

Exercises - lesson I

Hemispheric sea ice differences

Where is more sea ice at the maximum extent, in the Arctic or Antarctic?
Where is more sea ice at the minimum extent? What is the difference of both hemispheres with respect to the ice morphology and biology?

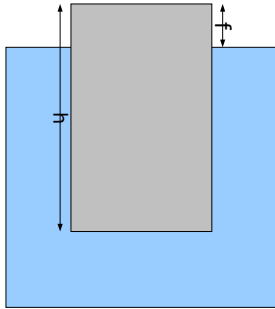
Sea ice terminology

Briefly describe the following ice zones and terms:

- MIZ
- SSIZ
- fast
- shear
- perennial
- polynya
- lead
- multi-year
- transpolar drift

Sea ice density

Isostatic equilibrium



The measured freeboard height f is 10cm. How thick (h) is the ice if you assume the ice is a) first-year b) multi-year ice. Derive a function to calculate ice thickness $h(f, \rho_w, \rho_{ice})$

- Density of water $\rho_w = 1.023 \text{ Mgm}^{-3}$
- Density of first-year (fy) ice $\rho_{fy} = 0.91 \text{ Mgm}^{-3}$
- Density of multi-year (my) ice $\rho_{my} = 0.887 \text{ Mgm}^{-3}$

Snow cover

The sea ice is additionally covered with snow. Retrieve a typical density for Antarctic snow from the literature. Calculate the snow thickness h_s for which the sea ice surface is on the sea surface level for ice of one meter thickness.

Literature search

The references given below are incomplete. Search the citation in the ISI index and give a complete reference.

- Massom, *et al.*, 2001
- Timco and Frederking, 1996