# Article information:

Modeling Thermodynamic Ice–Ocean Interactions at the Base of an Ice Shelf in: Journal of Physical Oceanography Volume 29 Issue 8 (1999)  
<https://journals.ametsoc.org/view/journals/phoc/29/8/1520-0485_1999_029_1787_mtioia_2.0.co_2.xml>

# Article summary:

1. The interaction between ice shelves and the ocean is a potentially important element of the climate system, and numerical models have been used to evaluate the key processes operating in sub-ice-shelf cavities.

2. Upper boundary conditions derived from a thermodynamic model of the ice-ocean interaction have been applied to ocean models of varying sophistication.

3. The fundamental assumption in all the models is that phase changes occur in thermodynamic equilibrium so that the temperature and salinity at the ice-ocean interface are always related by an expression for the freezing point at the appropriate depth.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article "Modeling Thermodynamic Ice–Ocean Interactions at the Base of an Ice Shelf" provides a detailed mathematical description of the heat and freshwater exchange at and near the ice-ocean interface. The authors aim to compare different upper boundary formulations used in models of sub-ice-shelf circulation and introduce a new formulation that closely follows the work of McPhee et al. (1987).

The article is well-written and provides a comprehensive overview of the subject matter. However, there are some potential biases and limitations to consider.

Firstly, the article focuses solely on modeling the thermodynamic ice-ocean interaction, without considering other factors that may impact sub-ice-shelf circulation, such as ocean currents or atmospheric forcing. This narrow focus may limit the applicability of the results to real-world scenarios.

Secondly, while the authors acknowledge that observations suggest marine ice found at the base of ice shelves has salinities greater than zero, they assume SI can be treated as zero always. This assumption may oversimplify the complexity of salt fluxes in sub-ice-shelf environments.

Thirdly, while the authors provide a comprehensive overview of their modeling approach, they do not explore potential counterarguments or limitations to their methodology. For example, they assume all phase changes occur at the ice-ocean boundary regardless of whether far-field ocean conditions are above or below freezing point. This assumption may not hold true in all scenarios and could impact model accuracy.

Overall, while this article provides valuable insights into modeling thermodynamic ice-ocean interactions at the base of an ice shelf, it is important to consider its potential biases and limitations when interpreting its findings.

# Topics for further research:

* Sub-ice-shelf circulation and ocean currents
* Salt fluxes in sub-ice-shelf environments
* Marine ice salinity and its impact on sub-ice-shelf circulation
* Phase changes in sub-ice-shelf environments and far-field ocean conditions
* Real-world scenarios of thermodynamic ice-ocean interactions
* Limitations of thermodynamic ice-ocean interaction models

# Report location:

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