

# Comparing velocity profiles of Byrd glacier with a simple 2D flow model

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Velocity profiles of Byrd glacier show a transition from parabolic transverse profile upstream to a plug flow transverse velocity profile. A big change in this velocity profile is observed at the grounding line of Byrd glacier. An explanation for this transition is that the uncoupling of ice from bed and sidewalls is causing the plug flow like behavior. A simple 2D flow model is used to simulate the surface velocity field. The model geometry consists of two parallel plates, representing a simplified top view of Byrd glacier, through which a Non Newtonian fluid flows. The transverse velocity profiles show a similar trend as the field data; a transition from parabolic transverse profile upstream to a plug flow transverse velocity profile. Interestingly enough the transition is taking place as a result of the parallel plates ending, immediately affecting the transverse velocity profiles between the parallel plates. This provides a new insight in the transverse velocity profiles of Byrd glacier; their plug flow like transition is, at least partly, caused by the ending fjord walls or the entering of the ice stream in the Ross Ice Shelf. The ending fjord walls of Byrd glacier affect the transverse velocity profiles between the walls in the same way as the ending plates in the simple model affect the transverse velocity profiles. Uncoupling of the ice itself may be a result from the ending fjord walls.