Characterising the Sea Ice Environment Using a Newly Developed Sensor Array Mounted on an Under-ice Trawl

Lange, B.A.1,2; David, C.1,2; Katlein, C.1; Meiners, K.M.1; Nicolaus, M.1; Peeken, I.1; and Flores, H.1,2

1 Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Am Handelshafen 12, 27570 Bremerhaven, Germany
2 University of Hamburg, Zoological Institute and Zoological Museum, Biocenter Grindel, Martin-Luther-King Platz 3, 20146 Hamburg, Germany

Antarctic Climate and Ecosystems Cooperative Research Centre, University of Tasmania, Private Bag 80, Hobart 7001, Tasmania, Australia

It’s not always smooth sailing

Ice Thickness calculations

\[ h_a = h_c + (h_c \cos \beta \cos \alpha - h_w) \]

\[ h_c = h_w - h_a \]

\[ h_a = h_c - (h_c \cos \beta \cos \alpha - h_w) \]

A = location of altimeter sensor
B = location of CTD perpendicular to altimeter (Nadir)
C = CTD depth sensor
BC = parallel to ADCP
\( \beta \) = pitch angle from ADCP (±)
\( \alpha \) = 1.12 radians or 64.2°
\( h_a \) = vertical distance between altimeter (A) and depth sensor (C)
\( h_c \) = draft
\( h_w \) = 1.06 or the result from: \( AB^2 + BC^2 = c^2 \)

Draft correction calculation

Spectrally derived chl a model using EOF/PCA

Coincident Ice Core chl a
Under-ice light spectra
EDF/PCA Analysis
Sig EOF coefficients
Sig EOF coefficients
Model
ROV under-ice light spectra
SUIT under-ice light spectra
EDF/PCA Analysis
EDF/PCA Analysis
ALM
chl a ~ EOF coeffs.

Derived chl a & measured chl a

ROV spectra derived chl a
SUIT spectra derived chl a

In progress

EDF = Empirical Orthogonal Function
PCA = Principal Component Analysis

ANT 29-7: Large-scale sea ice chl a observations

ARK 27-3: Arctic Sea Ice Thickness (Aug-Sept 2012)

ANT 29-7: Antarctic Sea Ice Thickness (Aug-Oct 2013)

It’s not always smooth sailing