Polarimetric analyses of dominant radar backscattering mechanisms for iceberg detection

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Outline

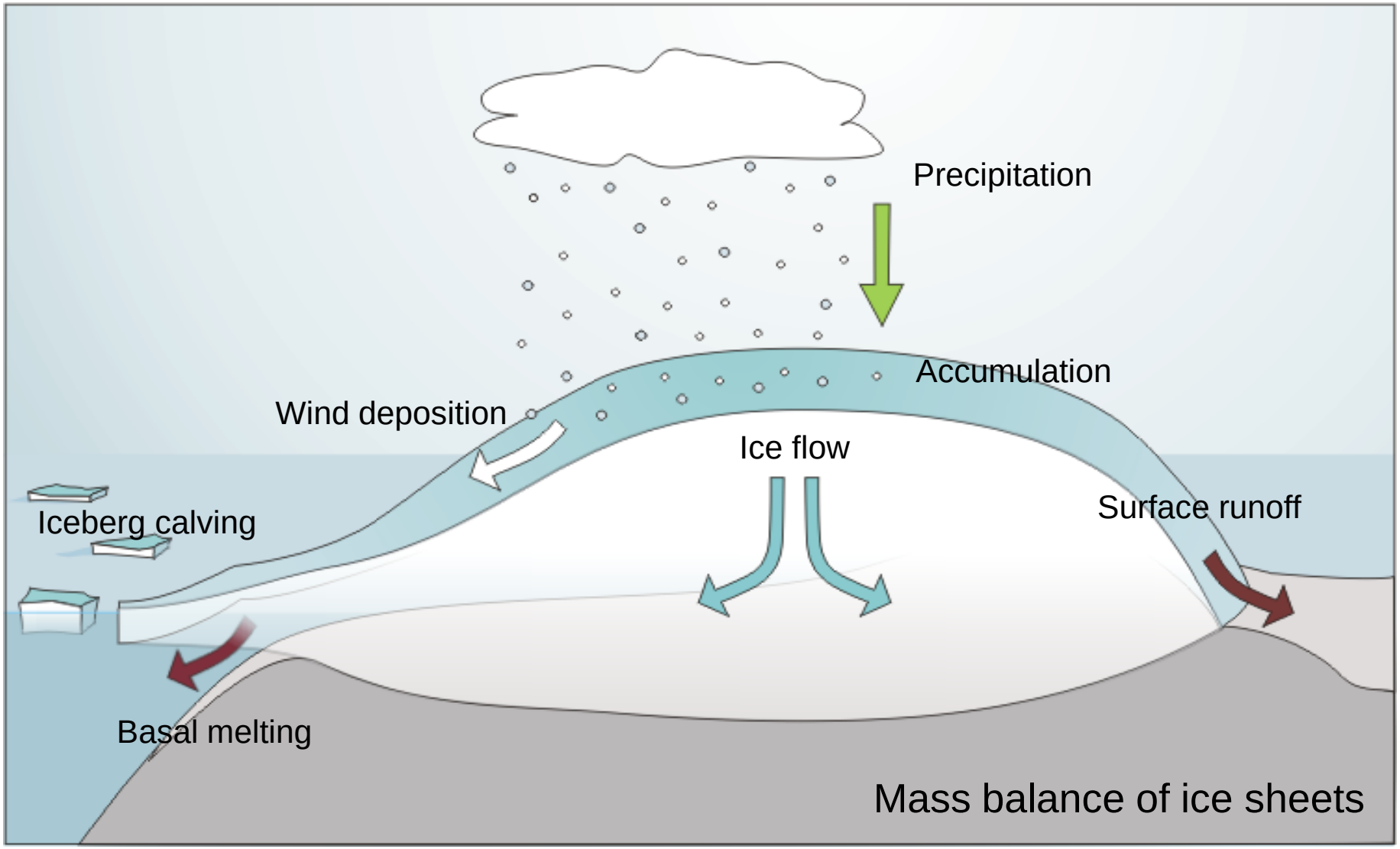
Why are we interested in iceberg detection?

Data set and regions of interest

Polarimetric parameter

Are polarimetric data useful for iceberg detection?

Why are we interested in iceberg detection?



Why are we interested in iceberg detection?

Icebergs are marine hazards

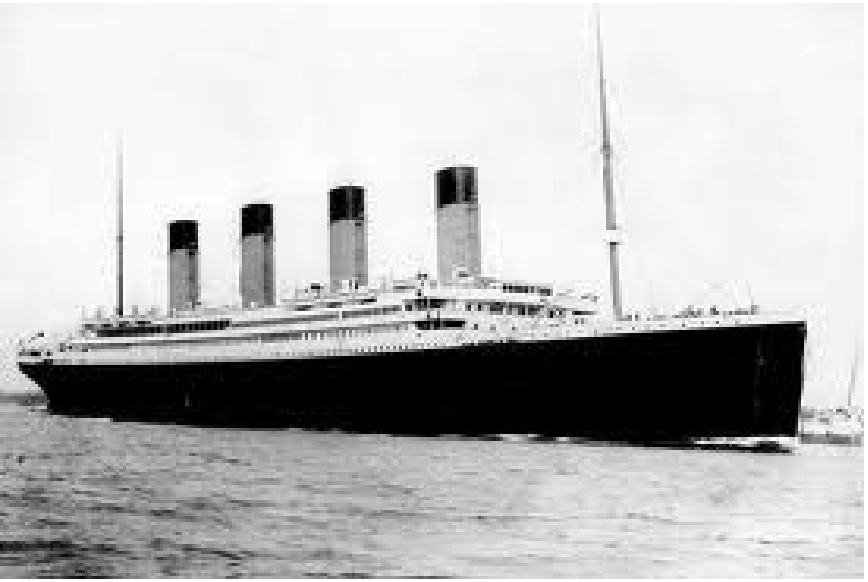
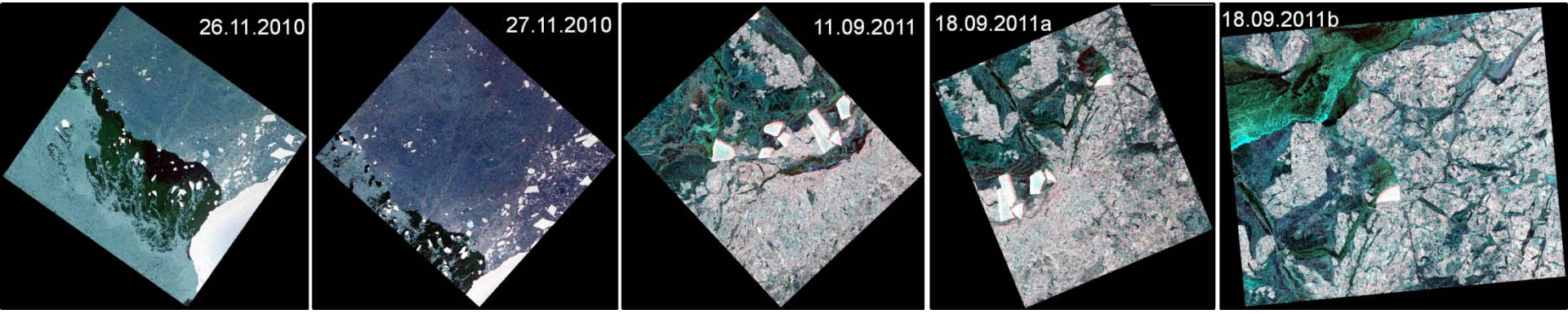


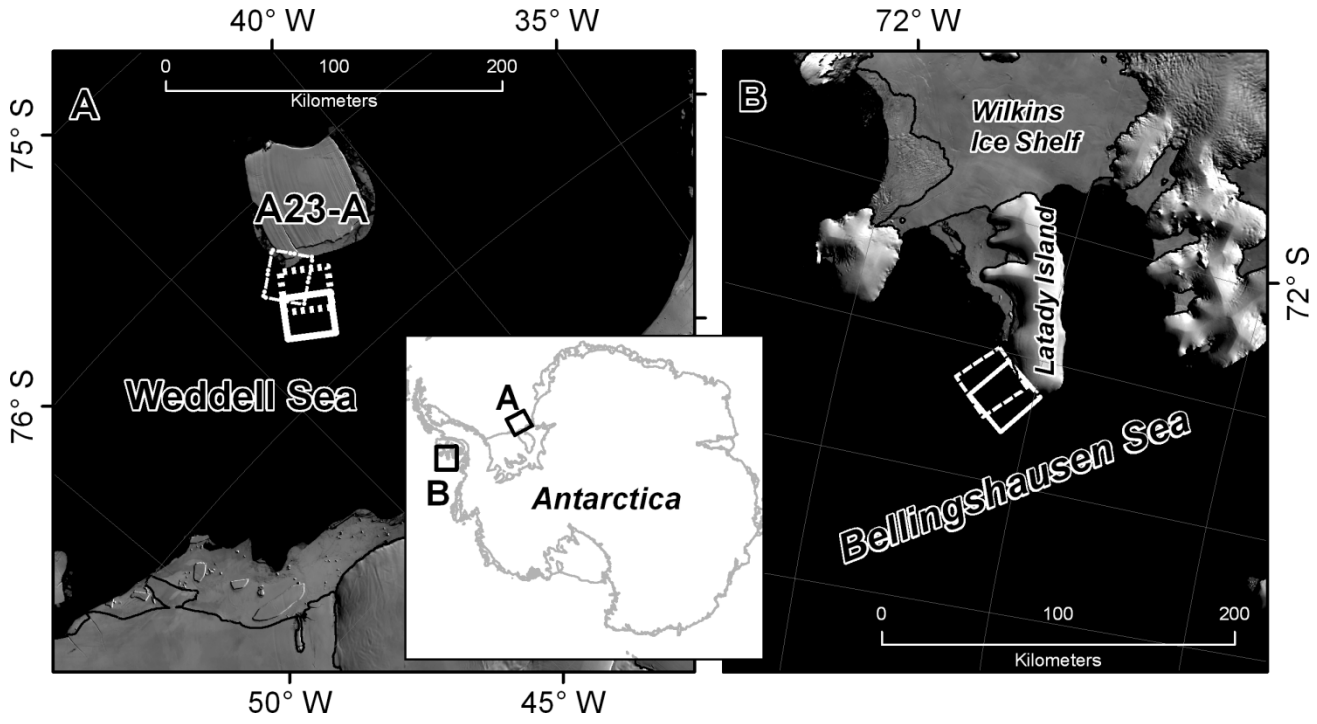
Image taken from Welt.de

Image taken from smh.com.au

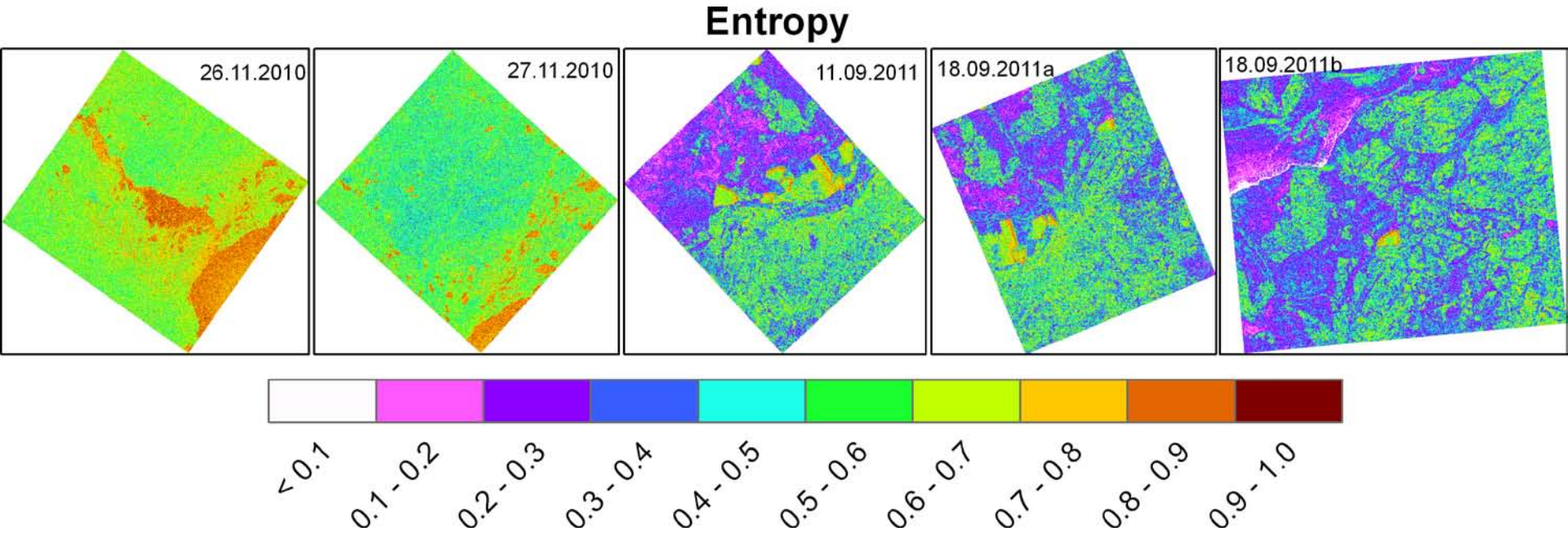
Data and area of investigation

Five RADARSAT-2 Fine Quad Pol images





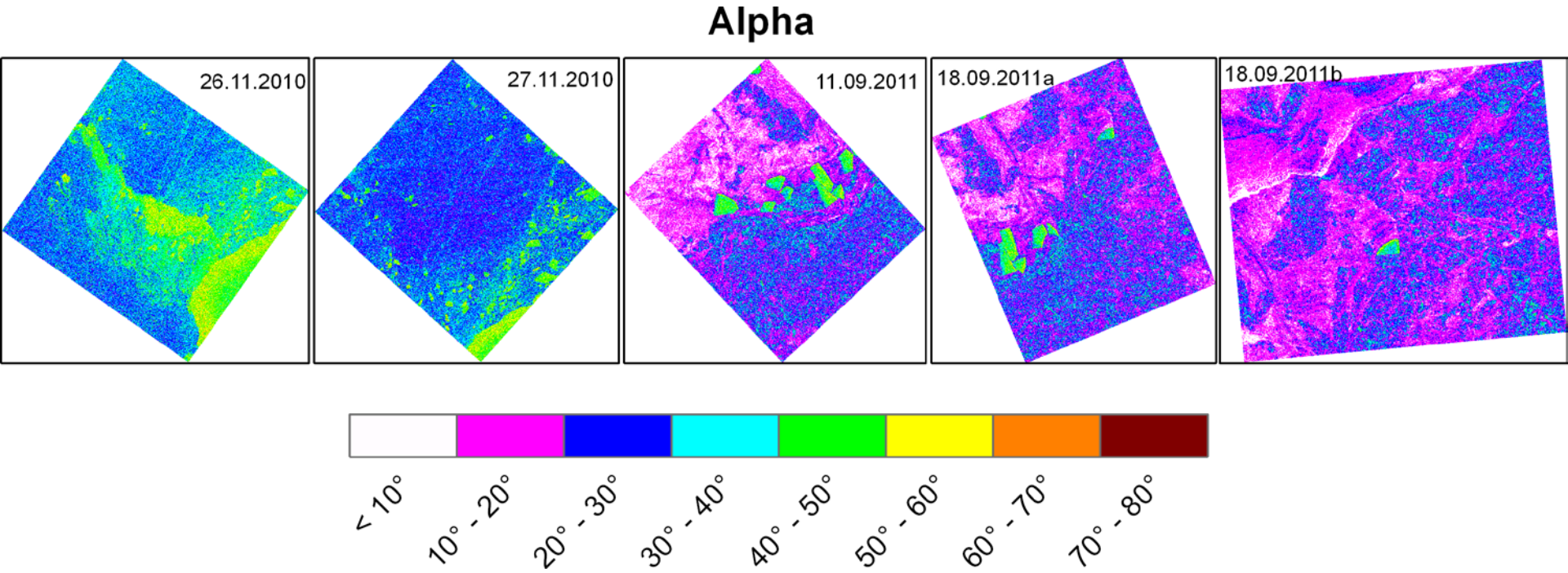
Polarimetric parameter



Small values = single scattering processes

Large values = multiple scattering processes

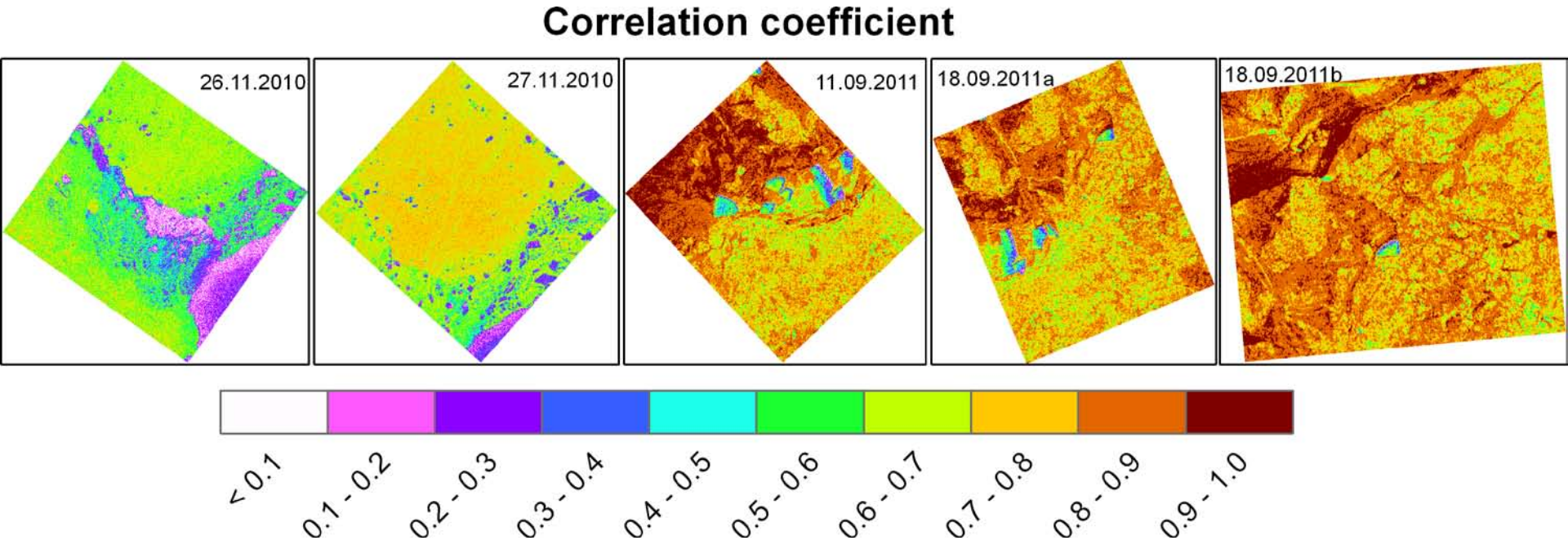
Polarimetric parameter



a ≈ 0° → surface scattering; a ≈ 45° → dipole scattering;

a ≈ 90° → double bounce reflection

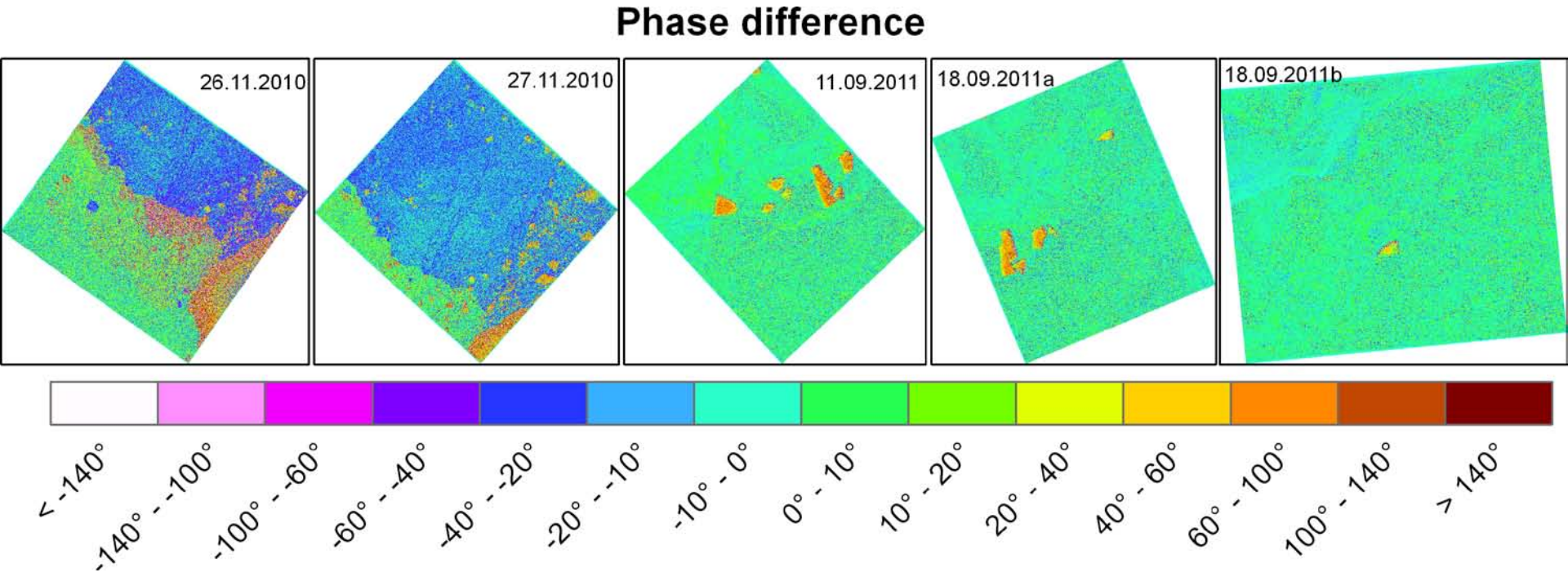
Polarimetric parameter



Large coefficients = isotropic medium

Low coefficients = anisotropic medium

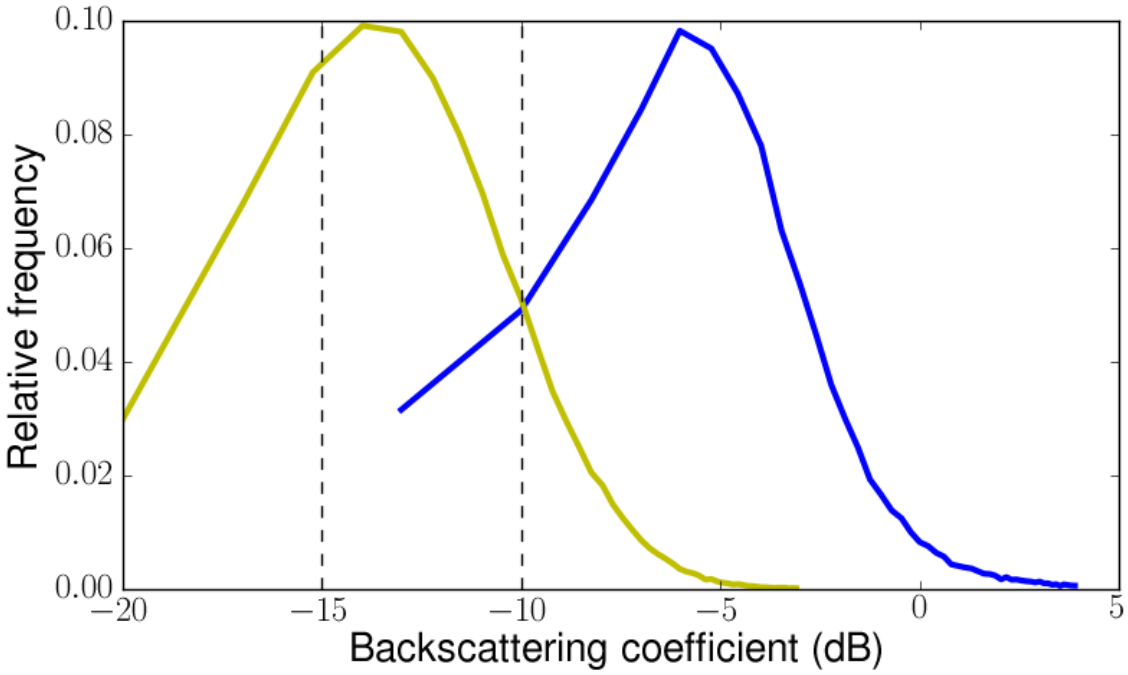
Polarimetric parameter

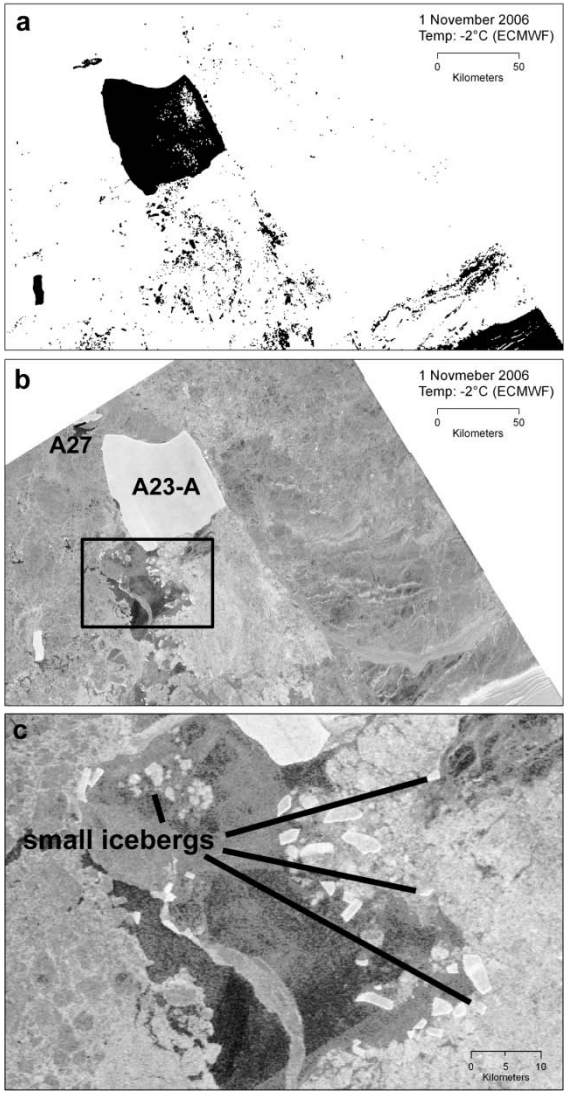


phase difference ≠ 0° → the medium is anisotropic

Are polarimetric data useful for iceberg detection?

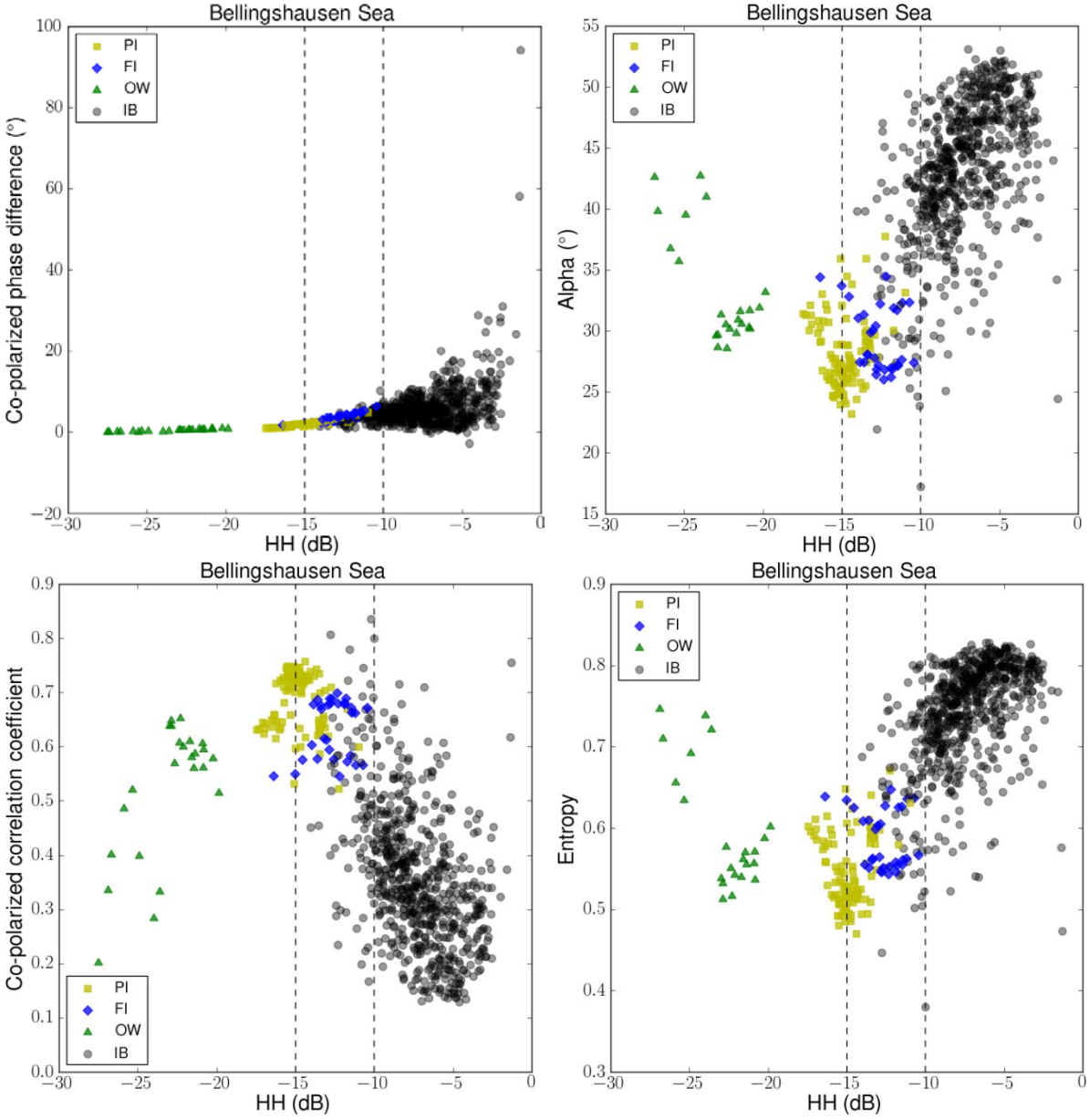
Iceberg detection using thresholds:





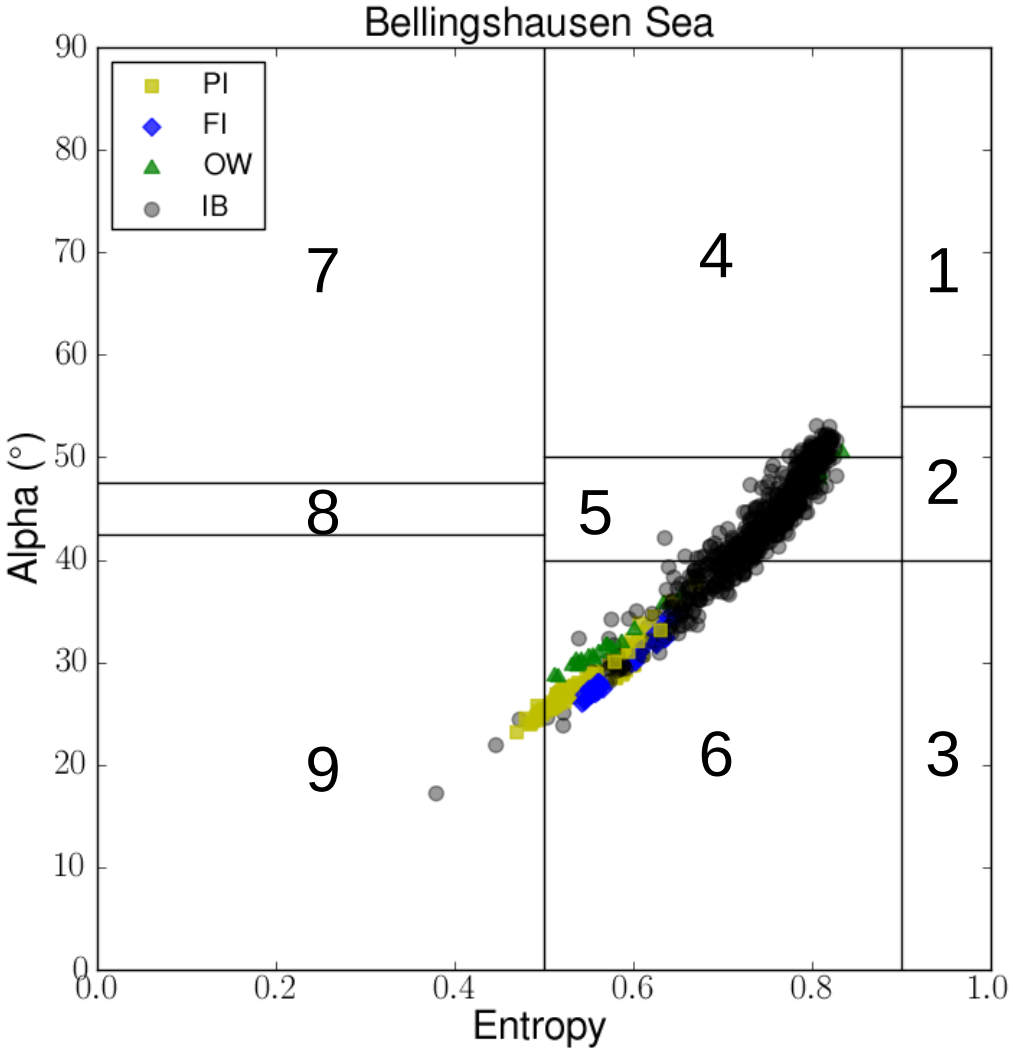
Wesche & Dierking , J.Glac. 58(208), 2012

Are polarimetric data useful for iceberg detection?



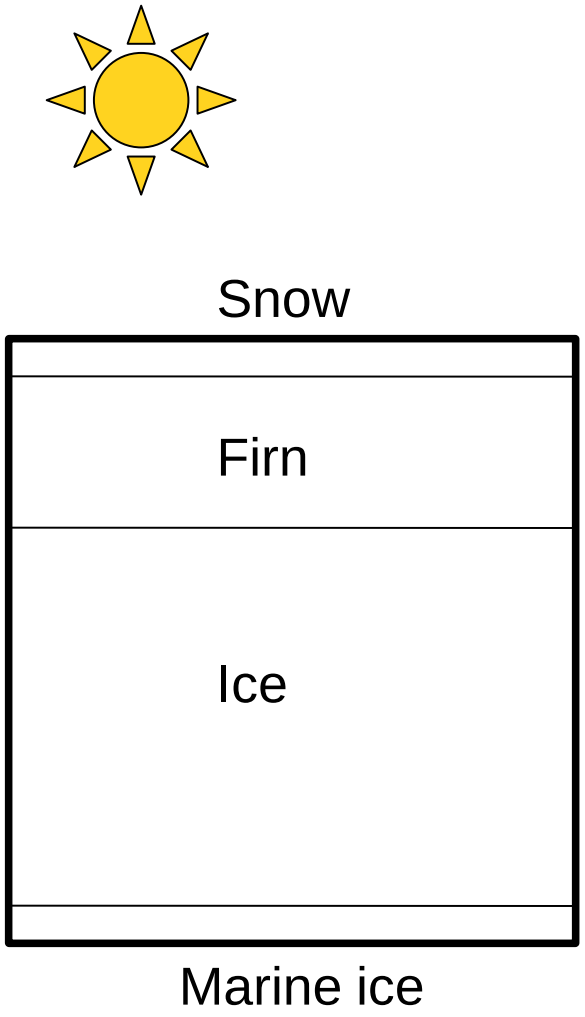
Dierking & Wesche, submitted to TGRS

Are polarimetric data useful for iceberg detection?



IB = dipole
FI = surface
OW = surface
PI = surface

What an iceberg looks like

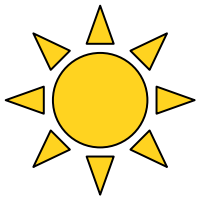


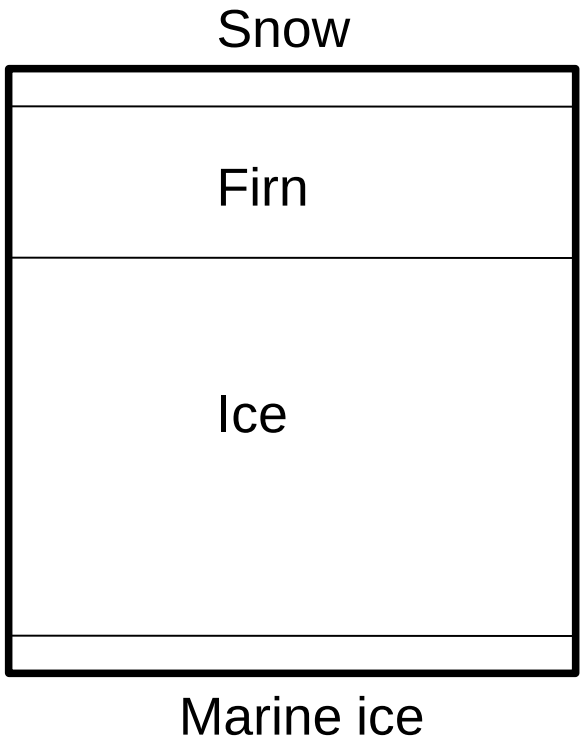
Iceberg surface characteristis depend on the:
- number
- duration
- intensity

of melt events.

Icebergs can roll over.

What an iceberg looks like





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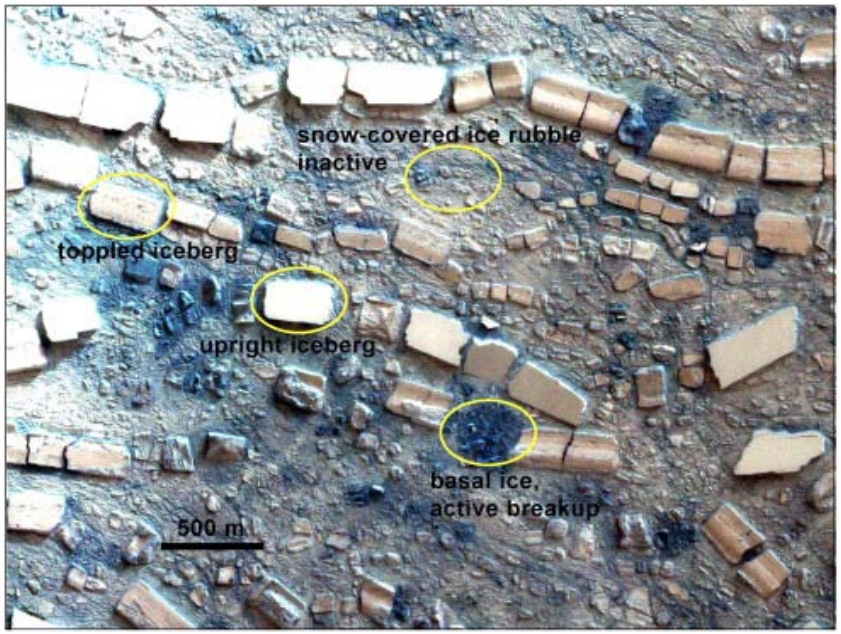
- number



Scambos et al., 2009

Summary

- iceberg radar signatures dominated by volume scattering from anisotropic scatterers

- relative contribution of scattering mechanisms varies – depending on ice properties and environmental conditions

Answer

Are polarimetric data useful for iceberg detection?

Yes, but there is no improvement.

Disadvantages:

- costs for handling more data
- more complex data processing
- limited swath width of recent satellite SAR systems

Thanks.