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Simulating European ice sheets through the last glacial cycle

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A thermo-mechanical ice sheet model has been used to simulated the behaviour of last glaciation ice sheets over Britain and Europe by determining the boundary conditions and climatic forcing functions required to make the model ice sheet match the geological evidence of palaeo-glaciological behaviour. The model not only simulates ice sheet extent, form, flow patterns and the relative sea level response to ice sheet loading, but uses a 5-10km grid size to permit detailed comparisons to be made between simulations and geological data, including patterns of erosion, deposition and indicator erratic dispersal. The model also generates ice streams and marginal ice lobes. In many areas, constraints are very strong and indicate clearly the parameter space within which the ice sheet must lie, and permits us to deduce time-dependent glaciological characteristics including thickness, shear stresses, structural organisation, velocities and thermal regimes. Comparisons with geological data are shown, some of which indicate ways in which the ice sheets contrasted with the regimes of the Earth's two modern ice sheets of Antarctica and Greenland.