Salish Sea Model Ecosystem - Lower Trophic: Tidally driven nutrient supply to surface waters in the Northern Strait of Georgia

Elise Olson, Susan Allen, Ben Moore-Maley, Doug Latornell
UBC
Background: **Salish Model Ecosystem - Lower Trophic**

**SalishSeaCast** Physical Model (Soontiens et al, 2015)
- NEMO (Madec et al 2012) v3.6 primitive equation, baroclinic model
- GLS vertical turbulence in k-ε regime
- 398 x 898 x 40 grid
  - ~500 m horizontal, 1-27 m vertical
- forcing:
  - tides: 8 constituents
  - atmospheric: hourly 2.5 km resolution from Environment Canada
  - open boundary SSH (west)
  - rivers (150+): climatology except for Fraser measured at Hope
**SMELT Biological Model** – Based on 1-d SOG Model (Olson et al., submitted, 2019; Allen and Wolfe, 2013; Moore-Maley et al., 2016))

- nutrients, phytoplankton, zooplankton, detritus
  - *M. rubrum* is a mixotroph
- mesozooplankton closure based on climatology
- forcing: nutrient input through rivers (climatology) and at open boundaries (climatology + LiveOcean model), light
Model Evaluation: Seasonal Cycles

Hakai Institute, Katie Pocock, and Stephanie King
Discovery Passage Tidal Jet and Nitrate Plume
results in:

Elise M. Olson, Susan E. Allen, Vy Do, Michael Dunphy, and Debby Ianson, 2019. Nutrient Supply by a Tidal Jet in the Salish Sea Based on a Highly Resolved Biogeochemical Model. Submitted to *JGR: Oceans*. 
Conclusions: Northern Nitrate

• Strong tidal flow in Discovery Passage leads to a southward pulse of nitrate in surface waters

• Downstream, increased stability and reduced velocities (greater residence times) lead to greater phytoplankton biomass and new production

• Regions of tidally enhanced mixing may increase local ecosystem resilience to anthropogenic forcing

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