An ice sheet is a particular type of glacier or dense, year-round mass of ice. What distinguishes glaciers from ice sheets is mostly a matter of scale or size – an ice sheet generally refers to continental scale glaciers.

The two main ice sheets that we consider are the Antarctic and Greenland Ice Sheets. As these ice sheets extend and flow, spreading out from their continental margins, they form ice shelves or floating segments of glacier ice at the ice sheet-ocean interface that are still intact and connected to the main ice sheet on the continental interior.

- Changes in the grounding line (especially grounding line retreat) can cause thinning and extension of the ice shelf, decreasing the buttressing force.
- Decreased buttressing from the adjoining ice shelf can cause acceleration and advance of the ice sheet, possibly leading to ice sheet instability.

**Grounding lines and more importantly the migration of grounding lines, is important for the overall stability of an ice sheet.**

**ICE SHEET/Ice SHELF SYSTEMS**

**Force Analysis**

**Importance of Grounding Lines**

- Analogue models have been sparse in glaciology, but they have the potential to improve our understanding of ice sheets and ice shelves and provide a straightforward way to learn more about specific components of ice sheet/ice shelf systems.
- Analogue models must have dynamic similarity - that is, the analogue must be similar to the natural system in terms of geometry, the forces at play in the system, and for models involving fluids, the rheology of the fluid.

**Description of Analogue Model**

<table>
<thead>
<tr>
<th>Ice Sheets/Sheel System</th>
<th>Analogue Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometry</td>
<td>Ice sheet flowing/grounding from interior of continent towards continental margin, H/L &lt;&lt; 1</td>
</tr>
<tr>
<td>Force</td>
<td>Gravitational driving force, basal drag, lateral drag</td>
</tr>
<tr>
<td>Rheology</td>
<td>Viscosity is on the order of 10^13 Pa * s, density of ice: ocean = 0.9, density of fluid: water = 0.8</td>
</tr>
</tbody>
</table>

**Future Work**

- Simulation of hanging glaciers
- Segmentation of flow (to simulate calving)
- Modification to specific glacier regimes (i.e. changing W:L ratio, angle of ramp, etc.)
- Simulation of subglacial hydrology

**Acknowledgements**

This material is based upon work supported by the National Science Foundation under Grant No. 1261833. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.