DENSE WATER OVERFLOW OFF CONTINENTAL SHELVES

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Introduction
Cascading is the phenomenon of dense water spreading and flowing down the continental shelf from one location to another. This process occurs in the form of cascading events, where dense water is pushed down the shelf by various mechanisms, such as wind-driven mixing, and eventually spills over the shelf edge into the open ocean. The identification of cascading events is crucial for understanding the dynamics of dense water transport and the impact on the marine environment.

Physical Mechanism
Dense water is produced in the region of cold and deep water, such as in the Arctic. Calculation of time scales supports the idea that in the Arctic, the dense water is produced more effectively in shallow areas of the continental shelf and eventually spills over the shelf edge into the open ocean. Cascading events are both along- and across-slope under the influence of gravity, Earth rotation, friction, and entrainment (mixing).

Identification of cascading events
- Search for surface signature of the dense water on the shelf/shelf edge
- Focus on previously reported locations, mostly at high latitudes
- Use of adaptive grid method

Prevalently observed locations

Table: Bottles CTD Total

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<th>Station</th>
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Case 1. Cascading west of Novaya Zemlia
- Initiation of downslope propagation
- Pre-conditioning
- Relaxation/dispersion
- Down-slope propagation

Case 2. Cascading off the Rockall Bank
- Role of wind-driven mixing
- Role of dense water transport from the shelf

Conclusions
1. Cascading is a wide-spread phenomenon
2. There are three stages of cascading:
   - Initiation of downslope propagation
   - Pre-conditioning
   - Relaxation/dispersion

References
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- Nansen, 1913 ("Fritjof" 1910)
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