An application of plume theory to asses impacts of subglacial discharge on glacier melting

Satoshi Kimura[1], Paul Holland[1], Adrian Jenkins[1] and Matthew Piggot[2]
[1]British Antarctic Survey,
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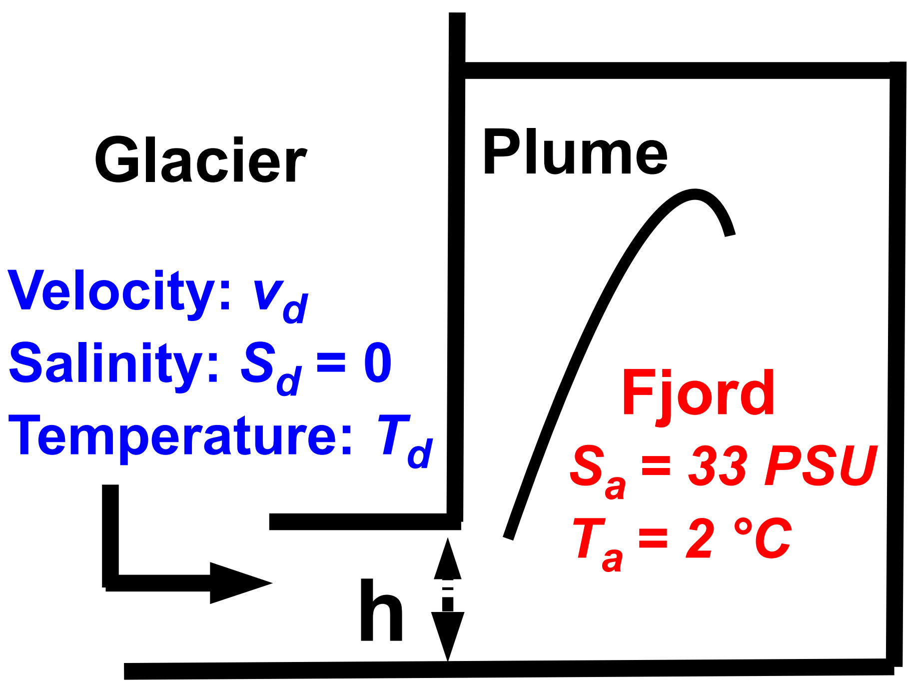


Key physics

1. meltwater feedback
2. buoyant jet

Tools

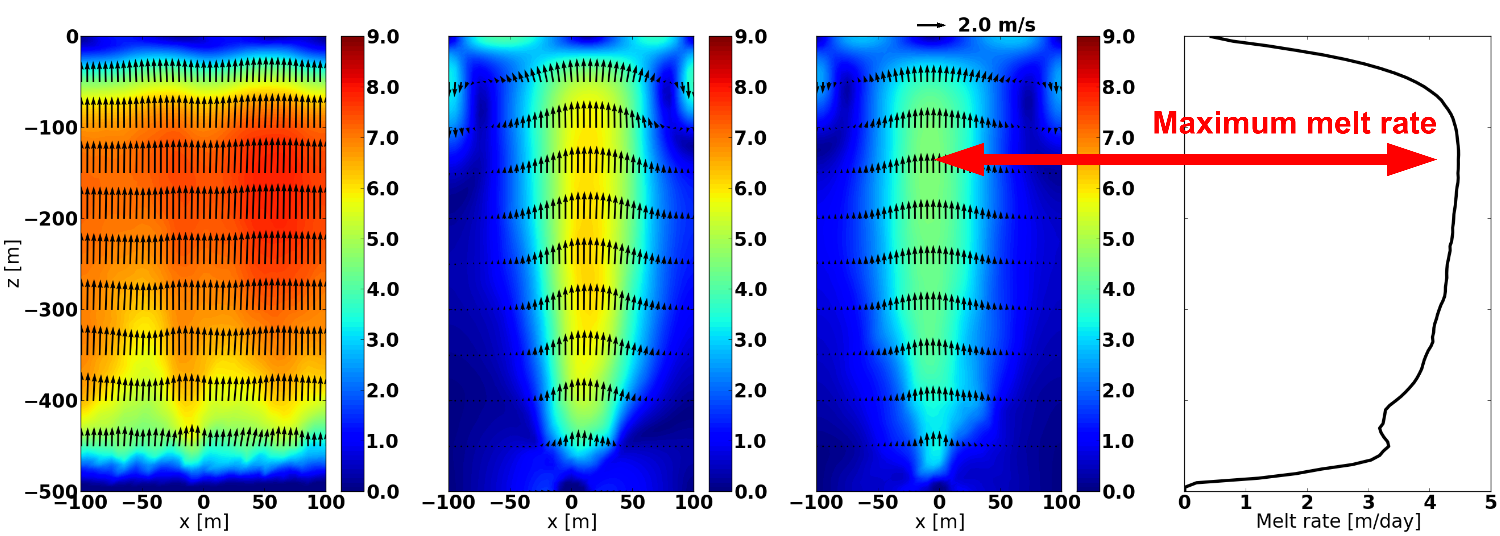
3D-unstructured, finite-elemet ocean model

Depth = 500 m
Width = 200 m
Length = 2000 m
h = 10 m

Fix the volume flux of subglacial discharge and change the channel size

Distribution of melt rate [m/day], viewing from the ice face

Volume flux = 20.0 m^3/s



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width = 200 m
height = 10 m

Point source
Width = 20 m
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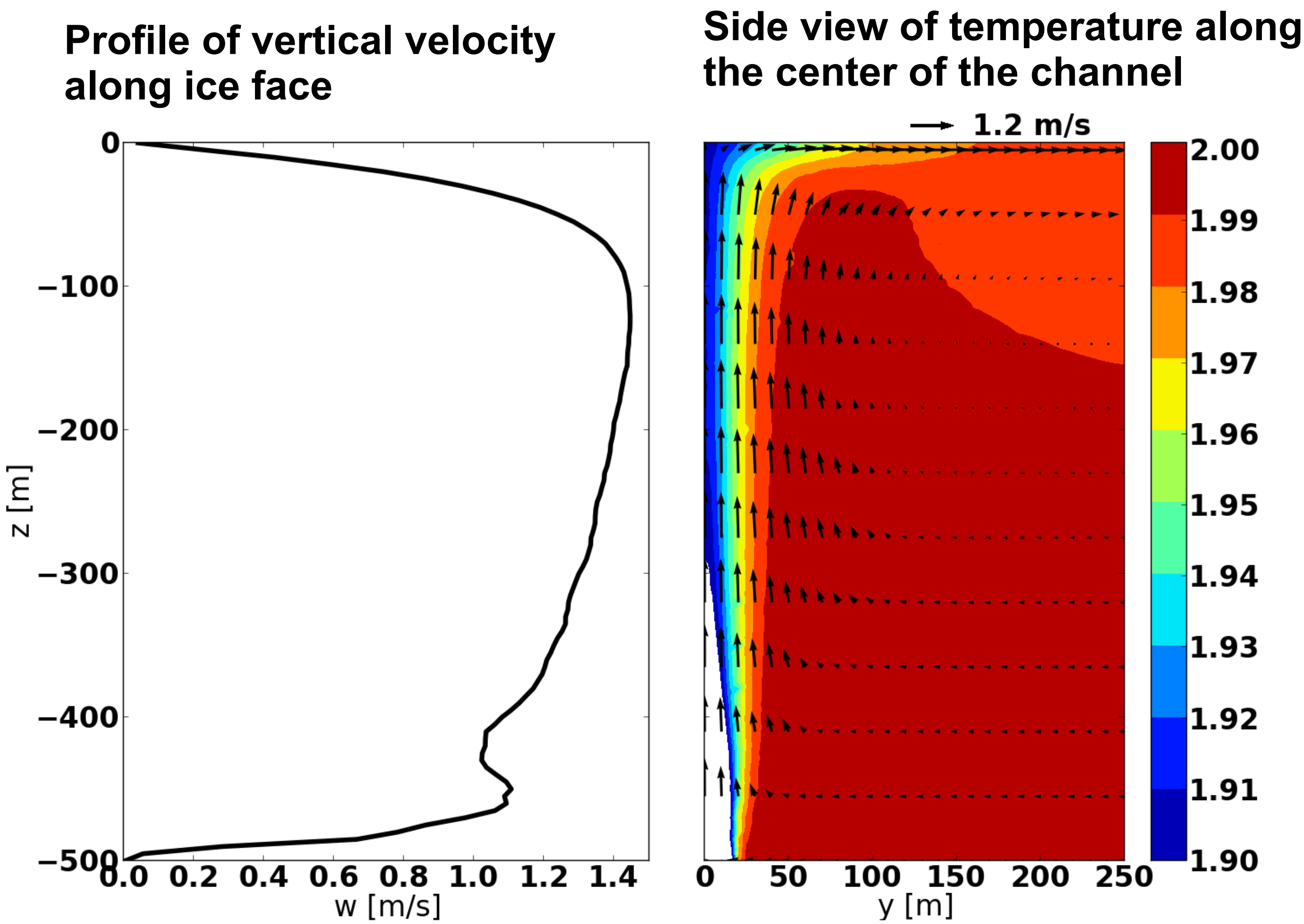
Side view


Profile of vertical velocity along ice face
Side view of temperature along the center of the channel
1.2 m/s
0
−100
−200
−300
−400
−500
z [m]
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4
w [m/s]
0 50 100 150 200 250
y [m]
2.00
1.99
1.98
1.97
1.96
1.95
1.94
1.93
1.92
1.91
1.90

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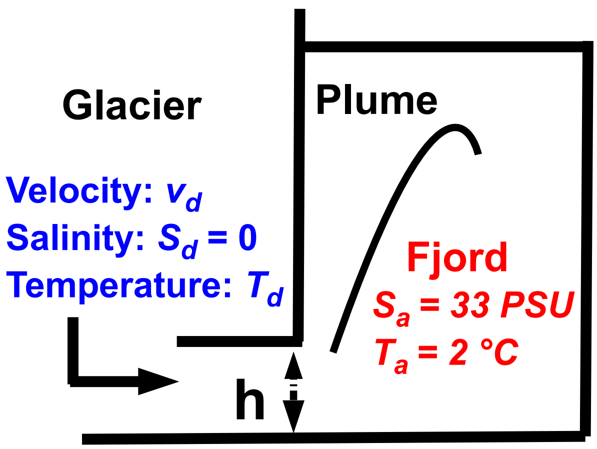

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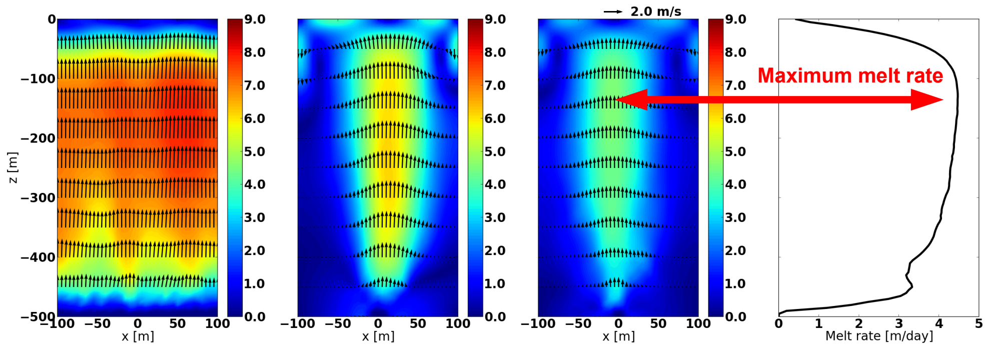

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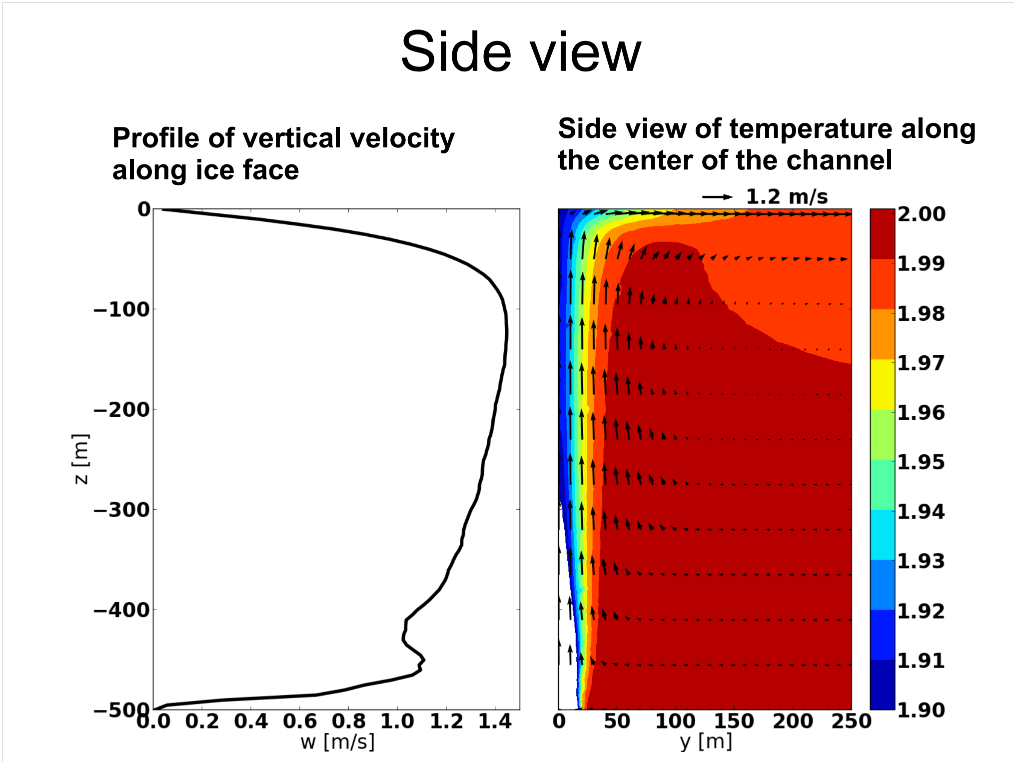
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