Satellite-derived ecosystem indicators: a retrospective analysis of high resolution ocean color and sea surface temperature products in the Salish Sea

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Satellite-Derived Ecosystem Indicators: A Retrospective Analysis of High Resolution Ocean Color Products in the Salish Sea

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**Introduction**

A complete set of MERIS CoastColour data products (2002 to 2012) was developed for the greater Salish Sea, including Puget Sound, Strait of Georgia, and the continental shelf/slope off Washington and Vancouver Island, BC. These data were processed by Integral Consulting Inc. for the Salish Sea Marine Survival Project and are being made available to the regional research community for any number of applications. The data set includes both nearshore and offshore processed satellite data products at 300 m resolution over a 10-year period (~3 day revisit) from the MERIS ocean color sensor.

**Table 1. Comparison of Select Remote Sensing Satellite Sensors**

<table>
<thead>
<tr>
<th>Ocean Sensor</th>
<th>Agency</th>
<th>Operating Dates</th>
<th>Spatial Resolution (m)</th>
<th>Number of Bands</th>
<th>Spectral Coverage (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZCS</td>
<td>NASA</td>
<td>1978–1986</td>
<td>825</td>
<td>6</td>
<td>433–12,500</td>
</tr>
<tr>
<td>SeaWiFS</td>
<td>NASA</td>
<td>1997-2010</td>
<td>1,100</td>
<td>8</td>
<td>402–885</td>
</tr>
<tr>
<td>MODIS-Terra</td>
<td>NASA</td>
<td>1997-current</td>
<td>250/500/1,000</td>
<td>36</td>
<td>405-1,4385</td>
</tr>
<tr>
<td>MODIS-Aqua</td>
<td>NASA</td>
<td>2002-current</td>
<td>250/500/1,000</td>
<td>36</td>
<td>405-1,4385</td>
</tr>
<tr>
<td>MERIS</td>
<td>ESA</td>
<td>2002-2012</td>
<td>300/1,200</td>
<td>15</td>
<td>412-1,050</td>
</tr>
<tr>
<td>VIIRS</td>
<td>NASA</td>
<td>2013-current</td>
<td>375/750</td>
<td>16</td>
<td>402-1,2,488</td>
</tr>
<tr>
<td>Sentinel-3A</td>
<td>ESA</td>
<td>2016-current</td>
<td>300/1,200</td>
<td>21</td>
<td>400-1,020</td>
</tr>
</tbody>
</table>

**Land Sensor**

| Landsat-8    | NASA              | 2013-current    | 15/30/100              | 10              | 435-12,510             |
| Sentinel-2A/B| ESA               | 2015-current    | 10/20/60               | 13              | 492-2,202              |

Data products highlight seasonal water quality trends in the Salish Sea and show how events, such as algal blooms, have wide reaching effects across multiple ecosystems. However, to create meaningful data products, a series of processing steps was necessary.

**Data Products Work Flow**

Data products highlight seasonal water quality trends in the Salish Sea and show how events, such as algal blooms, have wide reaching effects across multiple ecosystems. However, to create meaningful data products, a series of processing steps was necessary.

**Figure 1. MERIS Data Processing**

**Figure 2. Median Monthly Concentrations of Chlorophyll by Neural Network (2002-2012)**

**Figure 3. Median Annual Concentrations of Total Suspended Matter**

**Figure 4. Regions of Interest in the Salish Sea**

**Figure 5. Monthly Chlorophyll Concentrations in South Puget Sound**

**Figure 6. Monthly Turbidity along Victoria Clipper Route**

**Figure 7. Time Series of Colored Dissolved Organic Matter (CDOM) in Bellingham Bay**

Reference and data available upon request.

**Acknowledgements**

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