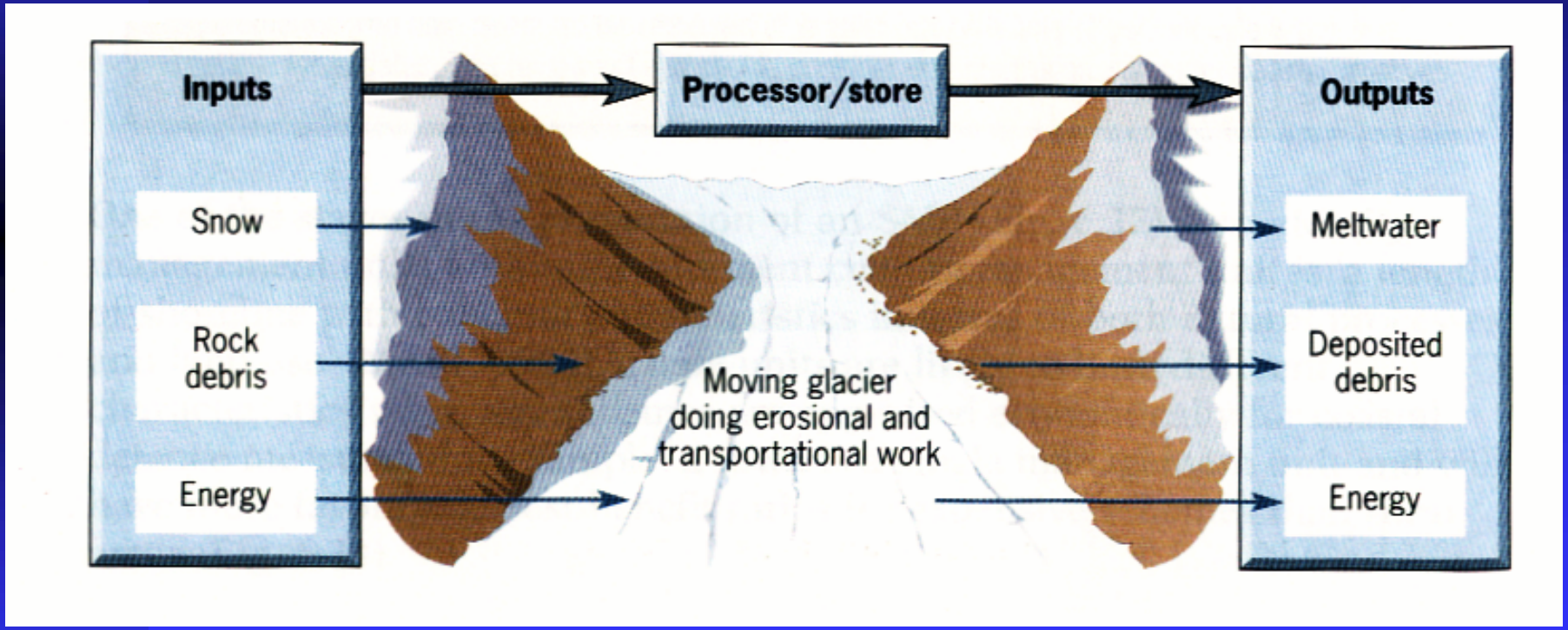
Glaciers as Systems

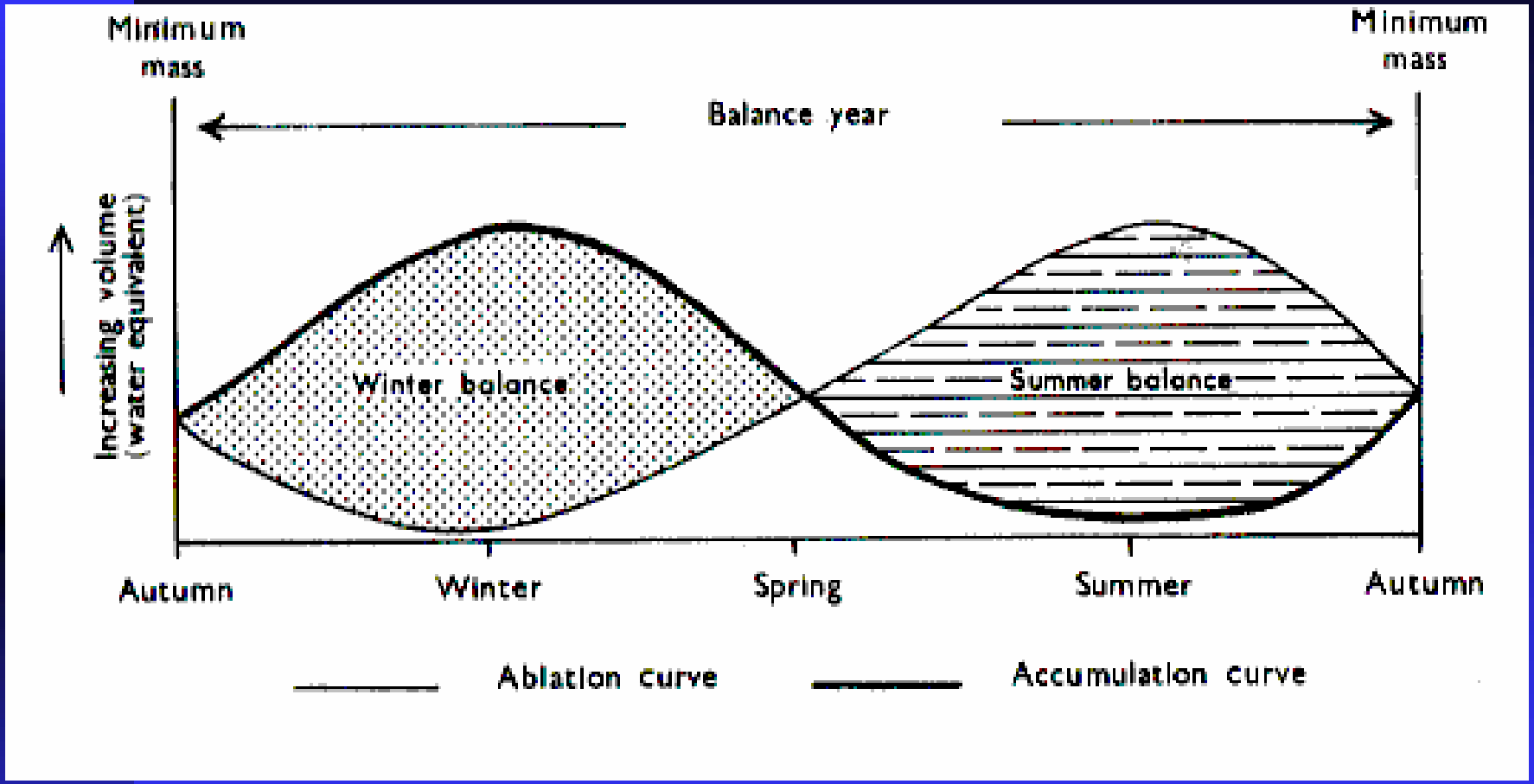
A Glacier as a System



Accumulation

Glaciers are sustained by the accumulation of snow in their upper reaches (accumulation area). This photo of a snow pit indicates one year's accumulation of snow (c. 6 m) in the upper part of the Juneau Ice field, Alaska.

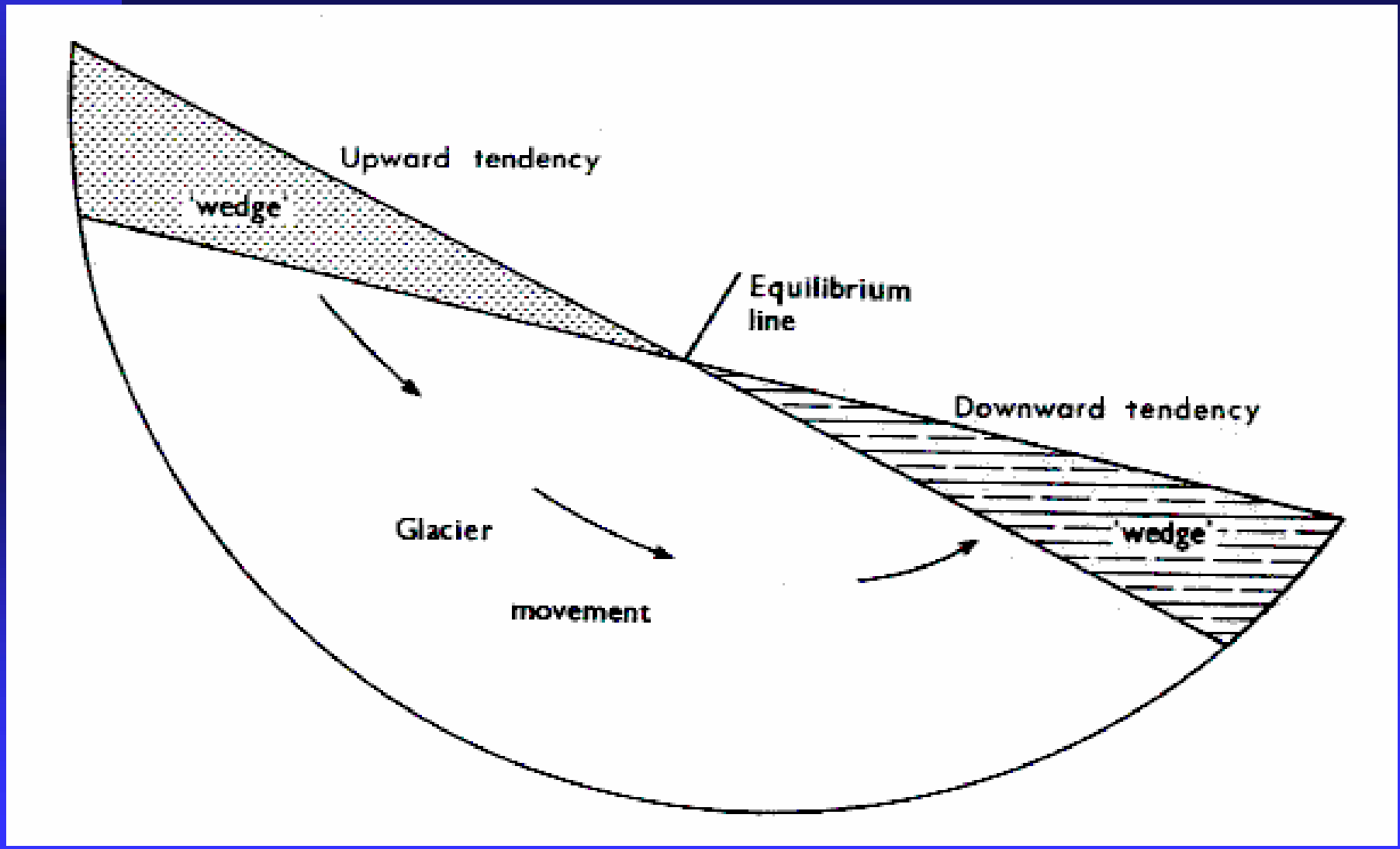
MASS BALANCE



The curves of total accumulation and total balance define an annual mass balance. The winter balance is positive and the summer balance is negative. If the two areas between the lines areas are equal, the annual balance is zero.

Inputs, Flows, Outputs and Stores.

An idealised glacier with net accumulation “wedge” above net ablation “wedge” below the equilibrium line. Glacial flow is necessary in order to maintain equilibrium.



Snow fields (an accumulation zone) above Mer de Glace


Ablating Ice

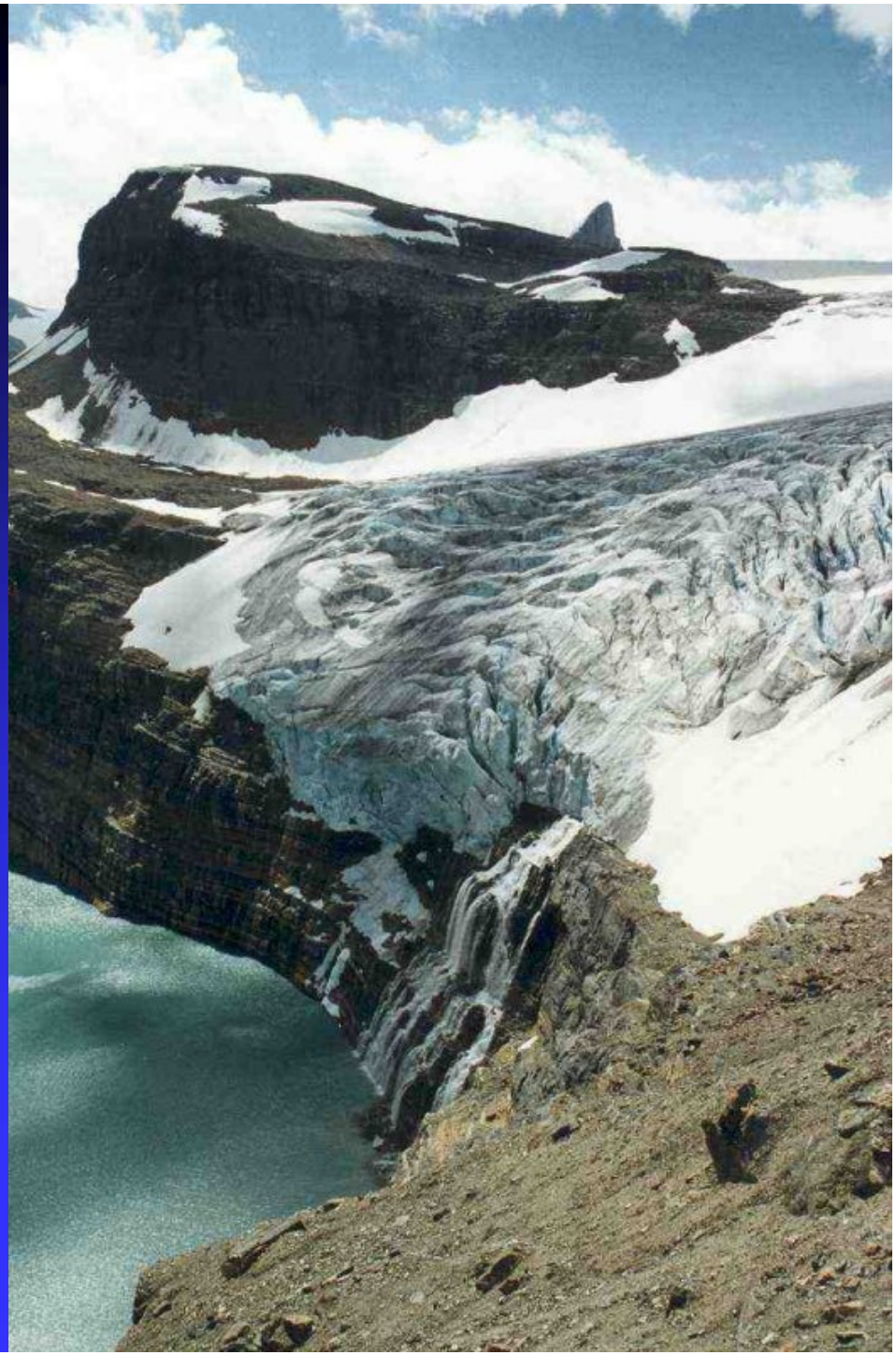
What is the difference between the firn line and the equilibrium line?

The **firn-line** is the snow-line or the uppermost line on a glacier, below which the previous winter snowfall melts during the ablation season of the summer.

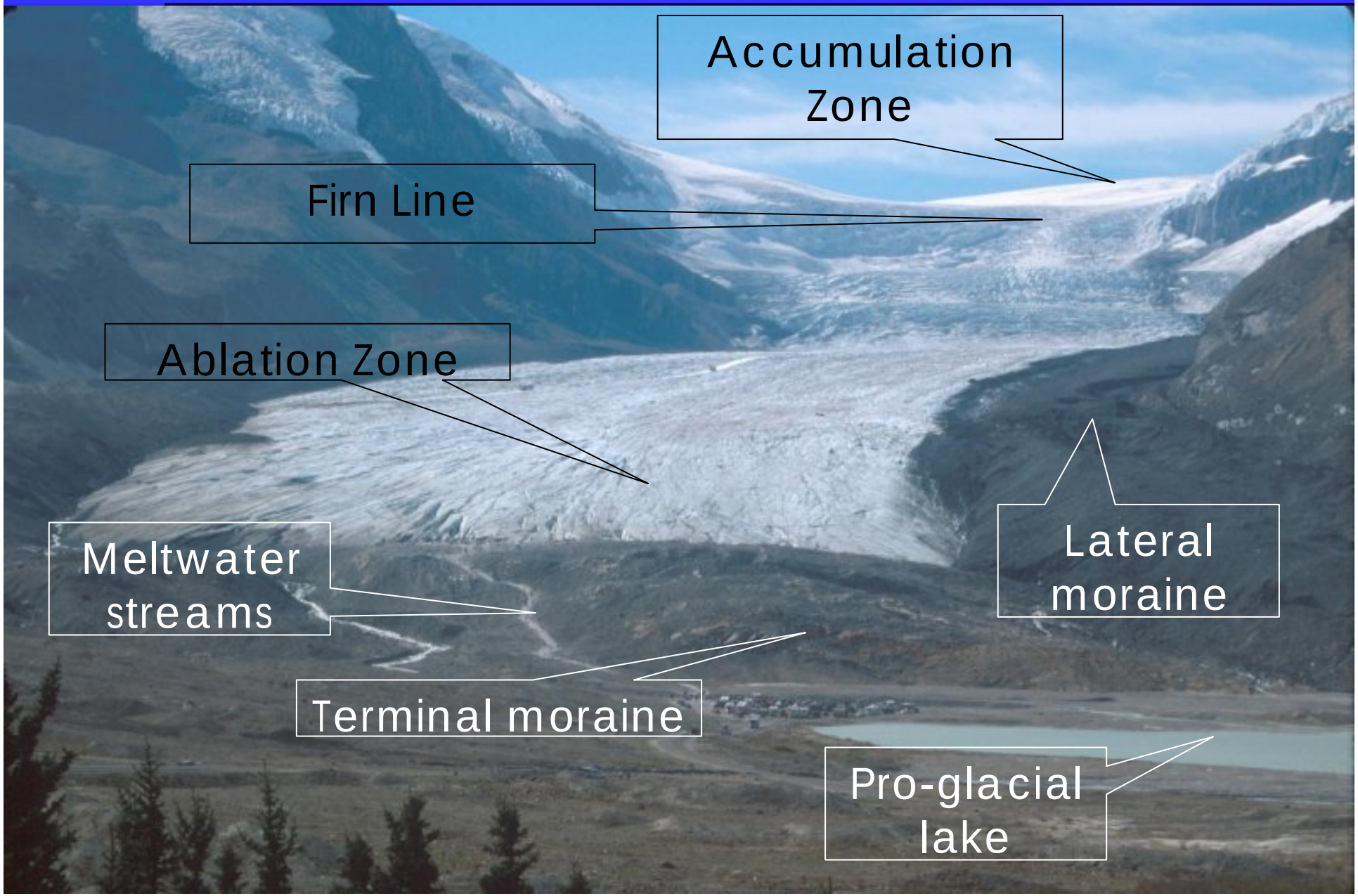
The **equilibrium line** is the boundary between the **ablation zone** and the **accumulation zone** of a glacier.

It is similar to the firn-line, but not synonymous with it because the surface of the glacier immediately below the elevation of the firn-line is regularly built up by layers of freezing meltwater.

A small outlet glacier overhangs a lake in Alaska. The accumulation and ablation zones can be seen clearly, separate by the firn line.

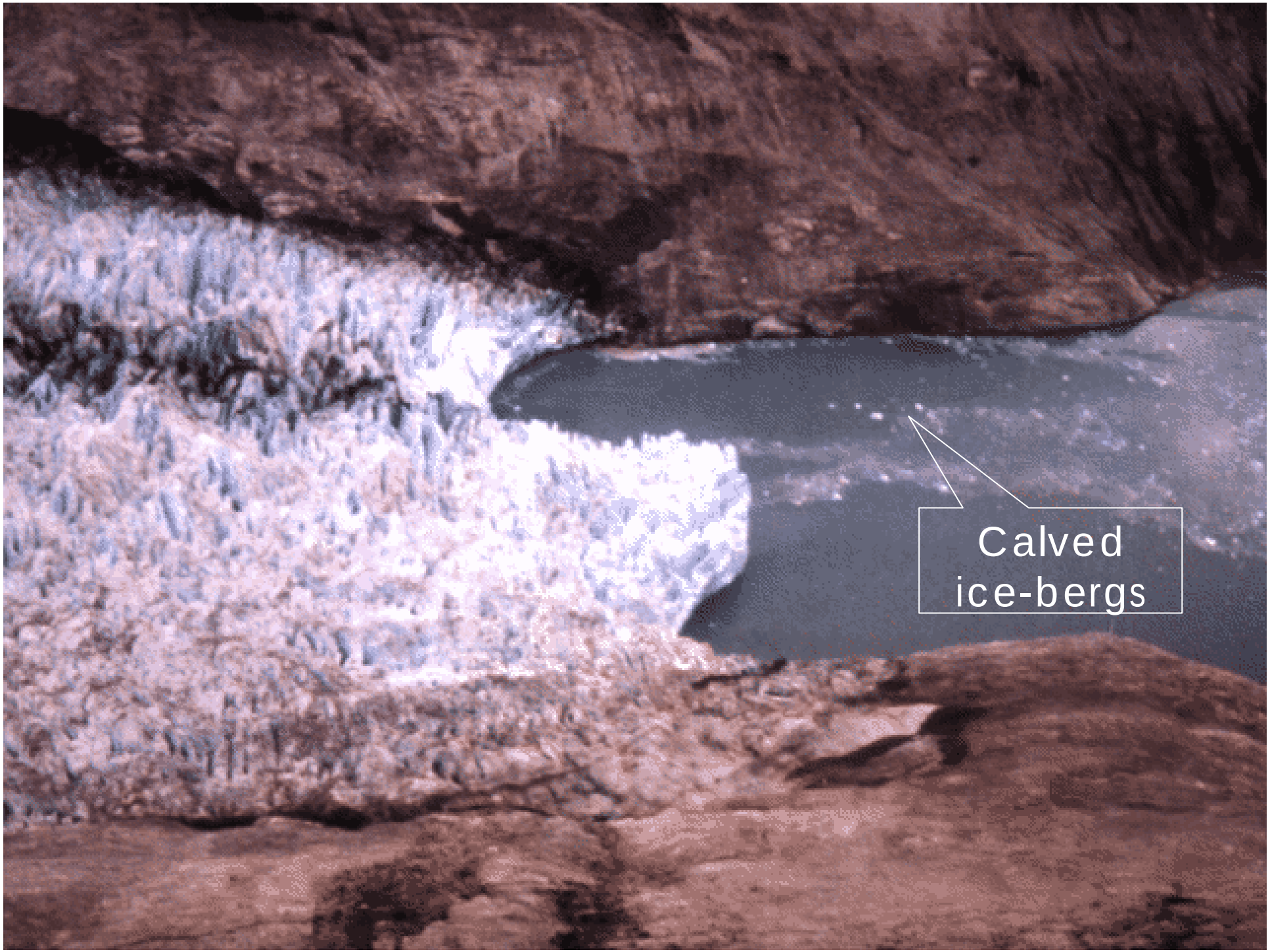


The Athabasca Glacier as System with inputs, outputs, processes and stores




Glacial snout
A man provides scale


A glacier meets the sea in Alaska


Calved
ice-bergs