Coastal Texas Oceans II

Enhancing Remote Sensing Capabilities of the Sargassum Early Advisory System (SEAS) Through the Use of NASA EOS and Open Source GIS

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The study area for this project includes the Texas coastal waters in the Northwestern Gulf of Mexico. This includes Galveston, South Padre Island, and Corpus Christi, TX.
Sargassum is a brown macroalgae found floating in large, dense mats in the Gulf of Mexico.

Two species found in GoM: S. natans and S. fluitans.

Gas bubbles cause Sargassum to stay afloat.

Mats serve as a valuable habitat to unique communities of marine organisms.

http://oarnorthwest.com/2013/03/daily-education-update-3-5-sargassum/

Sargassum natans, left, and Sargassum fluitans, right photo by GCRL
Community Concerns

• Can trap **plastics, paper, medical** and **industrial waste**

• Decomposition of **Sargassum** and the organisms therein give rise to **unattractive odors**

• Poses a serious **threat to local tourism**, which brings in **$7 million annually**

http://www.flickr.com/photos/mermaidsocks/5564726185/

http://www.crystalbeach.com/weed.htm
• Sargassum Early Advisory System (SEAS)
• Produces eight day forecasts of Sargassum events
• SEAS Forecasting timeframe allows coastal managers to concentrate the appropriate Sargassum mitigation techniques
• Forecast absence of Sargassum mats allows beach managers to focus equipment use where most needed
• Such forecasting also helps beach managers to better allocate their budget
1. **Improve estimations of *Sargassum* landings** in coastal environments through the use of NASA remote sensing

2. Develop and demonstrate methods for **enhanced *Sargassum* detection** in open source GIS software for cost-effectiveness
Satellites

Landsat 4-5 TM

Landsat 7 ETM+

Landsat 8 OLI
Sargassum is not easily identifiable in natural color images.
Methodology

Using different Indices and color alteration techniques we were able to highlight the *Sargassum* mats.
Visible *Sargassum* in ArcMap:
Confidence Level: 3
Landsat 8: Path 24 Row 42, 18 February 2014
Visible Sargassum
ArcMap
Confidence Level: 2
Landsat 8
Path 26 Row 41
31 January 2014
Conclusions

• **NIR/Red ratio, NDVI, and modified FAI** showed good potential for improving *Sargassum* mat visualization and detection – these could enable automated detection with additional research and development.

• **Enhanced “Natural Color” RGBs** derived from Landsat Level 1 data also **increased visibility of subtle *Sargassum* mats** compared to GloVis Natural Color images.
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This work is supported by NASA through contract NNL11AA00B and cooperative agreement NNX14AB60A.
• Proposed project at NASA Ames Research Center (January – April, 2016)

• Objective: Create Early Advisory System of Sargassum in Caribbean

• Ground data needed to validate satellite imagery

• End-users / collaborators interested?
Thank You!