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International Council for the Exploration of the Sea

CM 1971/C:32
Hydrographic Committee

# Report on standardisation of base periods for temperature and salinity anomalies

## Introduction

During the 58th Statutory of ICES, the Hydrography Committee considered the problem of standardisation of base periods from which anomalies of temperature and salinity are calculated. It was decided to form an ad-hoc group, consisting of Mr. H.W. Hill, Mr. F. Hermann and Mr. L. Otto to look into this problem working by correspondence, and to report to the 59th Statutory Meeting (ref. Procès-Verbal de la Réunion 1970, page 46 paragr. 7).
Because of lack of communication with Mr. Hermann, the exchange of views on this subject mainly took place between Messrs Hill and Otto. Therefore the present report reflects the opinion of the latter two members.

## Considerations

Anomalies of temperature and salinity directly inform the reader whether the temperature and salinity are above or below the "normal" value, and make comparison of deviations over a larger sea area easier than the observed values would do. However, for further investigations one usually will need an answer to the question what the "normal" value used stands for, and what degree of variability may be expected. Uniformity in the presentation of anomalies is needed for presentations in ICES publications such as the "Annales Biologiques". Comparibility with practices that are found elsewhere is desirable.
In a climatological series, averages may be calculated over different time intervals and trends and periodicities may be discribed according to the aims of the various investigators. It is impossible to comply with all these individual objectives.
Studies on the variations of the temperature of the North Sea have been made by G. Tomczak (Deutsche Hydrogr. Zeitschrift 20, (2), 1967) and by Hill (CM 1968/C:20). Recently Hill completed his work on salinity trends over the period 1905-1970 along the lines of his previous paper. He also reworked the temperature data for this period, splitting the series into two sets, 1905-1960 and 1955-1970. His conclusions are that there is virtually no upward or downward long term trend in salinity over the period 1905-1970, while only the first set of temperature data shows the trend, reported earlier. The second set shows no significant regressions.
In view of these findings it seems right to leave out of consideration any trend when calculating "normal" values that may serve as the bases for compentative of anomalies and to take for such values simply the averages over a certain period of years.
The question arises how long this period should be.
If a short base period is chosen the anomalies reflect mainly the irregular variations and trends and long periodic variations are reflected in the variation of the norms for the successive base periods. A short base period has some advantages for stations that are in existence over a relatively brief period of time. However in, sea areas where no regular observations are made, a too short period gives confidence limits for the norm that are too wide apart. If important periodicities do occur the length of the base period should be chosen such that in the successive norms no artificial long periodic variations should be introduced by "aliasing".

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In this respect Dickson's work (CM 1968/C:27) may be mentioned, in which pronounced short term (3 - 5 year) salinity periodicities are suggested. A duration of several times this period appears to be needed for a meaningful norm.
As stated before, compatibility with other data is desirable. In climatology the selection of standard periods has been discussed at length by meteorologists. In general 30 years periods are preferred, comprising 3 decades (e.g. 1931-1960). In cases, however, where time series of sufficient length are not available, means are calculated over periods of 10 or 20 years.
In this connection it is also important to mention the WMO (World Meteorological Organization) project on Historical Sea Surface Temperature Data. This project will make available monthly mean values (per year) for a very large number of ocean areas, more or less covering all oceans. In principle this project covers the period 1861-1960. It would be important if this project and the work done by ICES could be matched together.
The best compatibility with climatological practice would be achieved if the base period would be chosen to be 10 years or a multiple.
The choice which period should be selected has yet to be made. There are strong arguments for the most recent decade(s).
It is the intention to settle the remaining points during the 59th Statutory Meeting and to report to the Hydrography Committee during its session.

L. Otto