



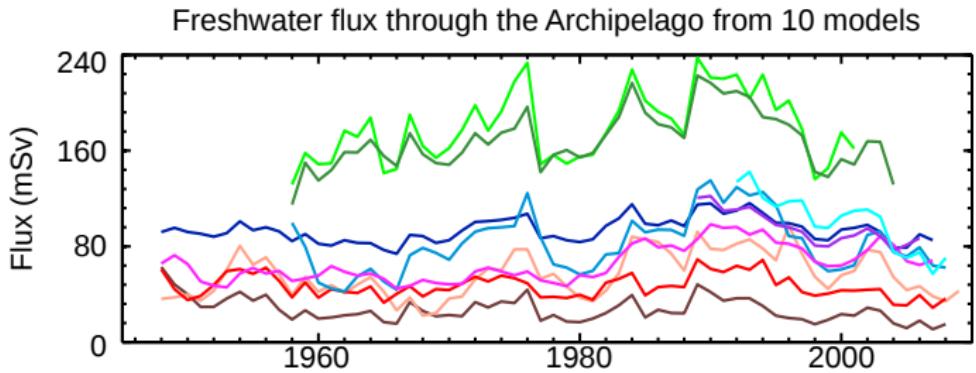
Small-scale ocean processes within channels in the Canadian Arctic Archipelago

Ken Hughes

SEOS Student Workshop

November 9, 2016

Large-scale flow estimates disagree



Jahn et al. (2012)

Past observations indicate strong mixing

Rationale

Processes

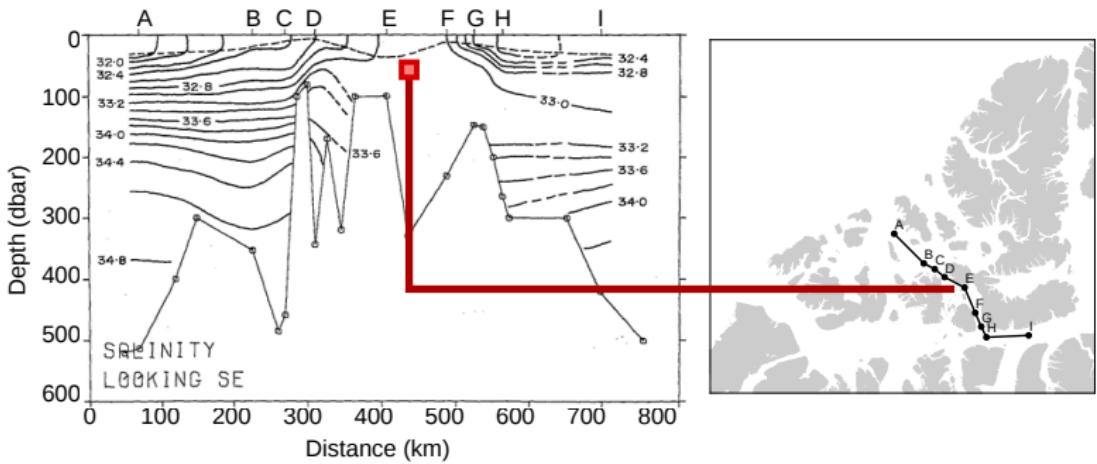
Approaches

Existing model

Observations

Process modelling

Conclusions



de Lange Boom et al. (1987)

Several processes control throughflow

Rationale

Processes

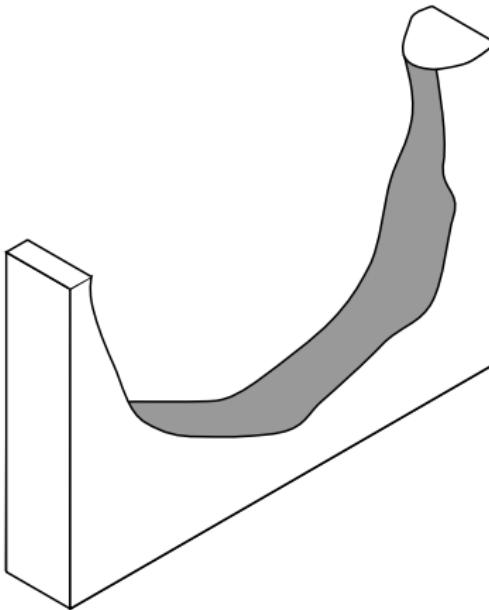
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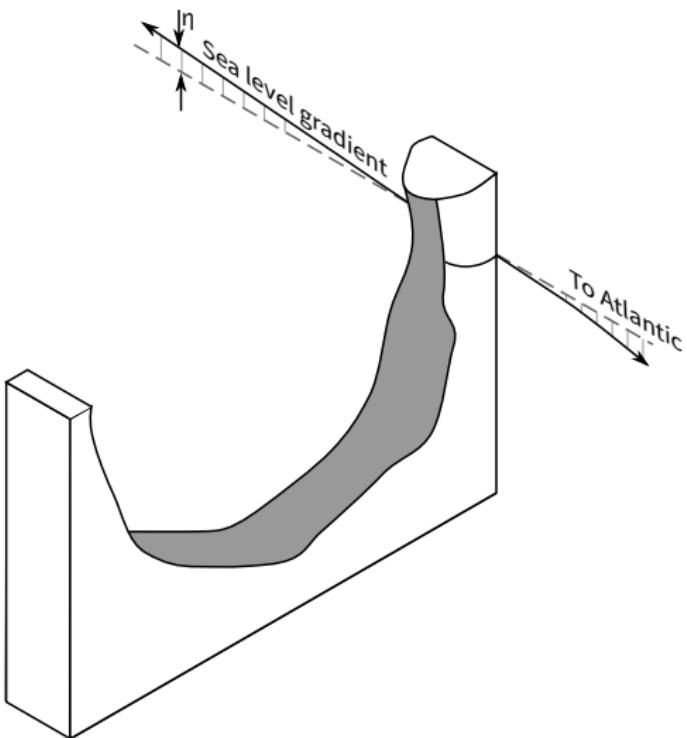
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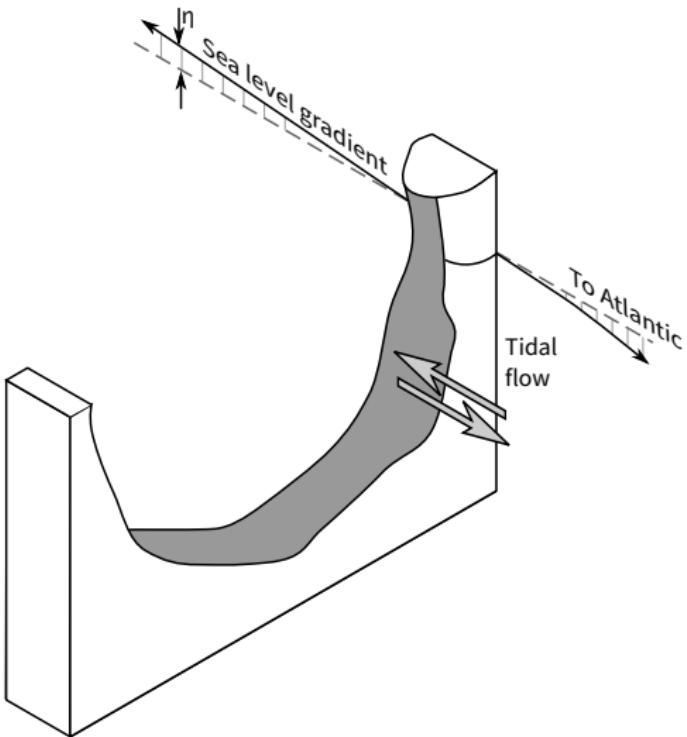
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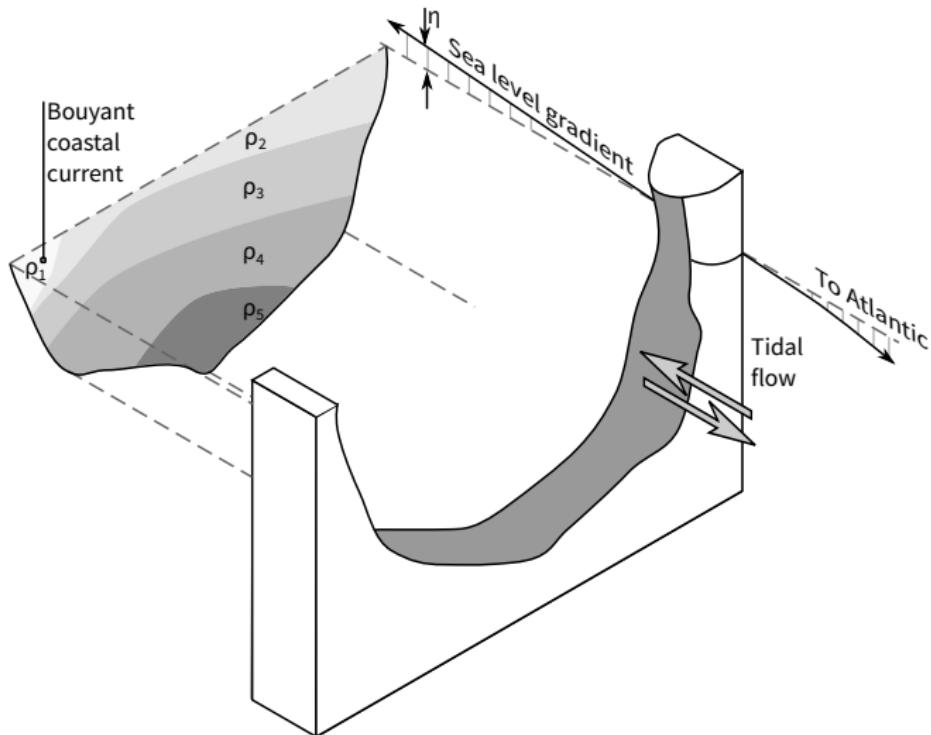
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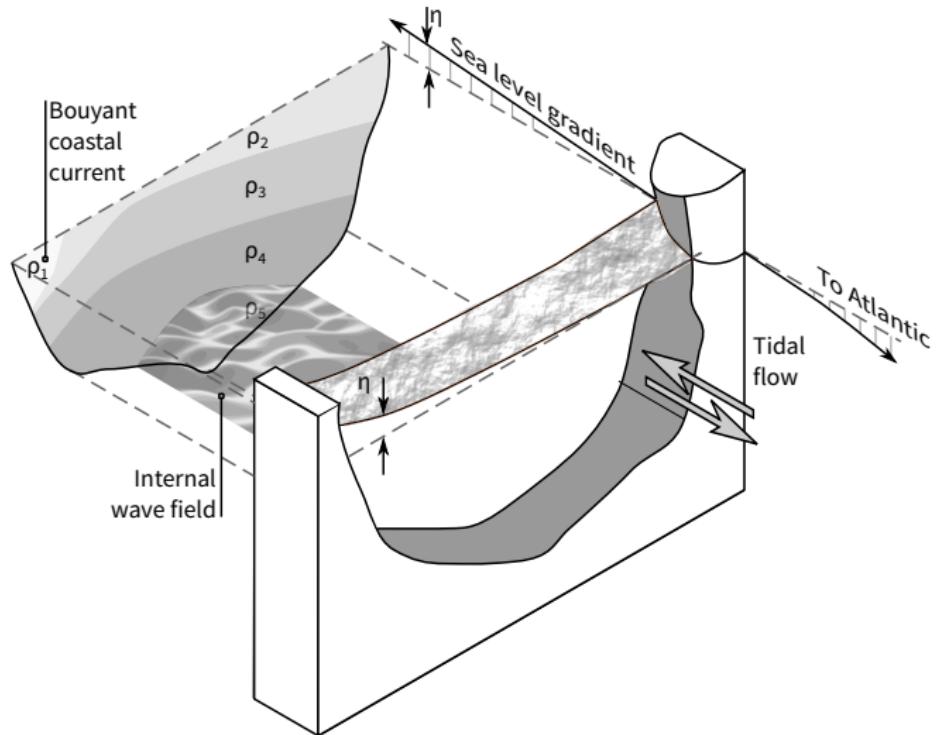
Several processes control throughflow

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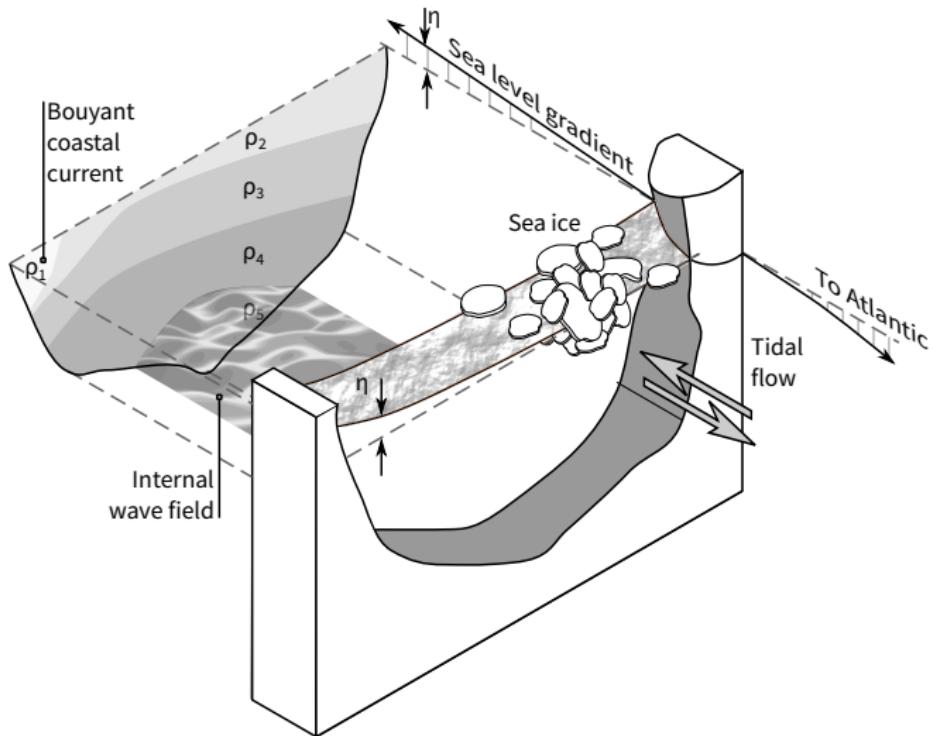
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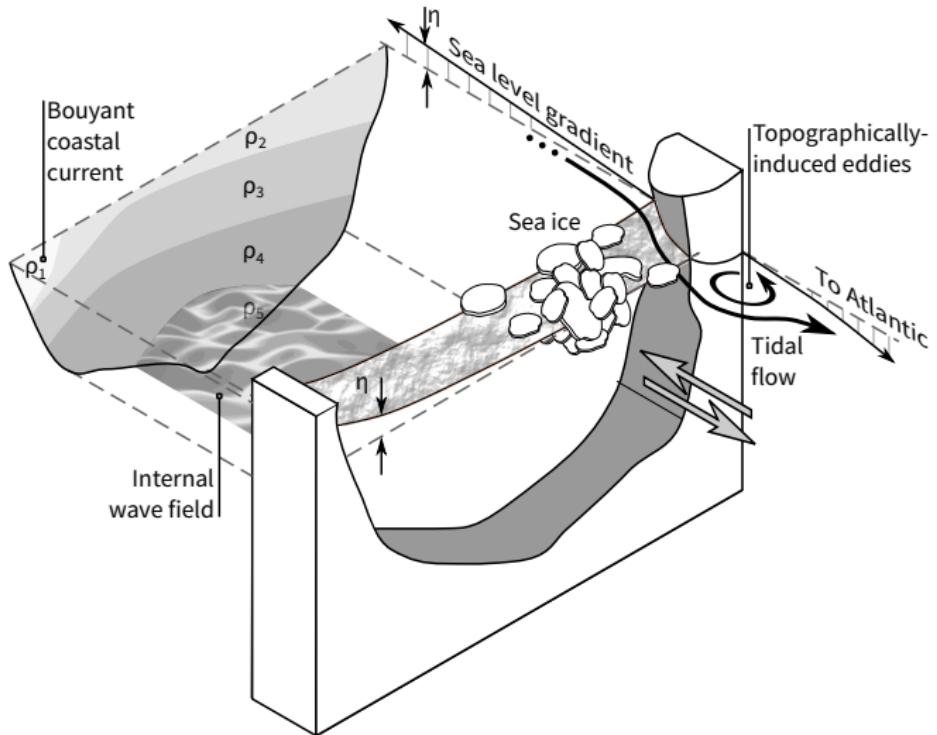
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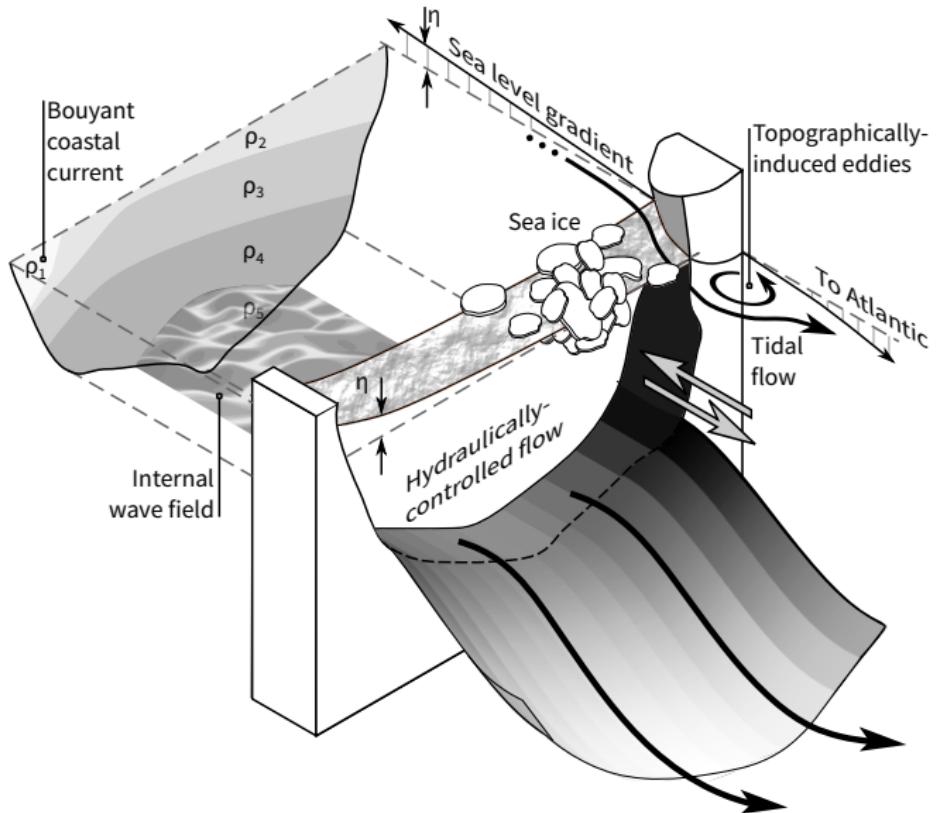
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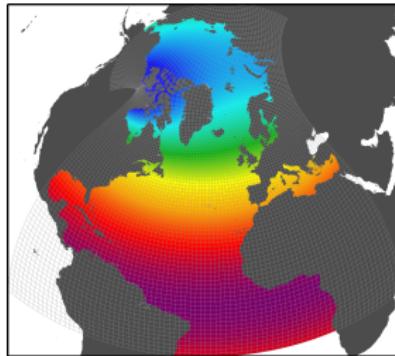


Several processes control throughflow

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Examine an existing model



knossos.eas.ualberta.ca

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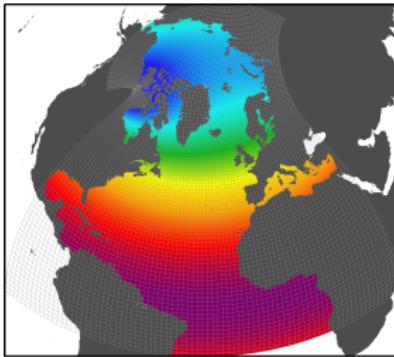
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Three approaches

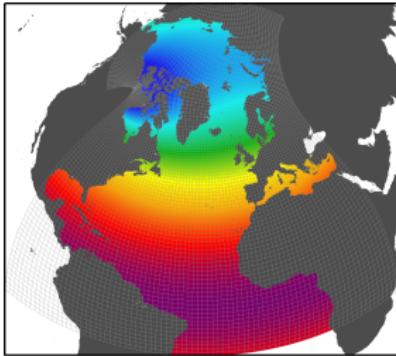
Examine an existing model



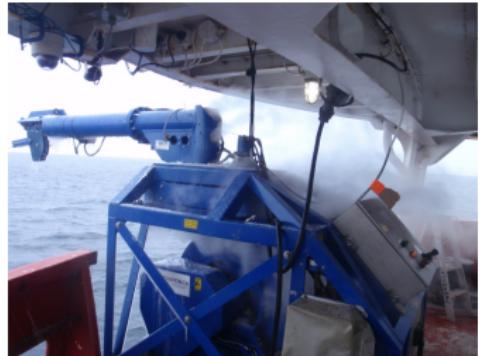
Take new observations



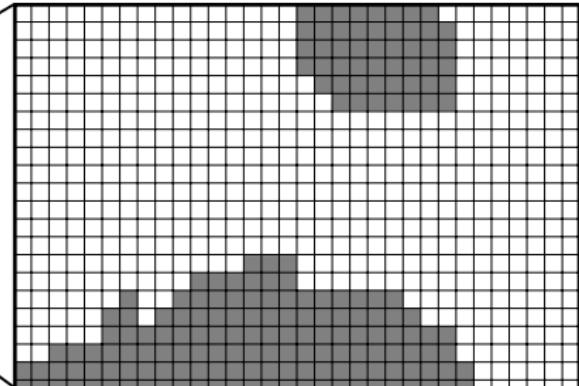
Examine an existing model



Take new observations



Process-oriented modelling



Estimating mixing: An inverse method

Rationale

Processes

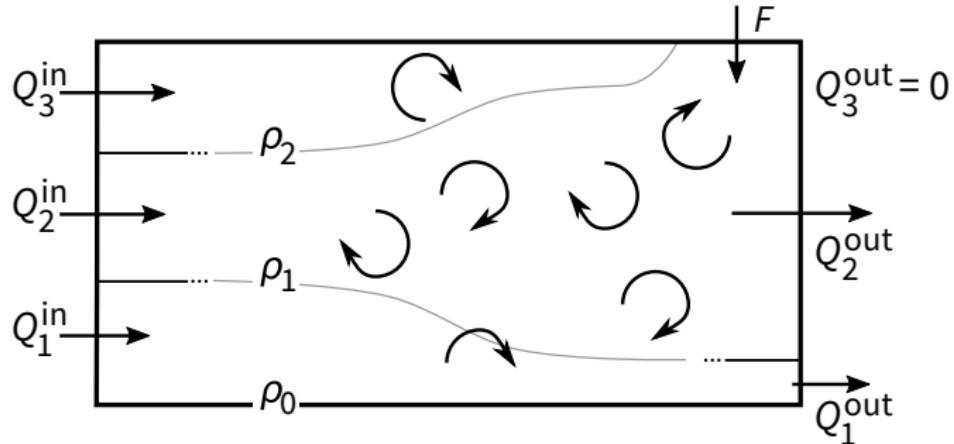
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Strong water mass modification

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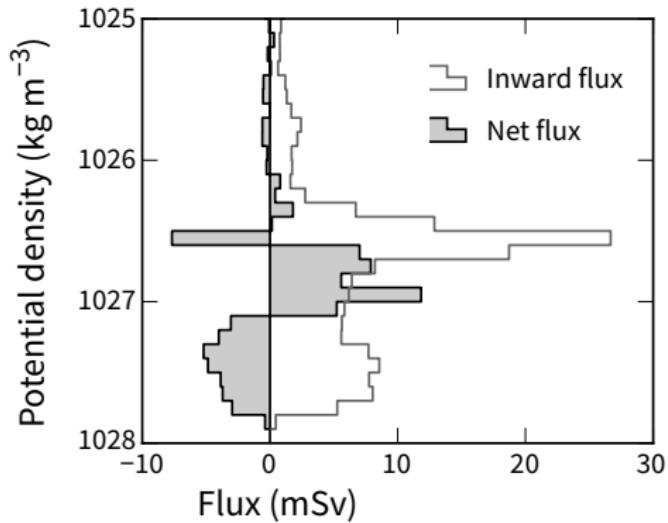
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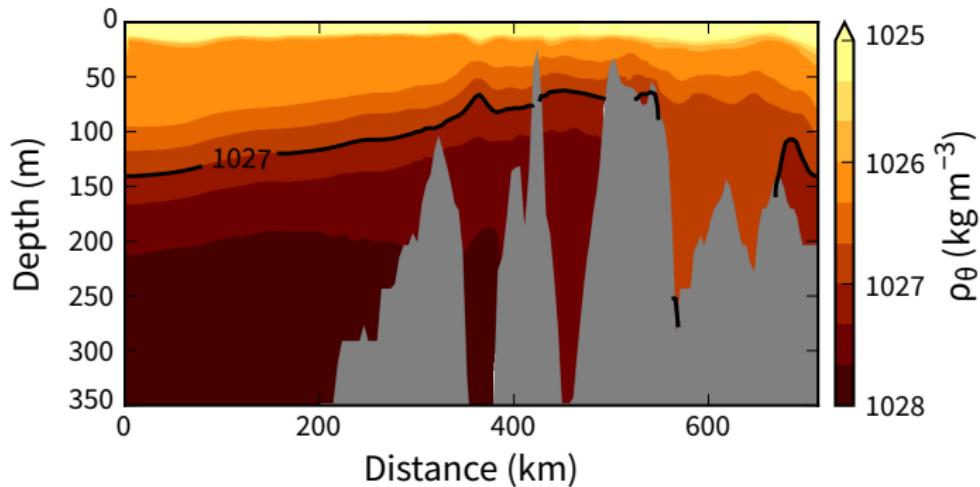
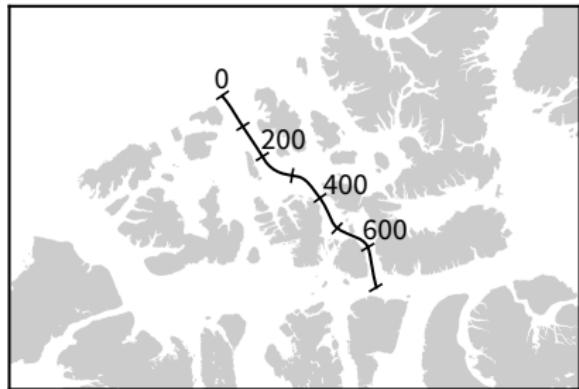
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Transport changes in Queens Channel



Deep fluxes require mixing

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Mixing linked to bathymetry

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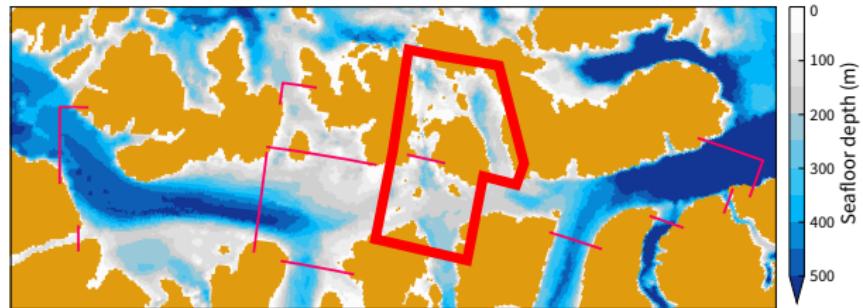
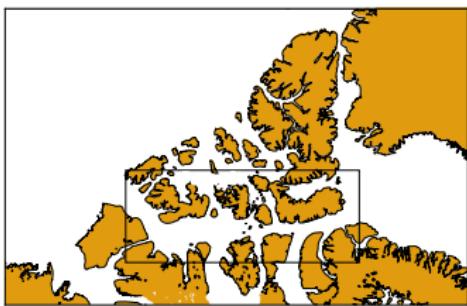
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Mixing linked to bathymetry

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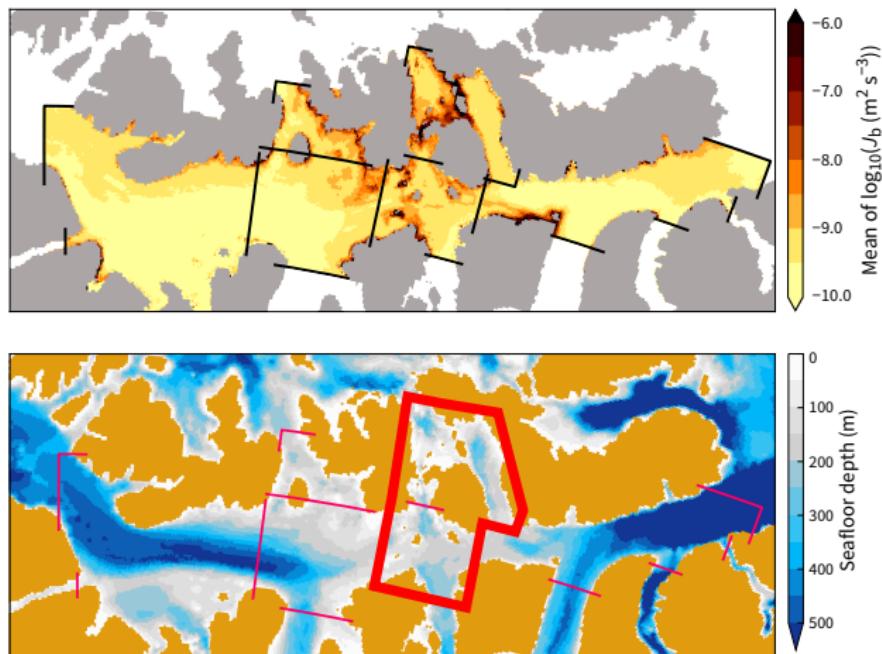
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The MVP: moving vessel profiler

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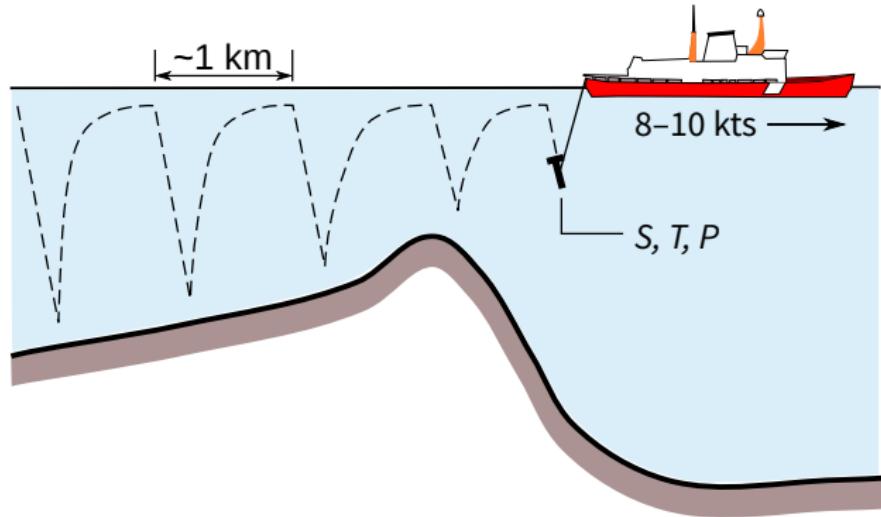
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An abrupt transition in properties

Rationale

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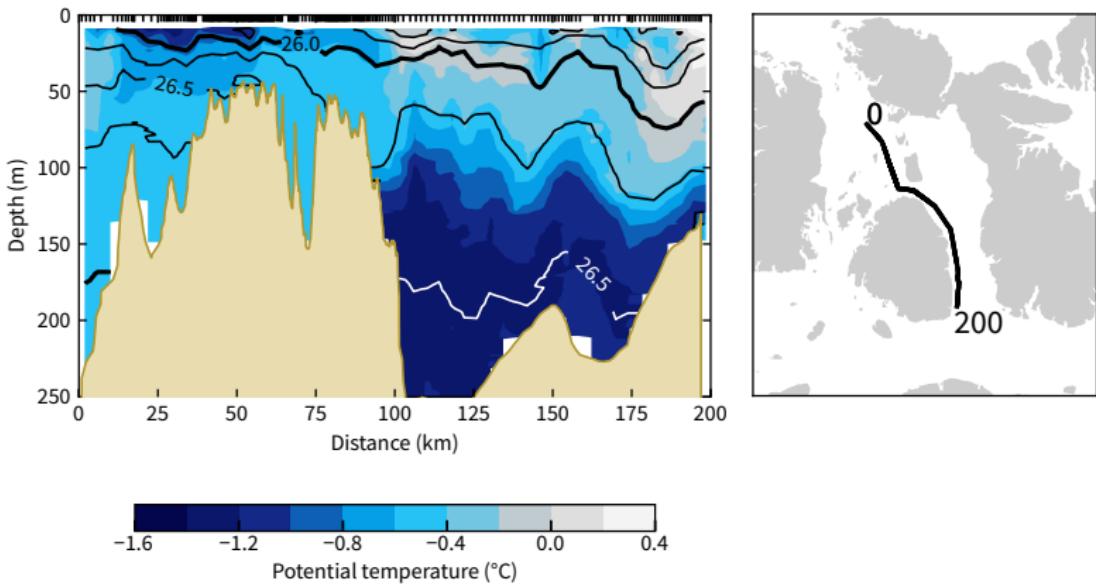
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An abrupt transition in properties

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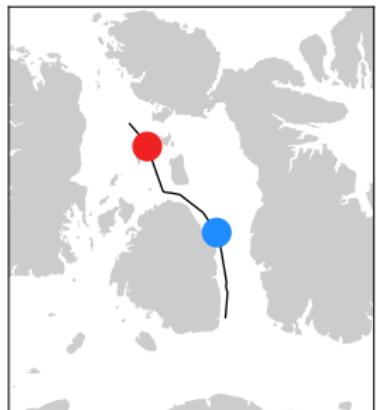
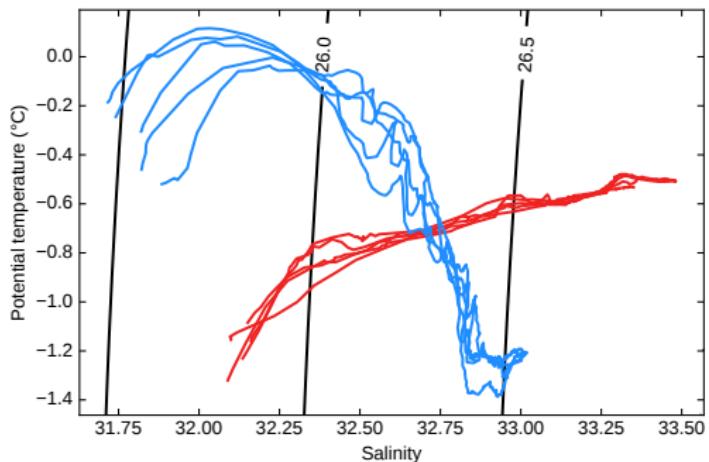
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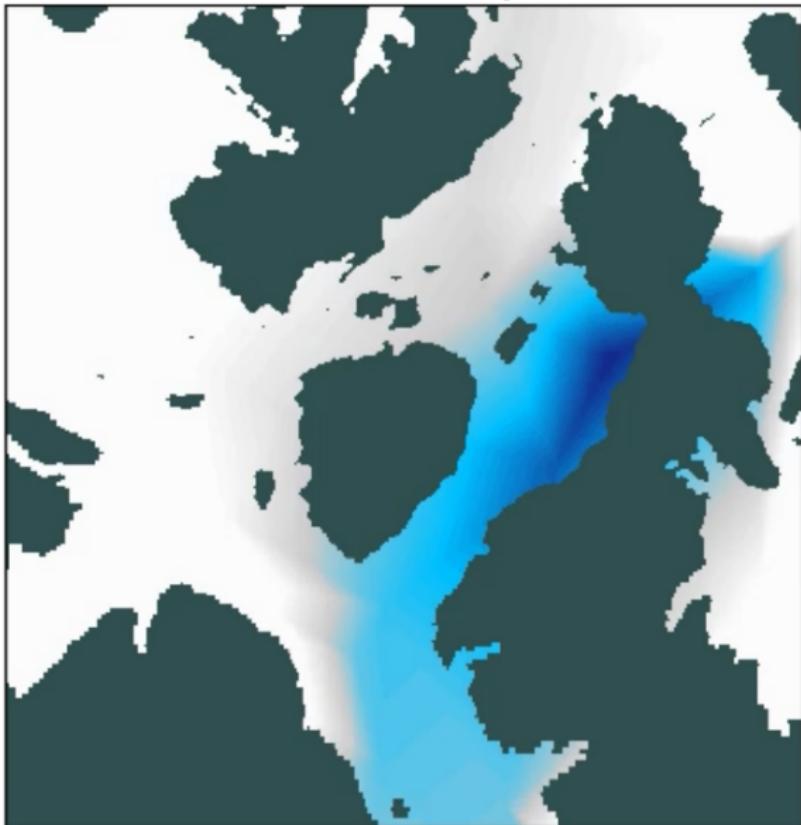
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Process modelling: Surface density

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Time = 0.0 days



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- Identify and quantify mixing with a large-scale model
 - Observe Pacific–Atlantic Water transition
 - Create a working model to complement observations

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Ocean processes in channels

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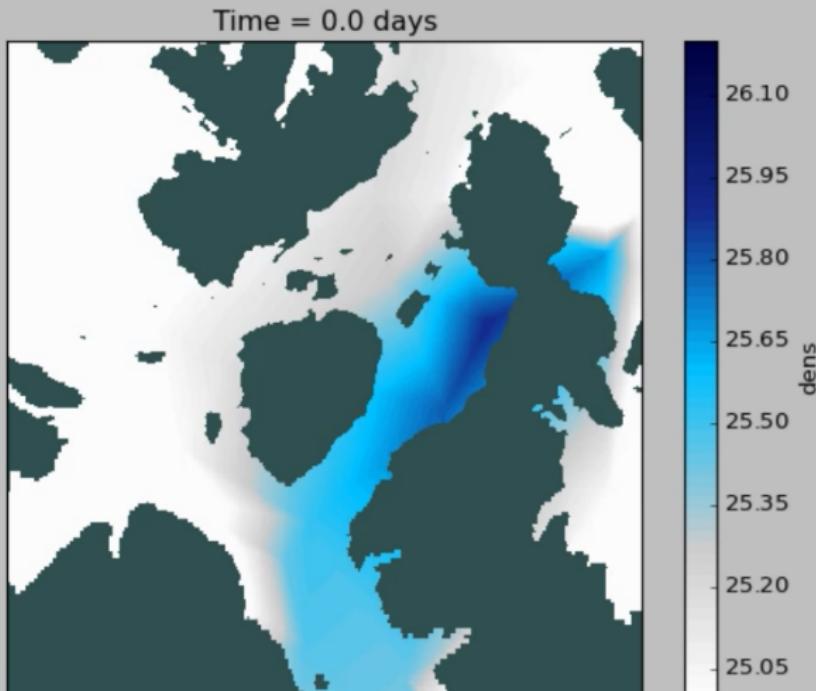
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Surface density snapshots

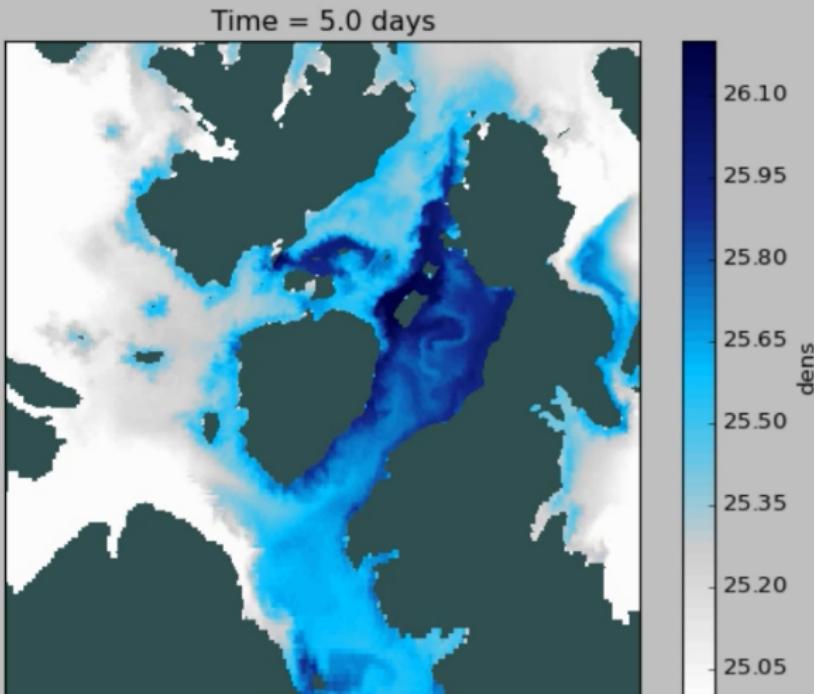
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Surface density snapshots

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Surface density snapshots

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Time = 20.0 days

