

**Slave to the rhythm: Can seasonal signals in otolith microchemistry be used as a tool for age estimation?**

Karin Hüsey, Franziska Heidemann, Hans-Harald Hinrichsen, Lasse Marohn, Joachim Gröger, Karin E. Limburg

The traditional age-based stock assessment of eastern Baltic cod has since 2013 been abandoned, owing to problems with the age data. This has left the stock status uncertain and caused the Marine Stewardship Council to suspend its certification of the stock. Historically, otoliths of this stock have been known to be difficult to age owing to the low contrast between growth zones, but in recent years the age reading inconsistencies have apparently increased. This may be connected with deteriorating water quality from intensified hypoxia, a restricted geographical distribution range despite increasing cod numbers, reduced prey availability and increased occurrence of parasite infestation. This calls for the development of alternative age estimation methods. The objective of this study is to explore the applicability of otolith microchemistry patterns from the core to the edge of the otolith for age validation. In this presentation we will demonstrate how we used patterns of opacity and trace elements in otoliths from stocks without age reading problems to identify and validate elements with signatures matching growth zones (western Baltic and North Sea). Matching patterns with respect to occurrence of minima and maxima in both otolith opacity and microchemistry were found for Cu, Zn, and Rb, and inverse patterns with Mg and Mn. Application of this technique to eastern Baltic cod otoliths with low visual contrast found clearly defined synchronous cycles in these elements, from the core to the edge of the otolith. We therefore propose that the incorporation of these trace elements into the otolith may be linked to fish somatic growth and thus presents a tool for age estimation in species where ageing is difficult.

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**Contact author:** Karin Hüsey, National Institute of Aquatic Resources, Technical University of Denmark, email: [kh@aqua.dtu.dk](mailto:kh@aqua.dtu.dk), phone: +45 3588 3458