3D Ice Sheet Modelling of Shirase Drainage Basin

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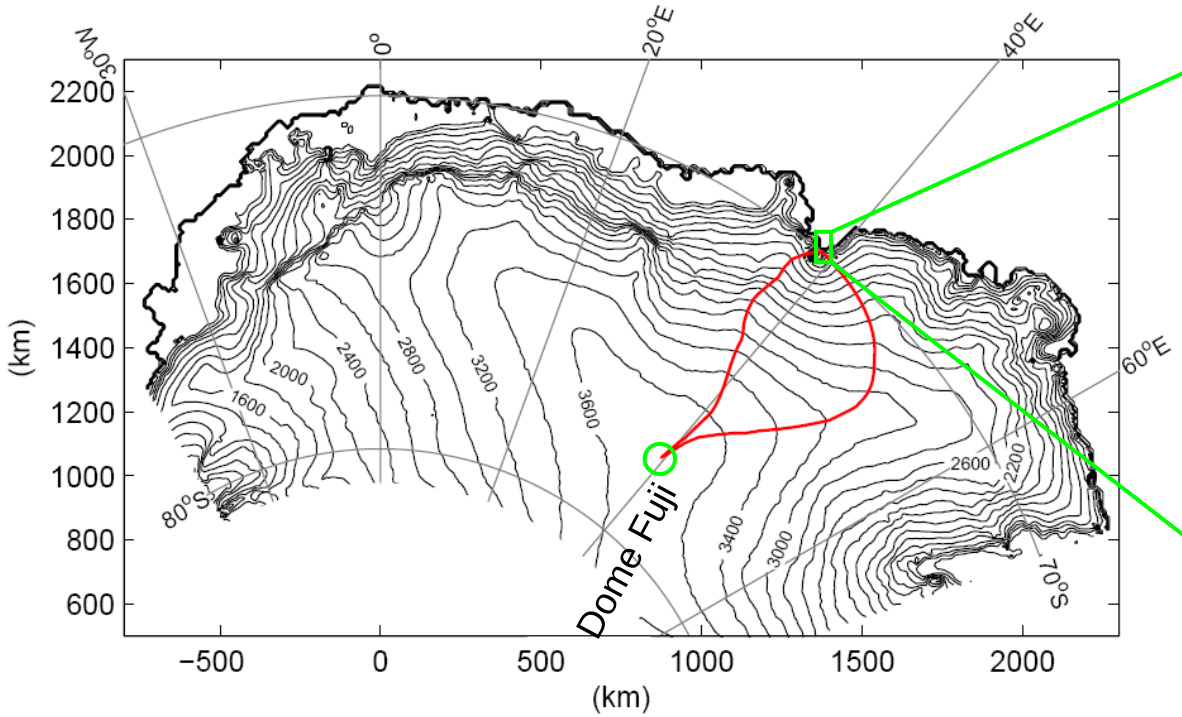
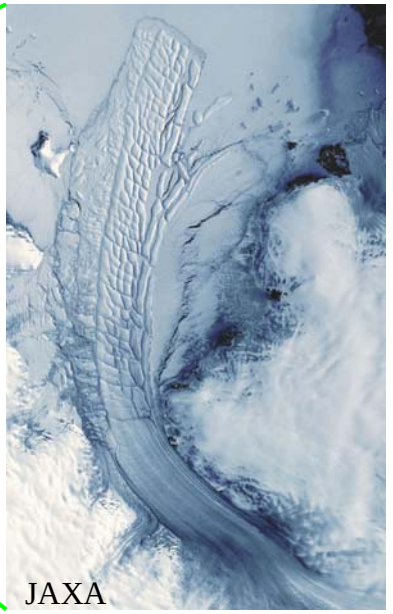
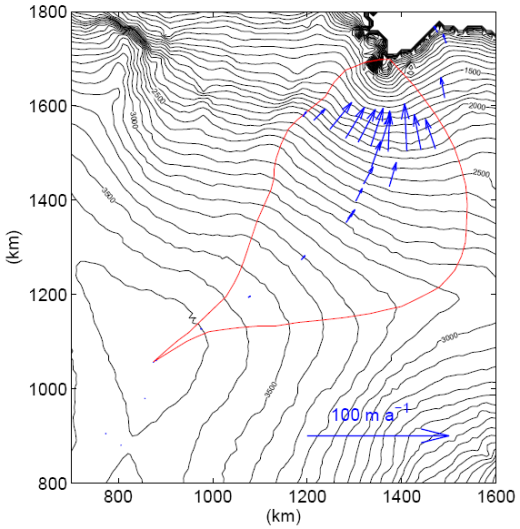
1. Introduction
2. Model
3. Preliminary results
4. Outlook

Why Shirase drainage basin?



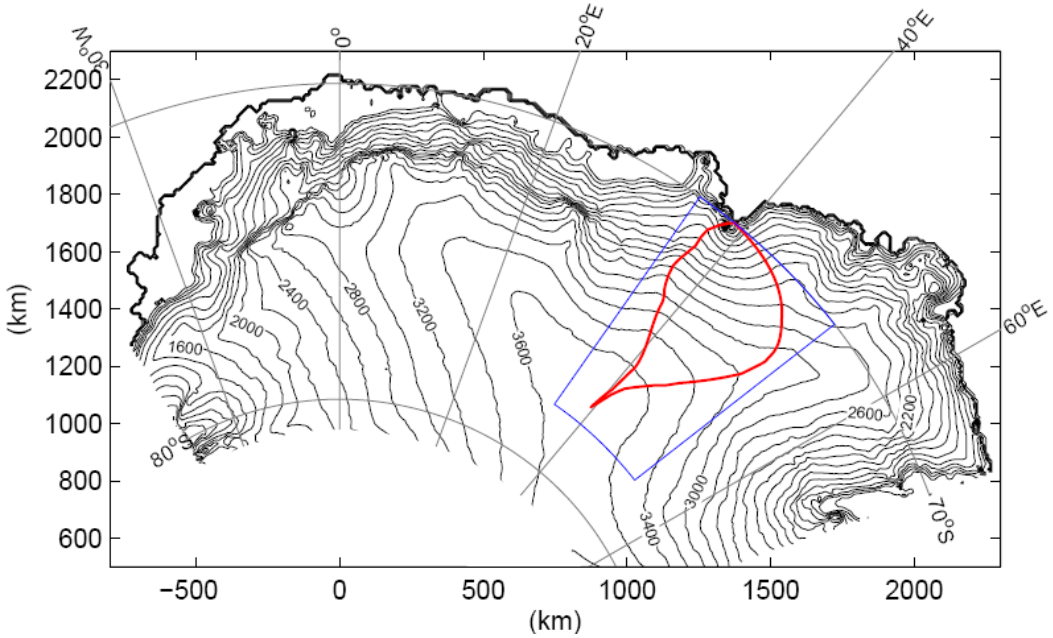


1. Field data corrected over the last 50 years
2. Fast outlet glacier (>2000 m a^{-1})
3. Dome Fuji drilling site
4. Simple geometrical and ice flow feature

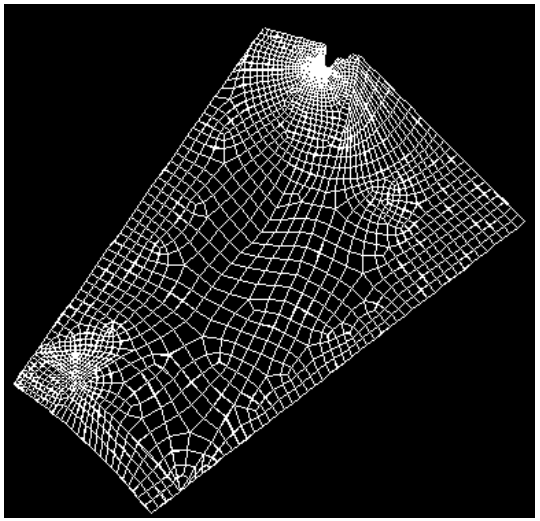


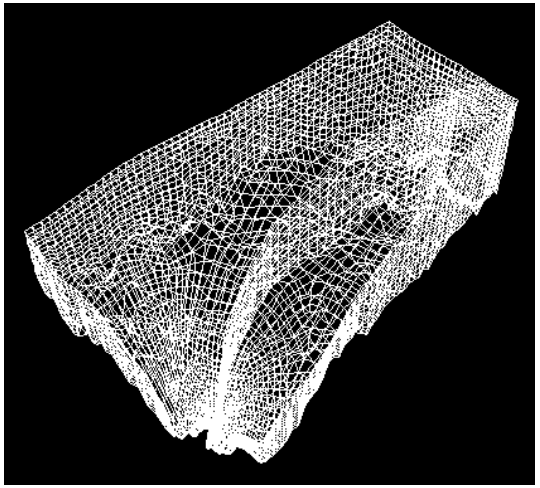
Motoyama and others, 2008

Model



5-20 km resolution FEM mesh



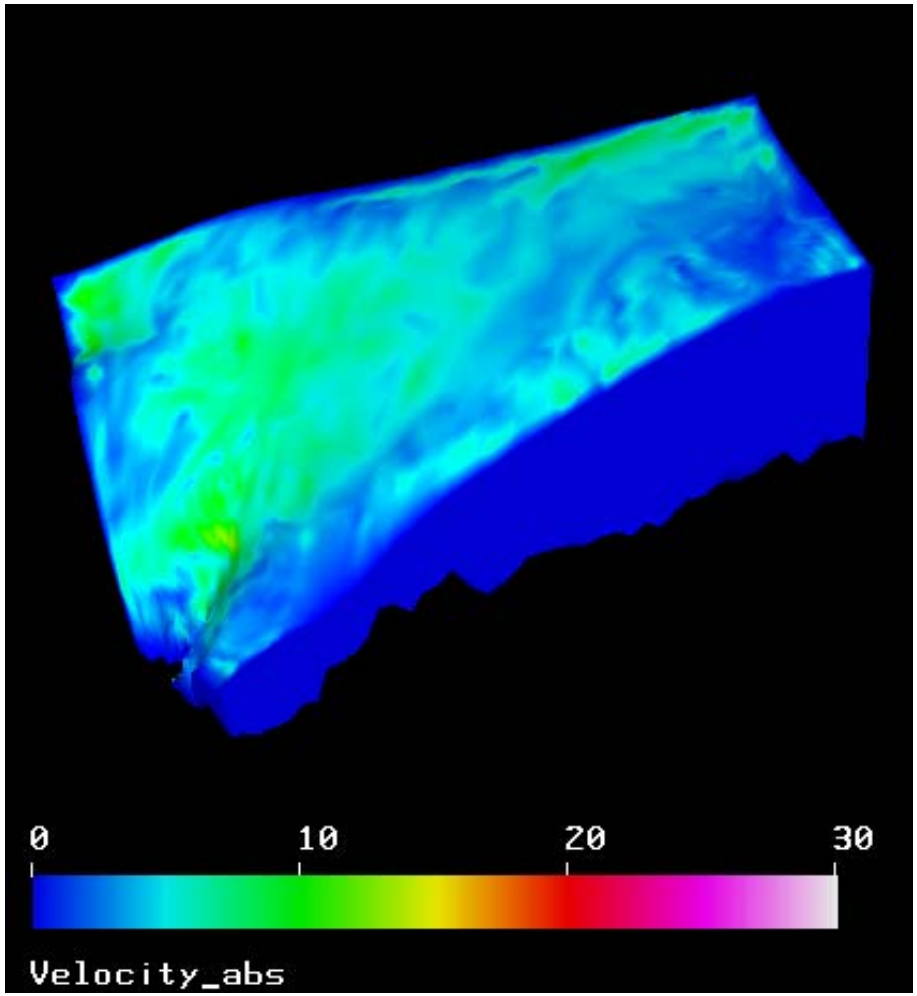


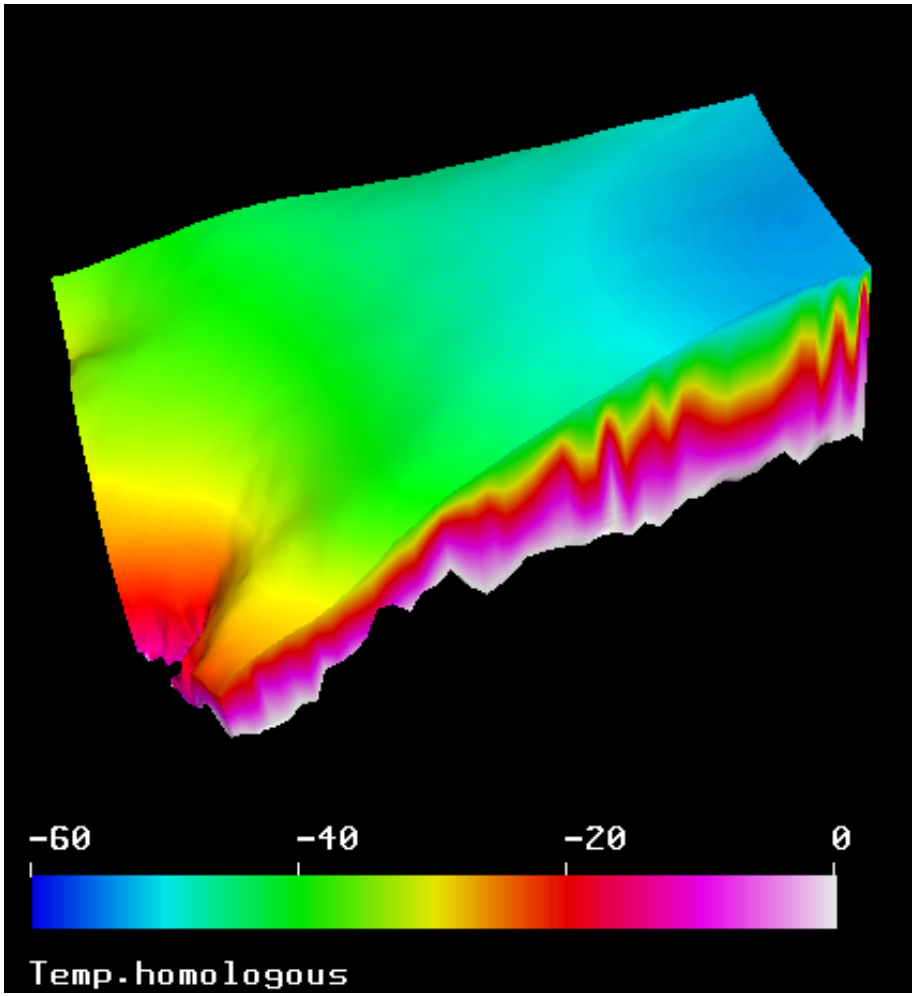
Thermo-mechanical coupling problem

Elmer/ Ice (Finite element solver)

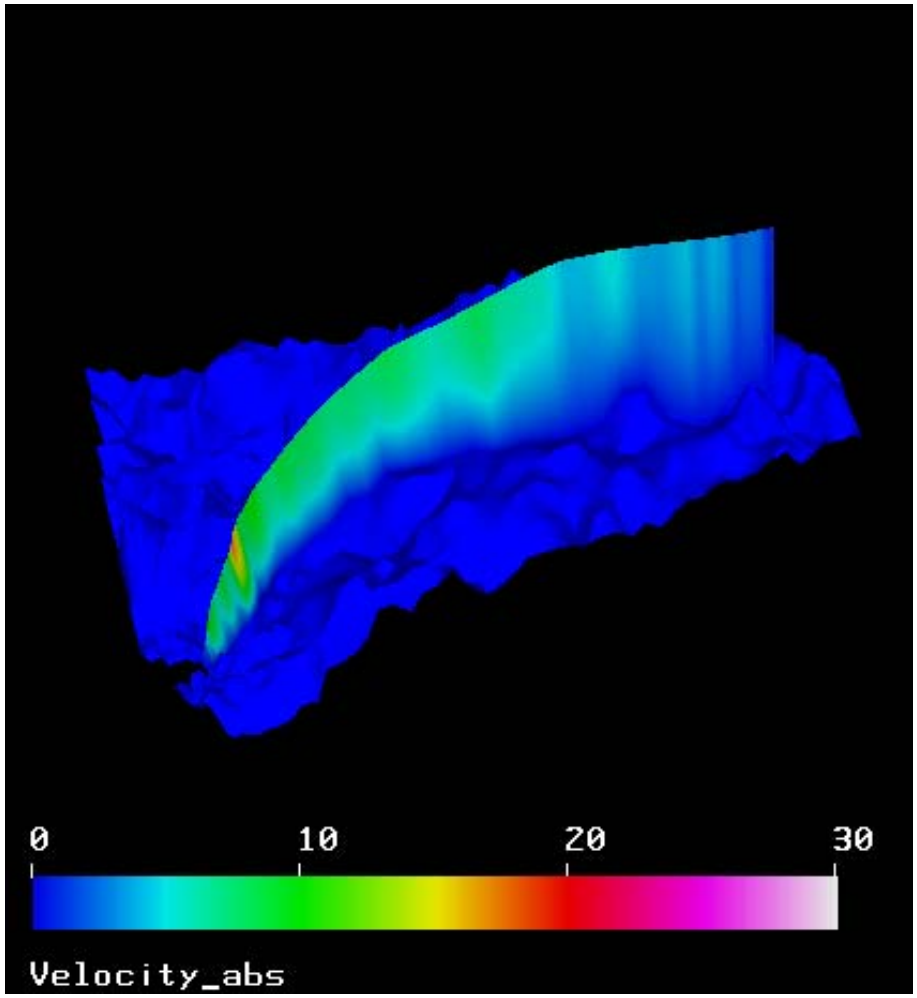
Ice flow speed / Temperature

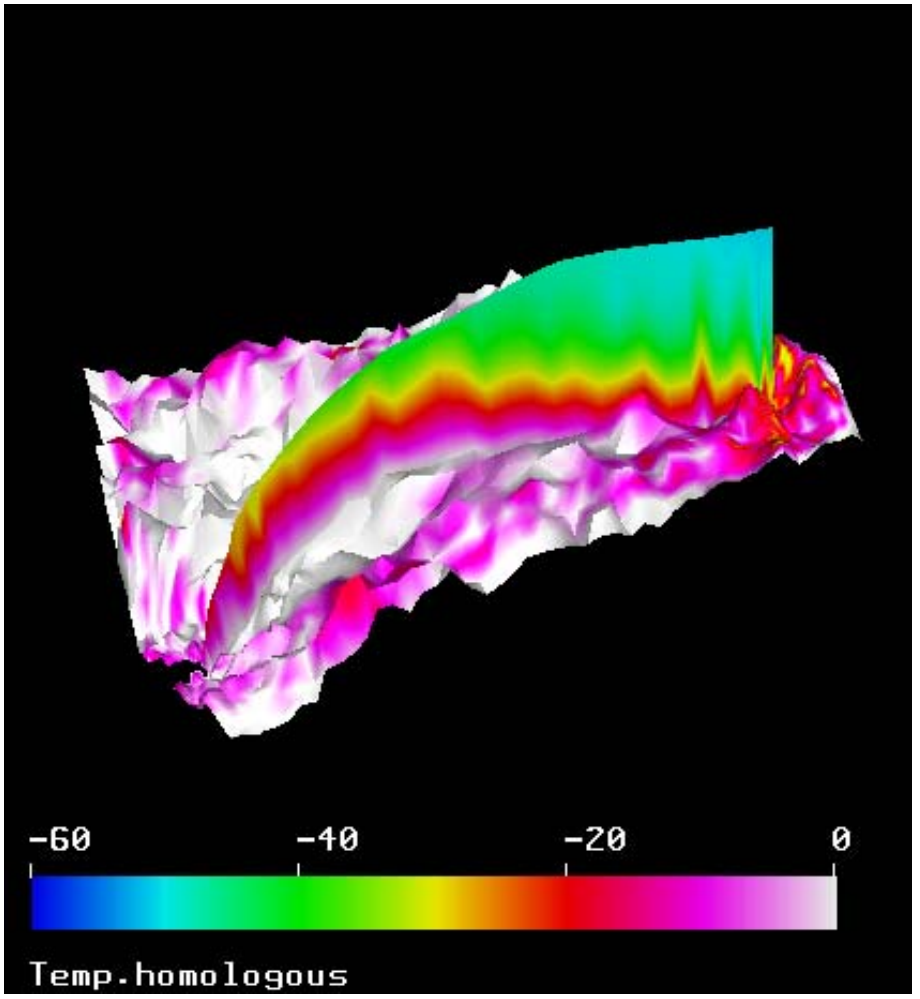
Model output – flow speed / temperature –



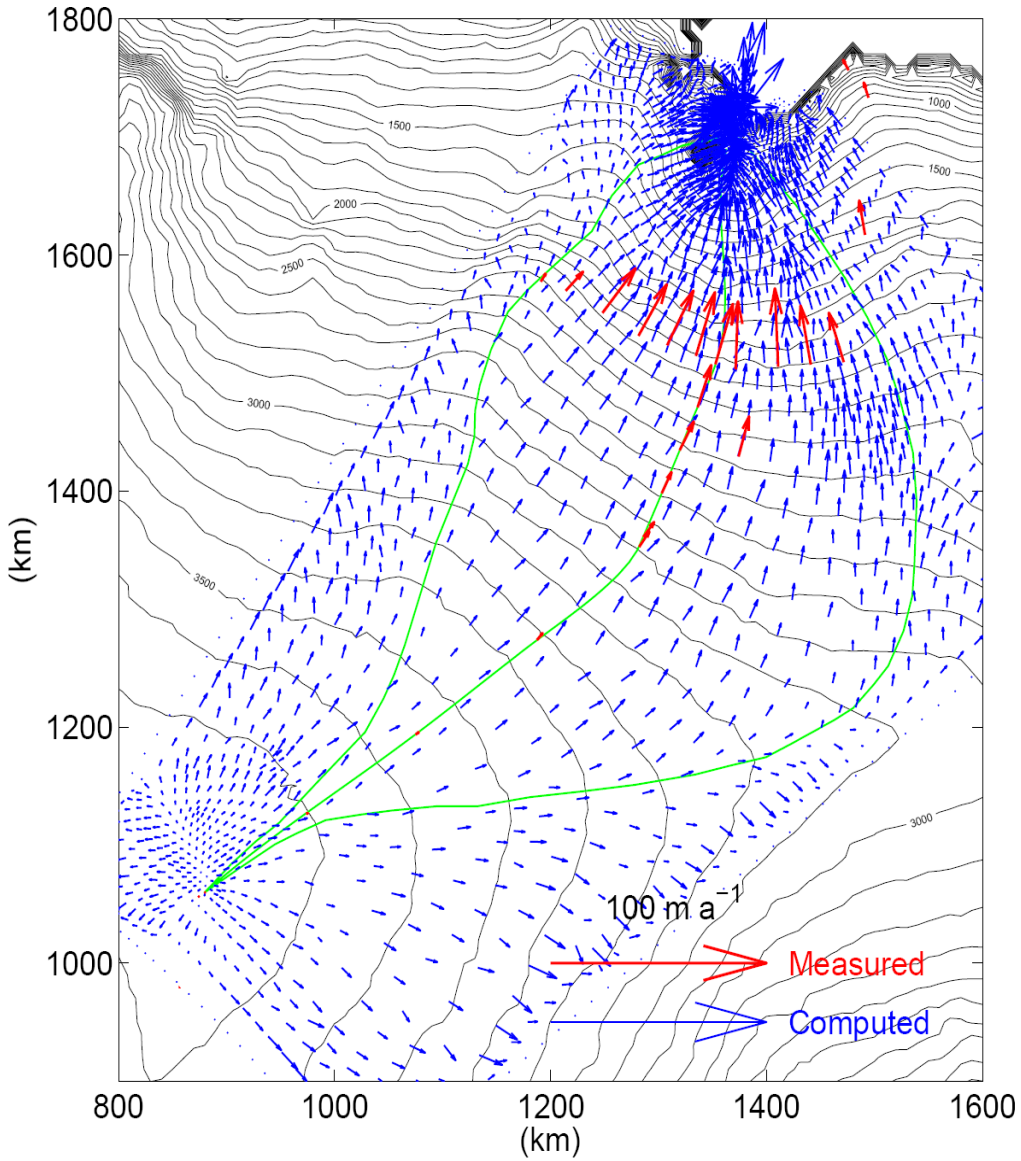


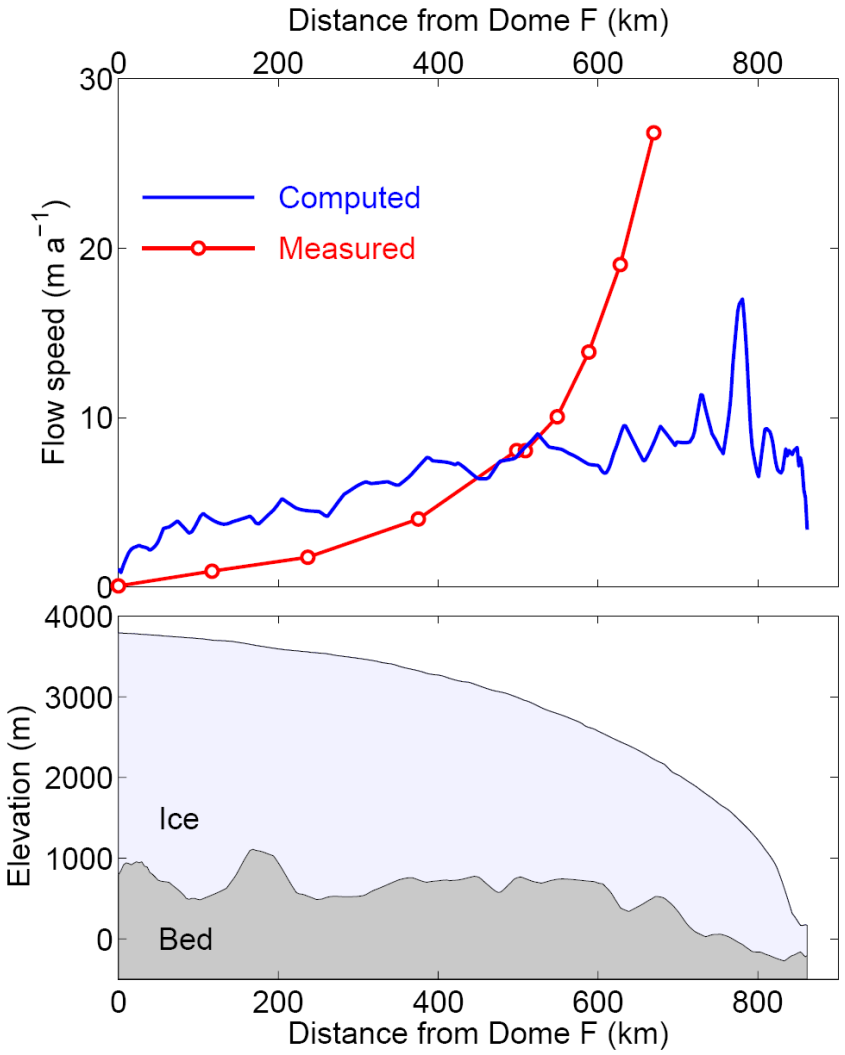
Model output – flow speed / temperature –





Computed and measured surface flow speed





Outlook

1. Model improvement
    - (1) Basal Sliding
    - (2) Bed and surface geometry
    - (3) Ice shelf and grounding line dynamics
    - (4) Prognostic model

2. Use of field data
    - (1) Bed elevation
    - (2) Ice flow speed
    - (3) Accumulation

3. Problems to be solved
    - (1) Regional response of the ice sheet to changing climate
    - (2) Dynamics of the fast flowing glacier
    - (3) Influence of Shirase glacier dynamics to Dome Fuji