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Stock separation based on Fourier analysis of a concave approximation to otolith contours applied to Greenland halibut in Norwegian and Greenland waters

Fourier analysis of otolith contours have been applied successfully in several cases as an efficient technique to discriminate between different fish stocks. Use of elliptical Fourier descriptors (EFDs) is probably the most applied technique in these cases. A recently published Fourier mirror technique transforms the 2D contour to a 1D function with the advantage of reducing the number of coefficients to half the number of EFDs, but with the disadvantage of creating ambiguities in case of non-concave contours. In this paper a concavisation technique is applied to Greenland halibut otolith contours, which are grossly non-concave with a hand-like gross shape with many "fingers" creating a large within-group variance. A classical Fisher discriminant analysis is applied to EFDs as well as to 1D Fourier coefficients of the original contours, smoothed contours and the concave approximation to the original contour, to investigate if one can discriminate between Greenland halibut in Norwegian and Greenland waters, and to compare the different contour modes and the 1D and 2D descriptors. The discrimination score is calculated by the leave one out at a time technique.

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Community structure and dynamics
Population dynamics
Spatial ecology