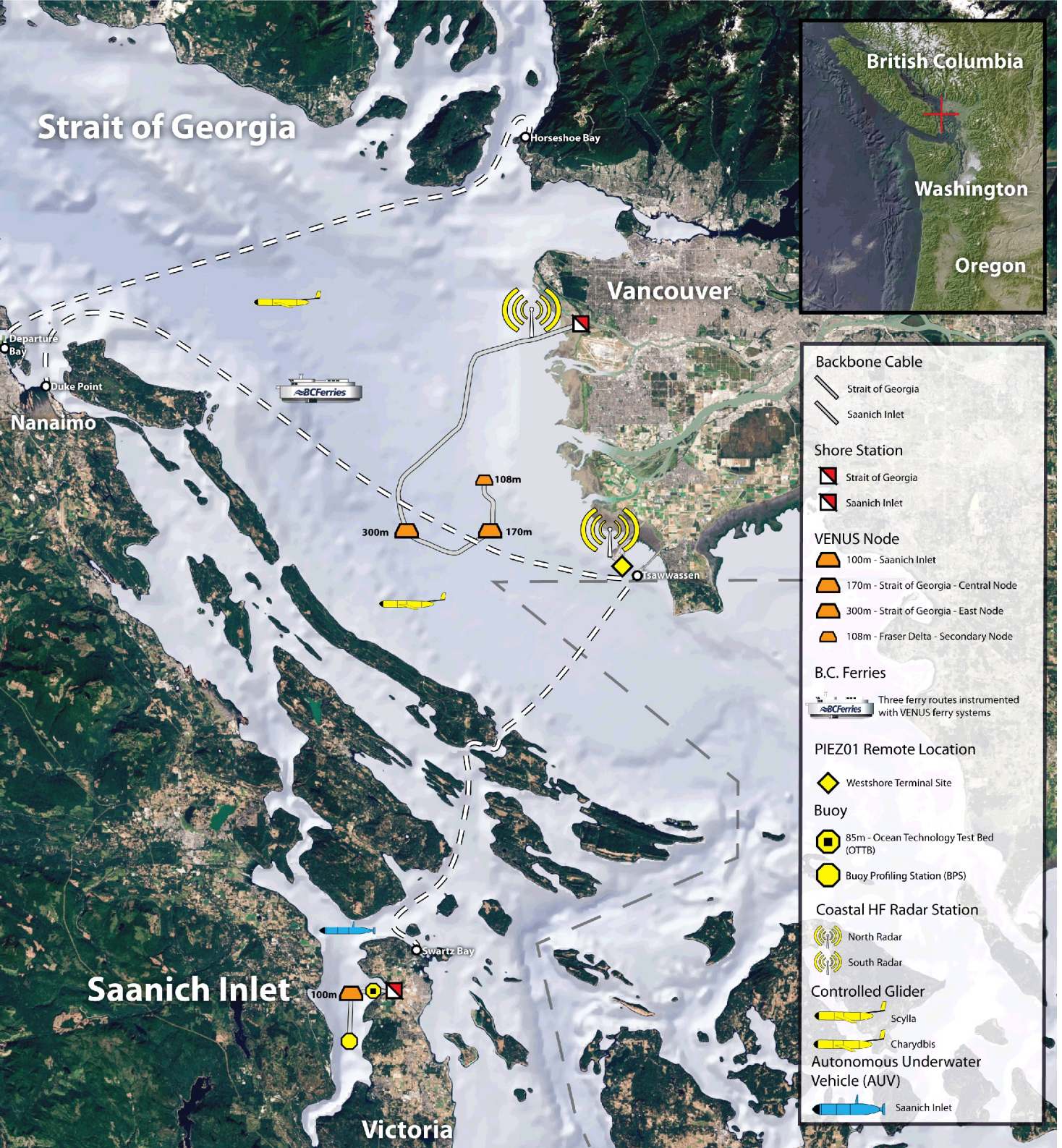
Include all of the Salish Sea from Campbell River (Johnstone Strait) in the North, to Juan de Fuca Strait in the South and including Puget Sound

- Masson & Cummins, 2004 (POM)
- Snauffer, Masson & Allen, in prep (ROMS)

Google Maps

NEMO

- New model for west coast except it is being used by CCC for their new ocean model



Data

Venus Canada

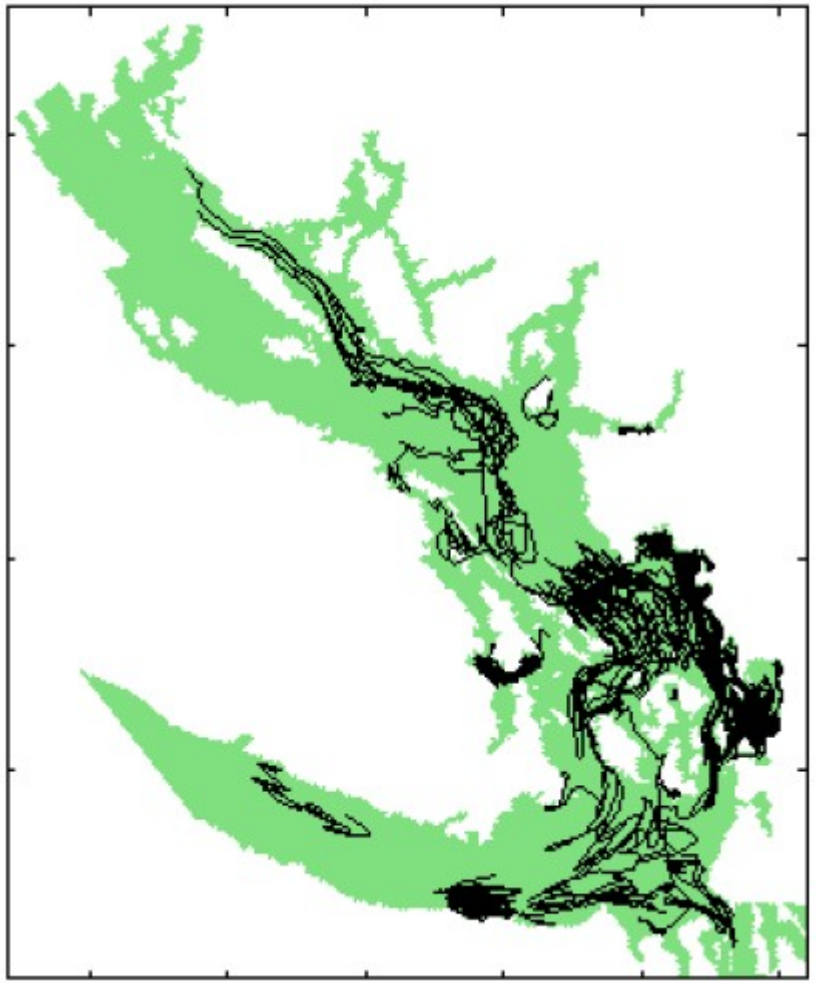
Strait of Georgia Modelling

- Crean & following to Marinone et al : tidal model +
- Masson & Cummins, 2004 : POM, seasonal cycle
- Sutherland, MacCready, Banas & Smedstad, 2011, ROMS for Salish Sea extending offshore, forced with 4km MM5
- Masson has a SoG ROMS model, a subset of that published for west coast in Masson & Fine, 2012
- Tinis & Thomson have an operational model for the Strait?
- Baptista model extends into SoG
- Foreman is using FVCOM for Discovery Passage region at north end of SoG

My SoG Modelling

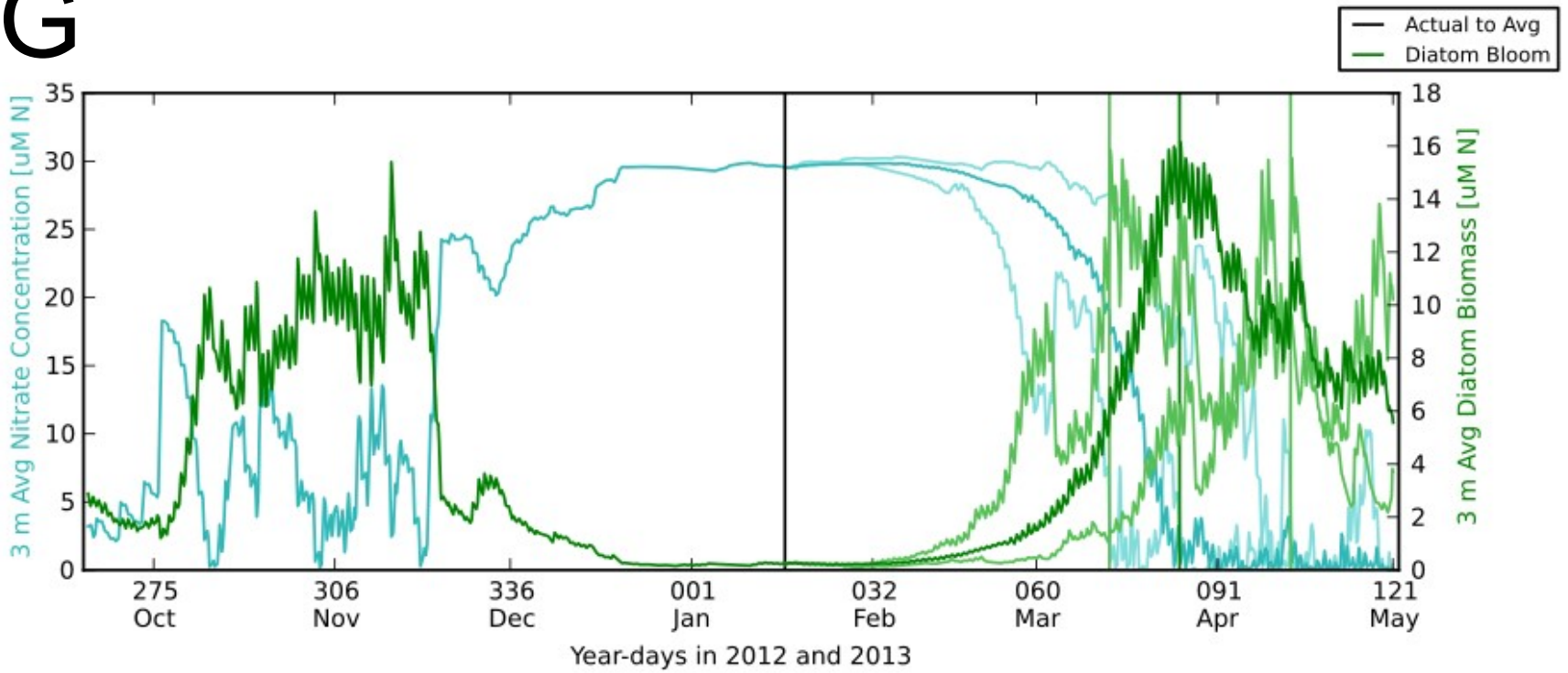
1) One-dimensional coupled bio-physical model of the SoG, with carbon cycle and oxygen. Run in hindcast mode and also in predictive mode. (No assimilation)
2) Co-supervised E. Snauffer with Diane Masson to use Diane's model to track herring and hake larval particles (6 weeks timescale)

Evgeniya Snauffer thesis



- Herring DVM
- Released in Boundary Bay region on March 19, 2007.
- Tracks shown for 50 herring from day 6 to 9 inclusive

SOG


Actual to Avg
Diatom Bloom
3 m Avg Nitrate Concentration [uM N]
3 m Avg Diatom Biomass [uM N]
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
275
Oct
306
Nov
336
Dec
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Jan
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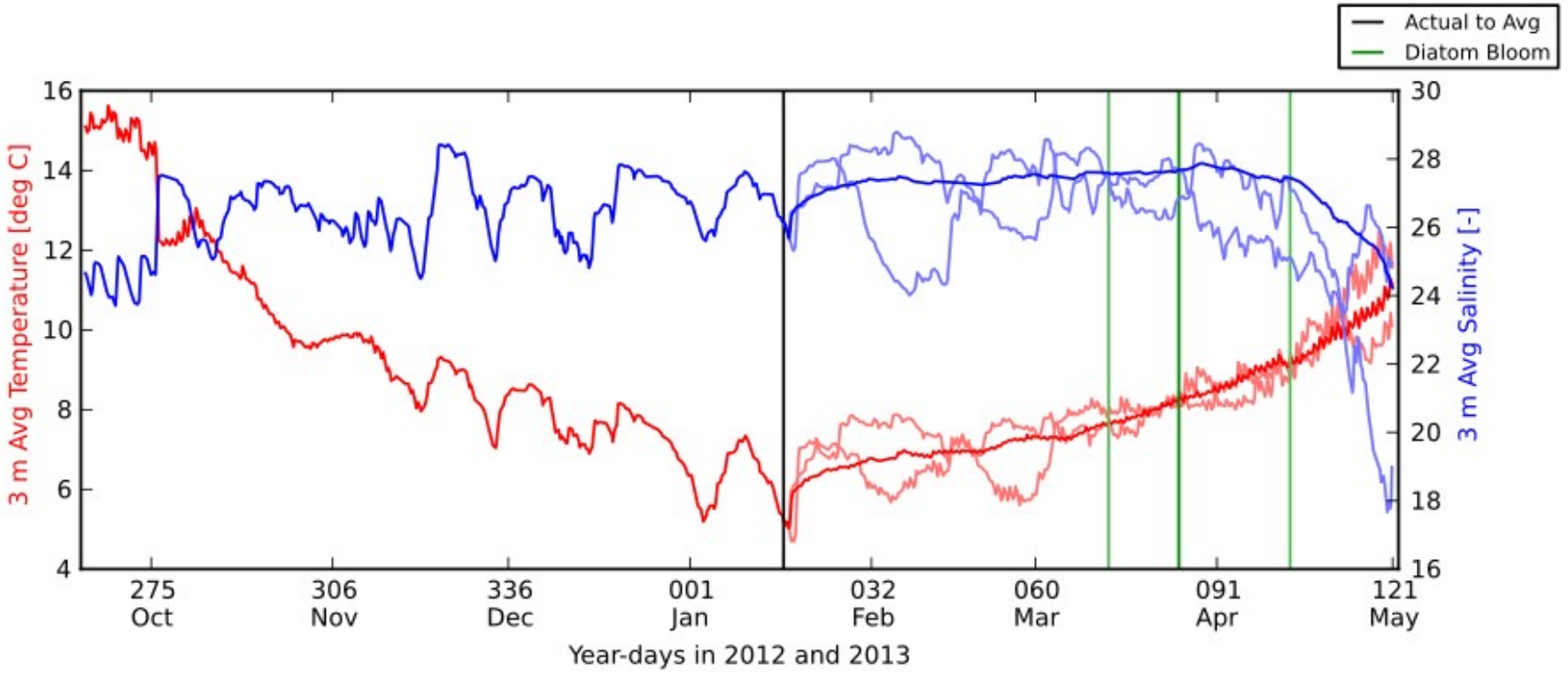
Mar
091
Apr
121
May
Year-days in 2012 and 2013


Actual to Avg
Diatom Bloom
3 m Avg Temperature [deg C]
3 m Avg Salinity [-]
4
6
8
10
12
14
16
16
18
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22
24
26
28
30
275
Oct
306
Nov
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Dec
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121
May
Year-days in 2012 and 2013

Plans

Focus on physical model. Most of the goals are physical and my group has a working biogeochemical model that can implemented in year 4-5

Use my sabbatical (starting July 2013) to plan (me) and start the configuration (software engineer)

- Bathymetry, model domain
- Forcing: rivers, meteorological data
- Open boundary conditions

River data and plume response Gulf/San Juan Islands & Southern input

Wind fields and wind response

Have a postdoc start about Sep 2013 with zher first job development of meteorological forcing fields and implementation into NEMO.

Two students starting Jan 2014

- One to prepare observational data set to test NEMO implementation
- One to prepare NEMO for assimilation

Questions/Planning

- Get NEMO from Dalhousie?
- Can we get bathymetry from DFO?
- Can we get river/met algorithm from DFO?
- Where are the met data coming from? EC GEM? EC 2010 Olympics model?
- Open boundary conditions? Navy Model?
- How assimilation ready is NEMO?
- Is NEMO configured for perfect restart?

Conclusions

Build a state-of-the-art forecasting model coupled to the Venus observing system to improve the ability of government and private sectors to respond to existing and emerging marine hazards on timescales of hours to months (e.g., extreme marine weather, storm surges and coastal flooding, extreme waves and currents, movement of marine pollutants, and the occurrence of oxygen depleted waters) in Strait of Georgia, a region of high importance and known marine environmental risks.