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Numerical modelling of flow at ice divide triple junctions and comparisons with surface observations and radar layer architecture.

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Ice domes are either axisymmetric, high points along ridges or ridge triple junctions. We use ELMER to model time-dependent isothermal flow near triple junctions solving the full set of mechanical equations. When forcing is purely axisymmetric, an axisymmetric dome is formed. If a three-fold symmetry in the forcing is applied, the axisymmetric dome breaks up into three ridges subtending angles of 120°. The Raymond effect is at its strongest at the dome, and weakens initially as one moves away from the divide along the ridges, but operates over distances many times the ice thickness. A set of experiments where the forcing was not exactly three-fold symmetric (angles of 105°,105°,150°) caused the triple junction to migrate; a steady-position was not found. Initially and locally, the ridges joined the triple junction at 120°, but this evolved into a elongated curved ridge. A futher set of experiments with a combined one-fold and three-fold symmetry in the boundary conditions created a configuration which did not achieve steady state, and where one of the ridges was very weak.

Some comparisons of modelled surface topography and internal layers are compared with data from Summit Greenland, Fletcher Ice Rise and Thyssenhöhe, Berkner Island.