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2018-04

Environmental Effect on Underwater Optical Detection and Communication

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<http://hdl.handle.net/10945/60518>

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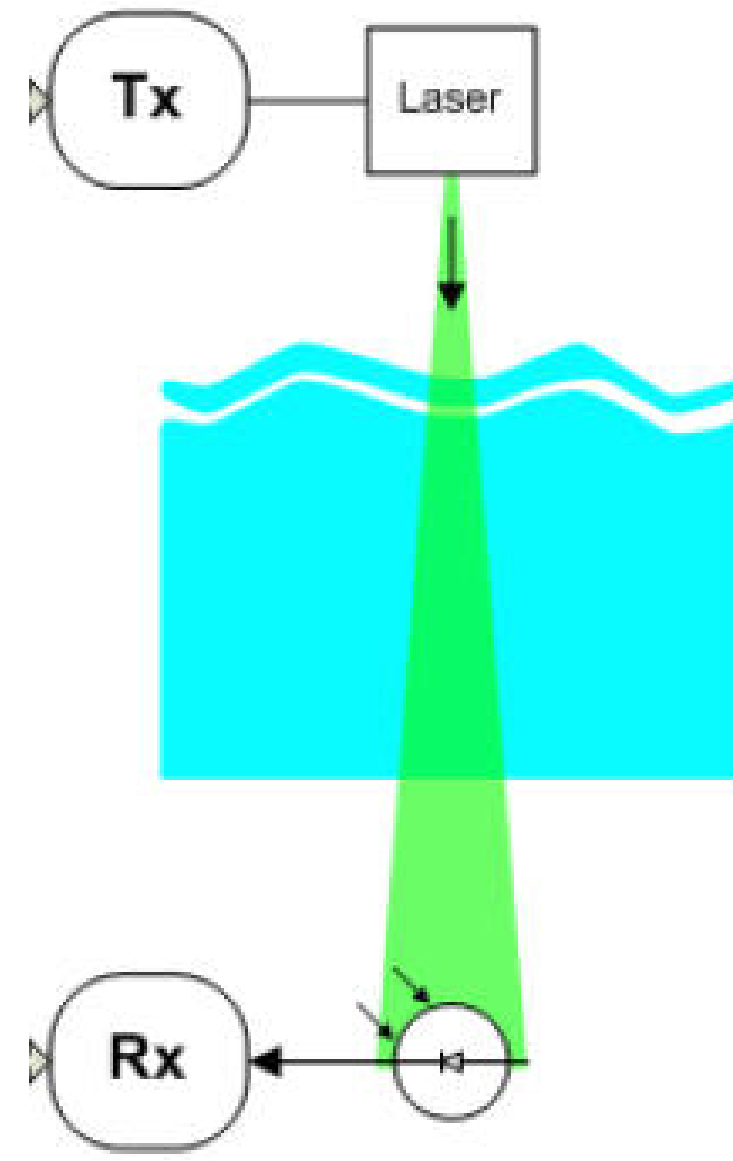
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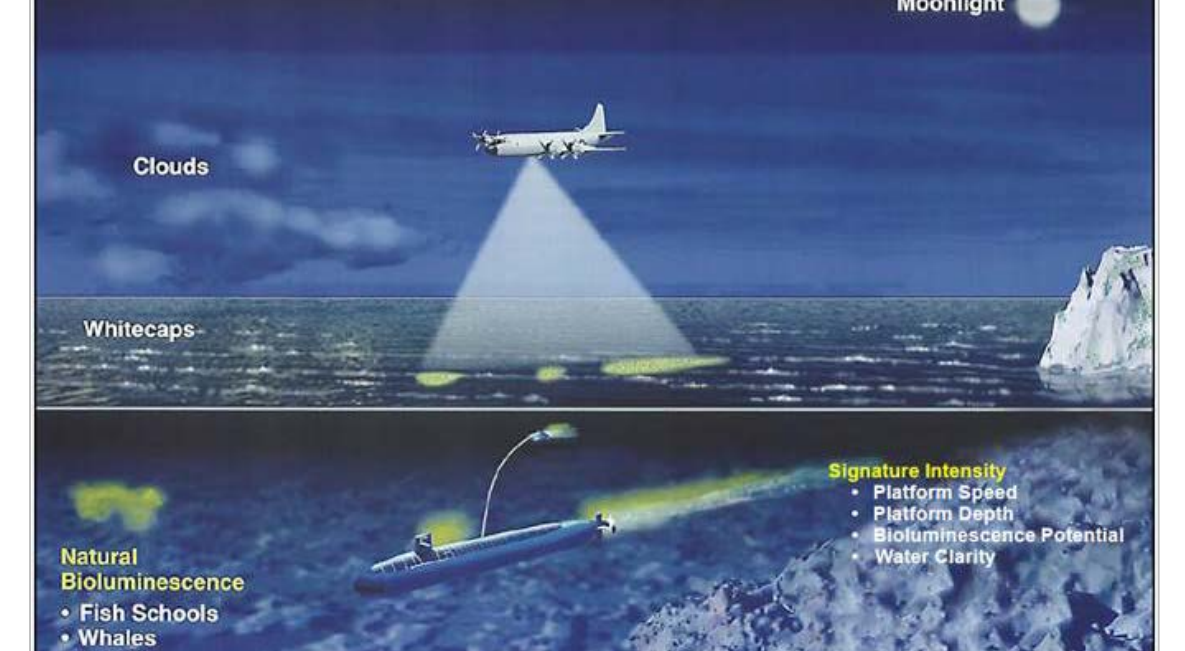
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Topic Description

- Optical communication/detection systems have great potential to get around the obvious limitations of current acoustic communications.
- The radiative transfer equation (RTE) with bioluminescence source, and observed (in situ and remotely sensed) optical parameters are used to develop efficient algorithms of optical detection and communication.



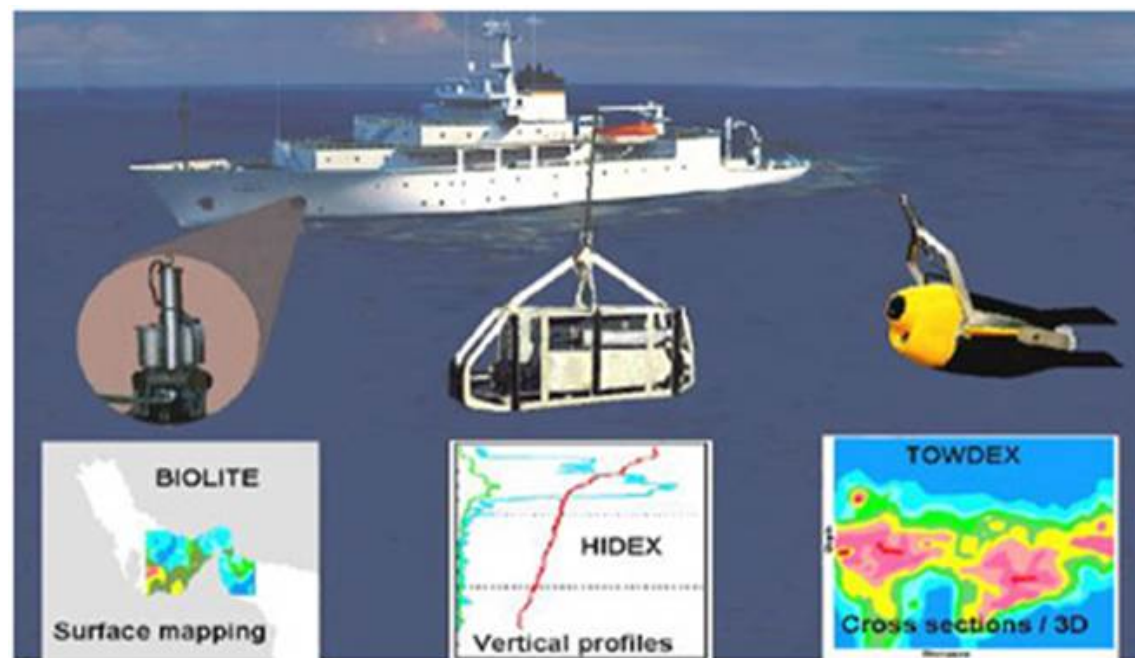
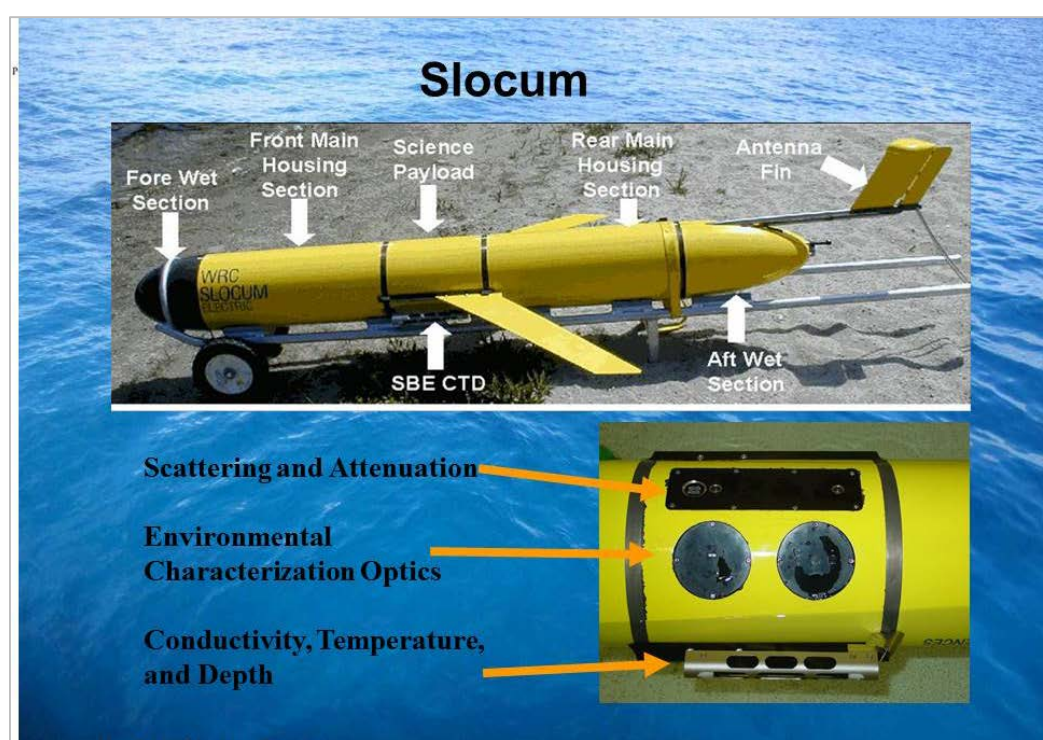
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Courtesy of Jeffrey Smart. (<http://www.atcourses.com>)

Underwater Optical Communication and Detection

Glider and shipboard data collection by NAVO



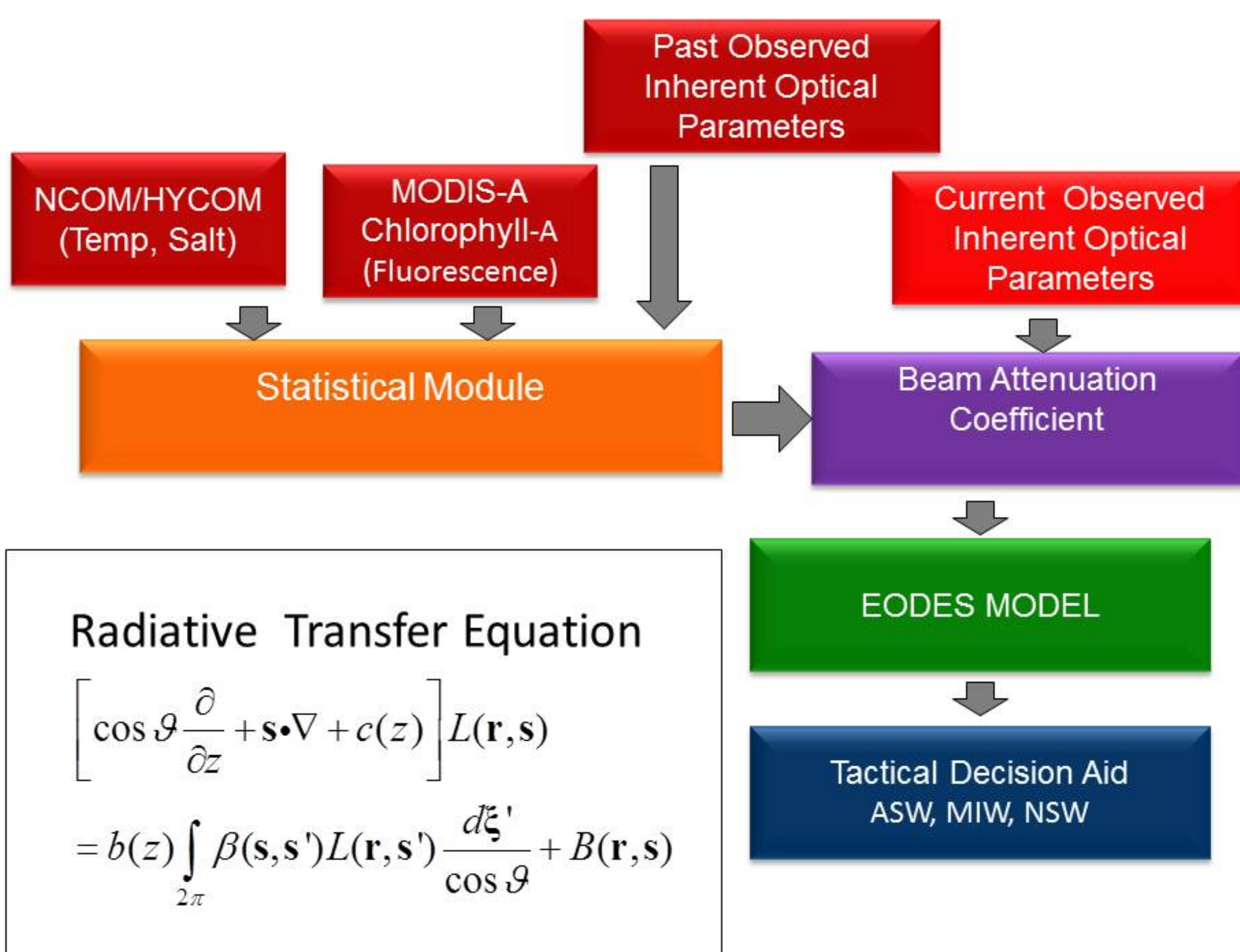
From Naval Oceanographic Office

Underwater Optical Transfer

- Sensor characteristics and response functions
- Laser image quality brought about by absorption and scattering of the media (i.e. seawater) and background illumination
- Bottom reflectivity and clutter effects
- Target characteristics

Glider and Shipboard HIDEK, BIOLITE Data from NAVO

Potential Research Focus/Questions



What are the effects of (T, S) and particles (e.g., chlorophyll) characteristics on the underwater optical transmission?

What is the bioluminescent effect?

What are the effects of ocean environment on underwater optical communication and detection?

How can the underwater radiative transfer equation (RTE) be effectively solved to get the optical path loss?