A method to geolocate eastern Baltic cod by using Data Storage Tags (DSTs)

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WHY ESTIMATE INDIVIDUAL MIGRATION TRACKS?

- Timing of migrations
- Identify *in situ* behaviours
- Identify environmental control mechanisms
- Understand changes in population distribution on different temporal and spatial scales
Hydrography
July 2003

Salinity

Temperature [°C]
Hydrodynamic model

- Output: 3 D-distribution of T, S, O$_2$, sea level height and current velocities every 6 hours with a horizontal resolution of 5 km and 60 vertical levels (3 m intervals)

- Input: Meteorological forcing data (wind stress, air temperature, humidity, cloudiness etc.), river runoff, initialization by realistic hydrographic data (based on project related cruises)
Average horizontal gradients
July 2003
Least squares technique

$$\sum (a(p_{\text{cod}} - p_{\text{hyd}}))^2 + (b(T_{\text{cod}} - T_{\text{hyd}}))^2 + (c(S_{\text{cod}} - S_{\text{hyd}}))^2 = \min$$

\(a, b, c\) — measurement error and parameter range dependent weighting factors

For \(u_{\text{travel}} < \frac{1}{2}\) bodylength of fish per second

Remaining distance to the known re-capture location < \(u_{\text{travel}} \times t_{\text{remain}}\)
Kalman-Filtering