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# Hypotheses concerning the circulation of the northern North Sea

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## Abstract

The circulation of the northern North Seas has been a subject which has occupied the attention of scientists since the end of the last century. Many

of the early ideas were simple and were based on the limited observations made at that time. During the early part of the present century a vast amount of observational data was obtained by means of drift bottles and water sampling and this gave rise to suggestions of water movements which were far more complex than those originally suggested. These circulation patterns of which two were suggested by Böhnecke and Tait, have subsequently commanded much attention with the result that the earlier work on North Sea circulation was ignored. They survived time because no reasonable alternatives could be put forward. From the early sixties technology enabled scientists to measure by direct means the currents of this area and it soon became obvious that the traditional concepts of circulation ignored points of detail which were in fact suggested at the beginning of the study on circulation. One such important feature is the shelf edge current, a flow of oceanic water which enters the Skagerrak by way of the continental slope and the western edge of the Norwegian Channel. Another current, the existence of which had shrunk into comparative obscurity during the past fifty years was the flow of mixed waters which entered the North Sea through the Orkney-Shetland Channel and which can be traced across the North Sea towards the Skagerrak. Although current measurements show this flow to be persistent its axis is subjected to large and rapid fluctuations in position. East of the Orkney Islands the width of the current is usually less than 8 nm and has a strength in excess of  $10 \text{ cm s}^{-1}$  which makes it a rather distinctive feature in the northern North Sea. Consequently although recent measurements demonstrate that the circulation pattern is basically simple and easily identifiable its variability suggests that residual current patterns at any location are complex.

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