Ocean color and sea surface temperature observations in the Labrador Sea

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Issues

1) Chlorophyll Algorithm Performance
   a) Operational OCTS & SeaWiFS vs. tuned
   b) Lab Sea data set characteristics

2) Relative Absorption by Constituents
   a) compare $a_p$ and $a_s$ with low latitudes
   b) compare chl-spec $a_\alpha$ with low latitudes
   c) model results with HydroLight

3) $T_{ship}$ or SST vs [Nutrient] or [Chl]
   a) predict [Nutrient] from SST
   b) predict [Chl] from SST
   c) predict new production from SST
Chlorophyll map of our study area on June 5, 1997

05 June 1997

Chlorophyll map of our study area on June 5, 1997

Optical Research Consortium of the Arctic
OEAS, CCPO, ODU
ORCA Predicted Chlorophyll (mg m\(^{-3}\))

1:1

OCTS

2:1

SeaWiFS

3:1

ORCA Predicted Chlorophyll (mg m\(^{-3}\))

Optical Research Consortium of the Arctic
CCPO, OEAS, ODU
The diagrams illustrate the relationship between log Chlorophyll (mg m$^{-3}$) and log $R_{rs}$ (490/555) and log $L_{wn}$ (520+565/490) for different data sets: ORCA - 2L, ORCA - 2M, SeaWiFS, ORCA - 3, and OCTS. The data points are categorized by Lab 96 and Lab 97. The Optical Research Consortium of the Arctic (OEAS, CCPO, ODU) is credited at the bottom of the page.
log R<sub>rs</sub> (490/555)

log Chlorophyll (mg m<sup>-3</sup>)

ORCA - 2L
ORCA - 2M
SeaWiFS

Log L<sub>wn</sub> (520+565/490)

log Chlorophyll (mg m<sup>-3</sup>)

ORCA - 3
OCTS

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Wavelength (nm)

Chlorophyll Specific Absorption $[\text{m}^2/(\text{mg Chl})^{-1}]$

Lab 96 & 97

<table>
<thead>
<tr>
<th>$\lambda$</th>
<th>$a_s/a_p$</th>
</tr>
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<tbody>
<tr>
<td>412</td>
<td>0.96</td>
</tr>
<tr>
<td>443</td>
<td>0.66</td>
</tr>
<tr>
<td>490</td>
<td>0.61</td>
</tr>
<tr>
<td>510</td>
<td>0.67</td>
</tr>
<tr>
<td>555</td>
<td>0.88</td>
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</tbody>
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$a_t$, $a_p$, $a_s$

$n=108$

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Salinity (psu)

| 32 | 33 | 34 | 35 | 36 |

Nitrate (µM)

| 2 | 6 | 10 | 14 |

Silicate (µM)

| 2 | 6 | 10 | 14 |

Chlorophyll (mg m⁻³)

| 0 | 5 | 10 | 15 |

Temperature (C)

| 0 | 3 | 6 | 9 |

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SST and chlorophyll vs. distance (left to right) along Transect A and the relationship between chlorophyll and SST.
SST and chlorophyll vs. distance (left to right) along transect B and the relationship between chlorophyll and SST.
Summary

1) OCTS & SeaWiFS Algorithms & Retrievals
   a) Lab Sea data encompasses most variability
   b) SeaWiFS chlorophyll retrievals >2X low
   c) OCTS underestimates at high [Chl]
   d) Tuned algorithms provide good retrievals
   e) ORCA-2L > ORCA-2M > ORCA-3

2) Relative Absorption by Constituents
   a) for BG λ  \( a_p > a_s \) with \( a_s \approx 61-96\% \)
   b) \( a^*_a \) is \( \approx 2X \) lower than low latitudes
   c) modeling results further w HydroLight

3) SST vs. Nutrients or Chlorophyll
   a) T is not related only to SiO\(_3\) or NO\(_3\)
   b) T is not related to Chlorophyll (ship – 3 m)
   c) SST is not related Chlorophyll (satellite).