

## Contribution submission to the conference Dresden 2011

**Brine channel formation by phase separation in sea ice** —  
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The distribution of brine channels in sea ice is important as the nat-  
ural habitat of psychrophilic microorganisms and influences the heat  
exchange between the ocean and the atmosphere. The brine channel  
formation in sea ice is driven by salinity exchange between both phases,  
ice and water. By a variation of the free energy functional maintaining  
the conservation of salinity, we deduce a coupled differential equa-  
tion system, which describe the phase separation between liquid water  
with high salinity and the hexagonal ice phase with low salinity. These  
equations connecting the hydrodynamic equations with the statistical  
thermodynamics are solved numerically in one and two dimensions. In  
contrast to the Turing structures the resulting phase-field equations  
lead to more realistic structures of the brine channel texture.

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