

CoastColour: Lessons from Area 7

Jim Gower¹, Stephanie King¹,

¹Institute of Ocean Sciences, Fisheries and Oceans Canada, Sidney BC

jim.gower@dfo-mpo.gc.ca, stephanie.king@dfo-mpo.gc.ca

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Acknowledgements

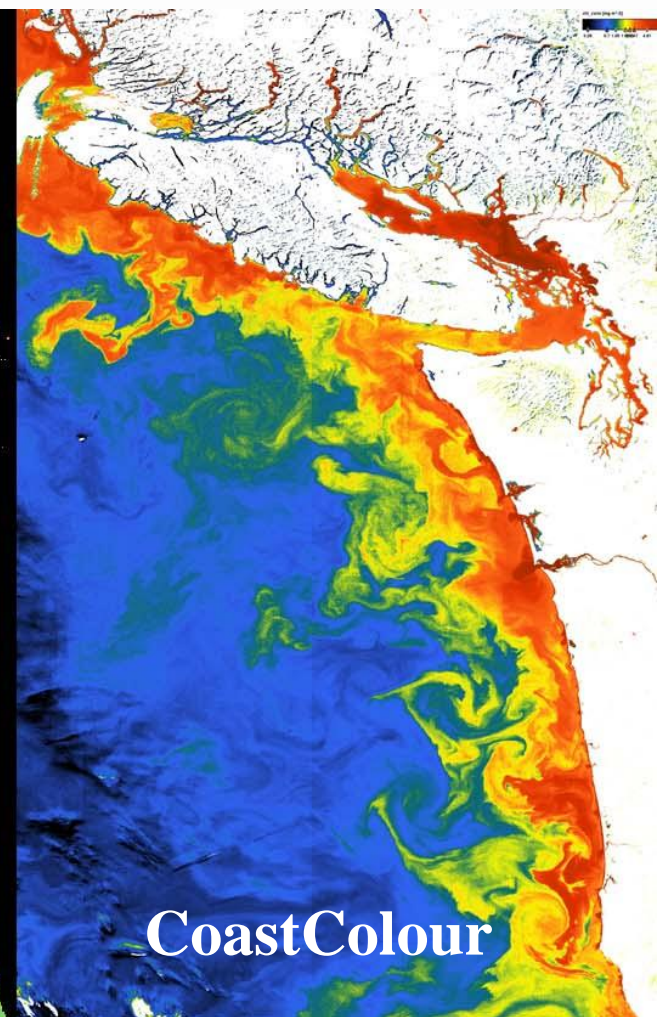
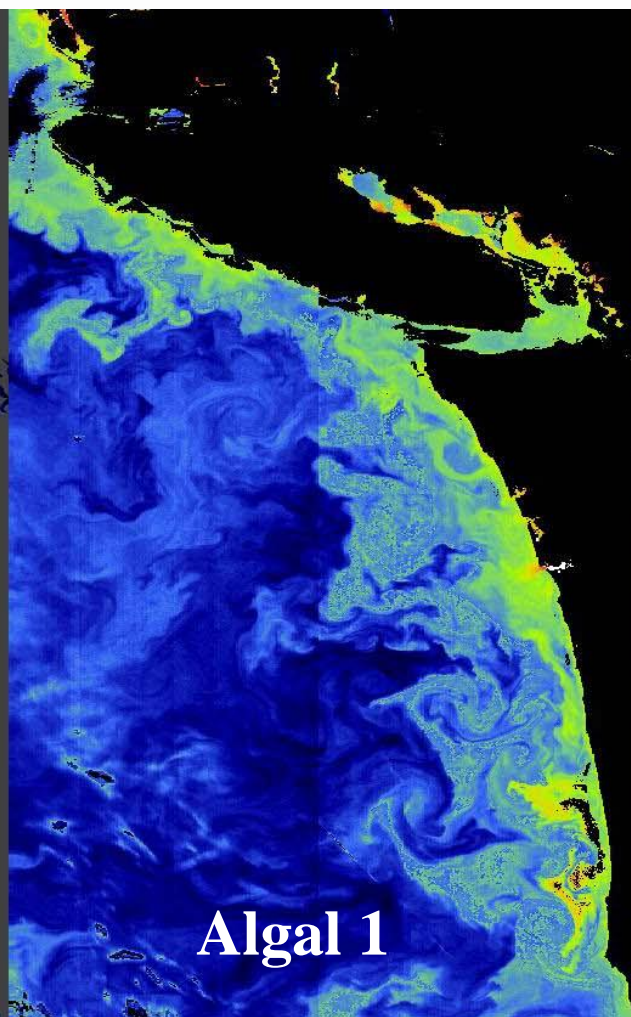
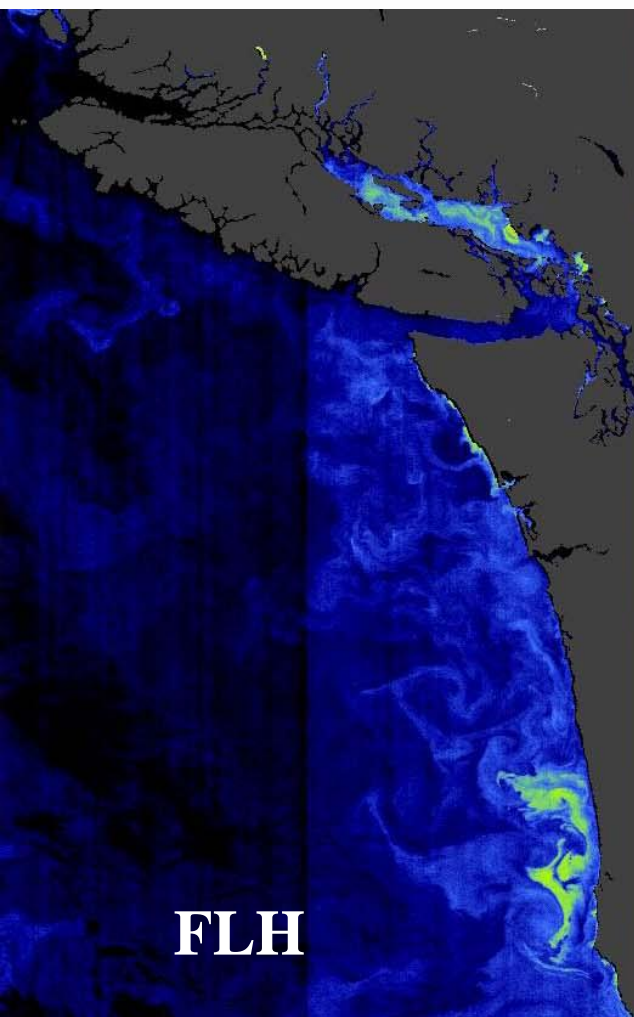
- Funding provided by the Canadian Space Agency under the GRIP program, by the Canadian Department of Fisheries and Oceans and by CoastColour
- MERIS image data provided by ESA
Global MERIS MCI data from GPOD, ESA
MODIS images from NASA
- Image processing and glider operation by University of Victoria Co-op students: Lindsay Orr, Sara Statham and Rowan Fox, Thomas van Manen, Erika Young



Summary

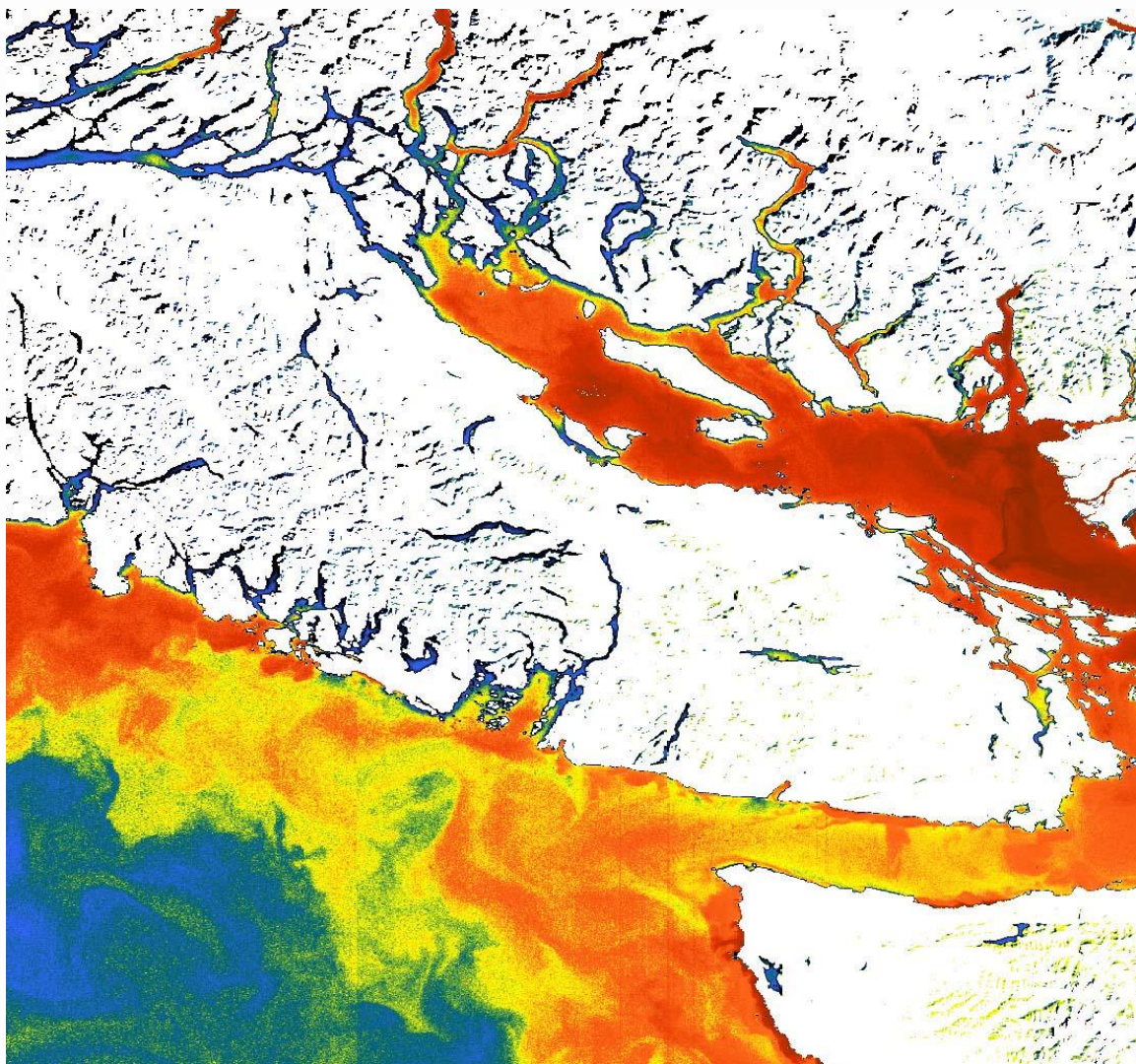
- CoastColour provides improved products, but problems remain
- FLH provides improved imaging in BC coastal waters
- MCI provides new data on Sargassum and intense plankton blooms





CoastColour provides improved products compared to Algal 1, but FLH suggests that the band of high chlorophyll along the coast may not be real. CDOM is a likely culprit (13 March 2005. CoastColour Web example, Area 7)



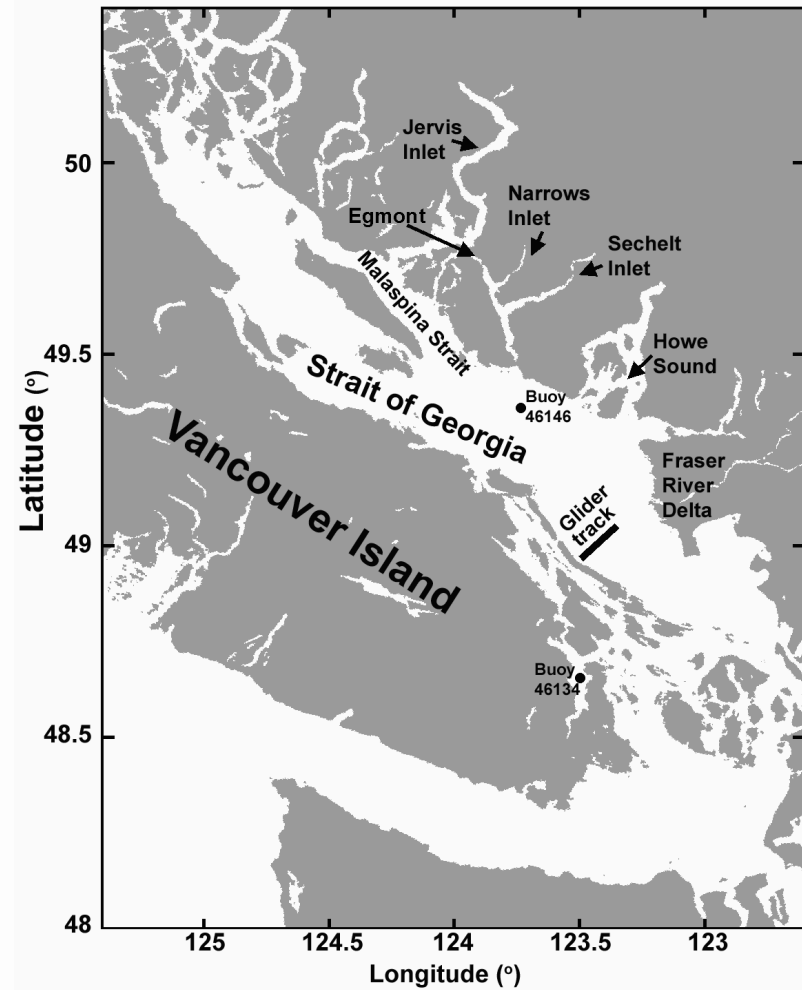


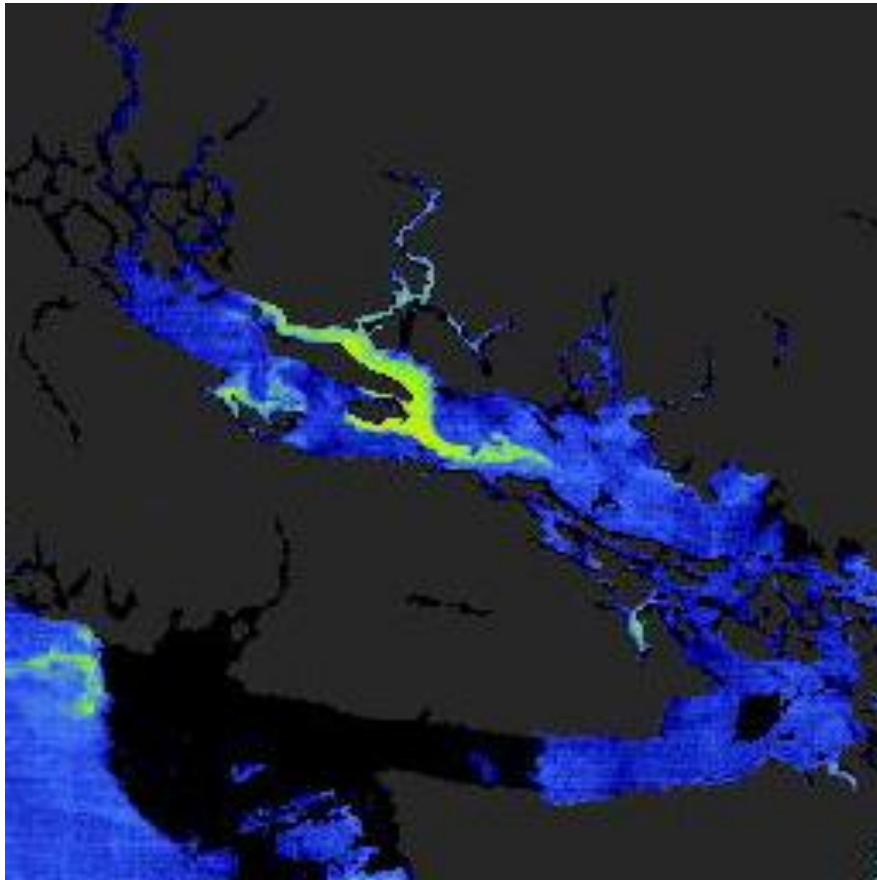
13 March 2005. CoastColour Web example, Area 7 showing low values in almost all narrow inlets, suggesting adjacency error, especially near steep mountainous coasts



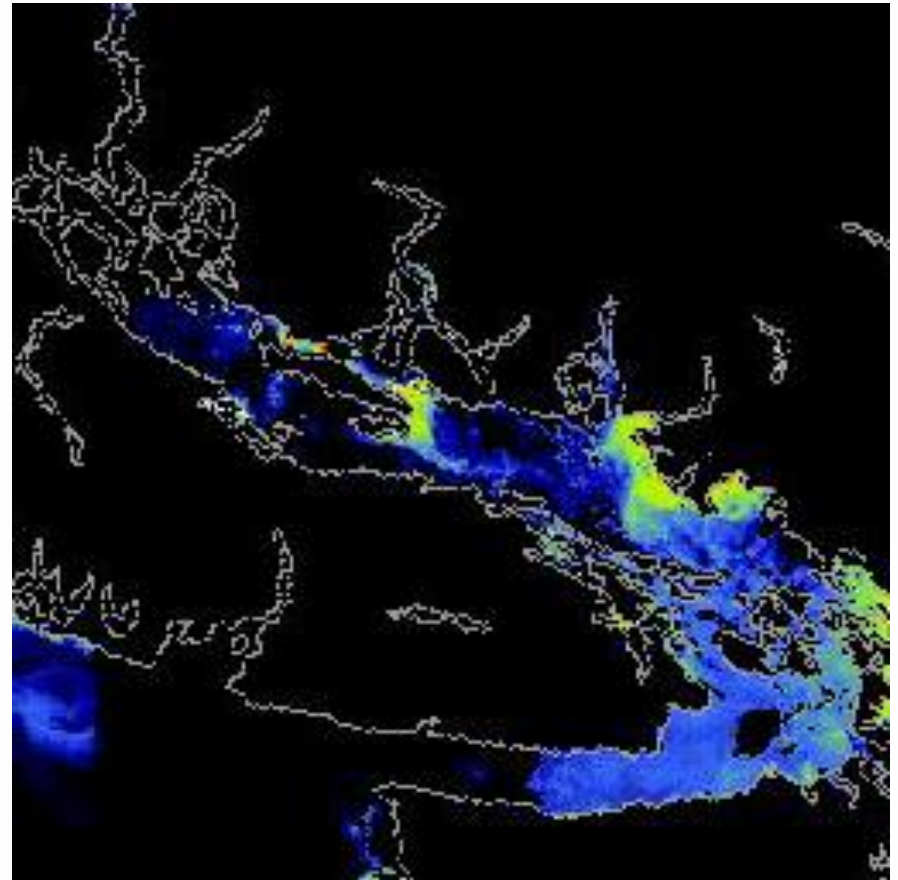
Strait of Georgia spring bloom

- Satellite FLH images give full area coverage interrupted by cloud (gaps to 10d)
- In situ instruments at Egmont, buoy 46146 and glider track give good timing
- Seeding blooms with “Malaspina Dragon” occurred in 5 out of 9 recent years
- Spring Bloom nearly 1 month earlier with seeding





FLH

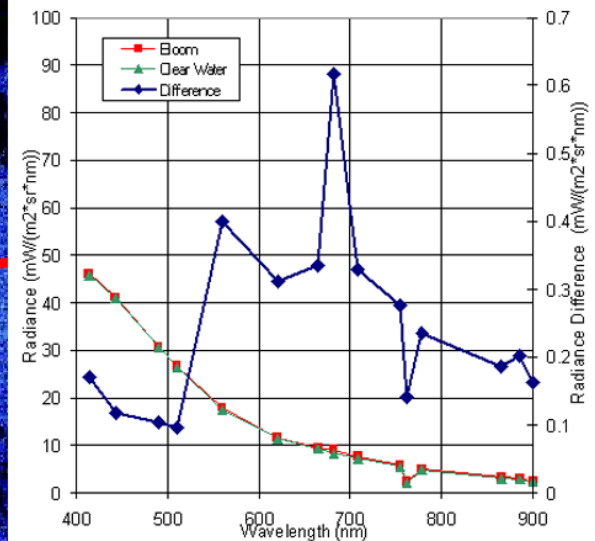
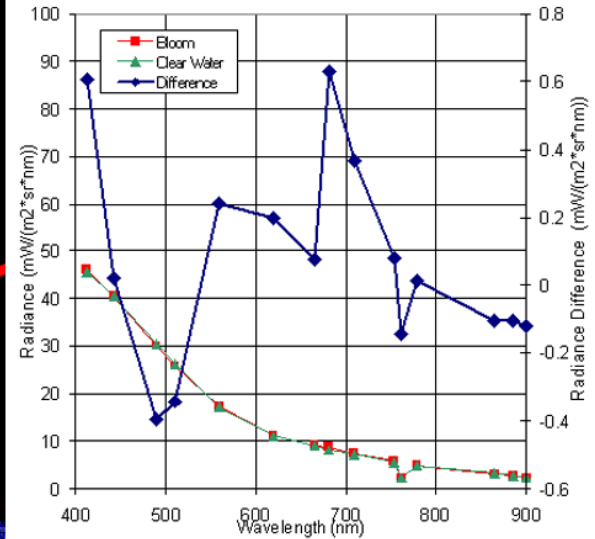
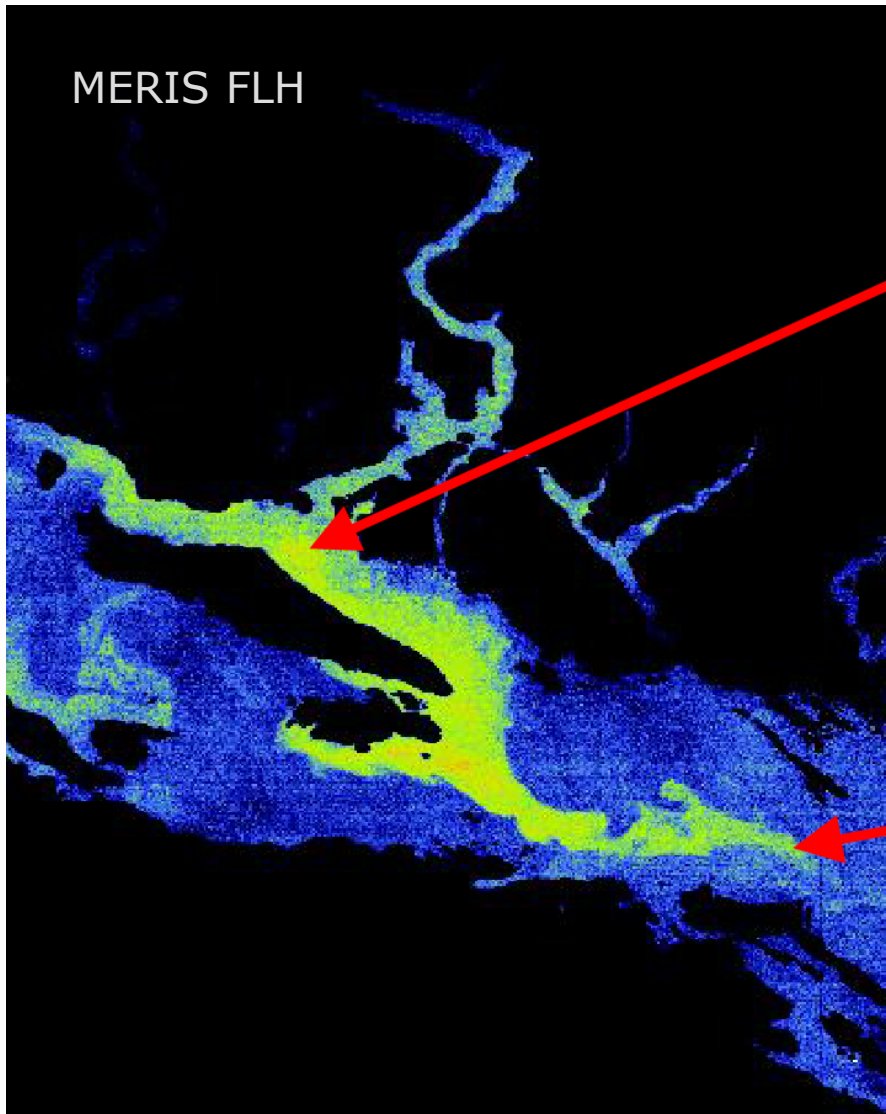


Algal1

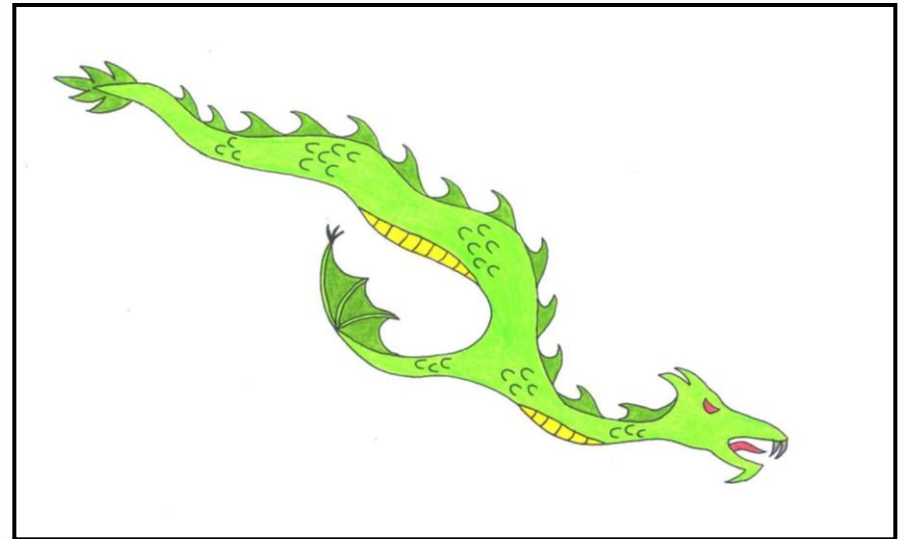
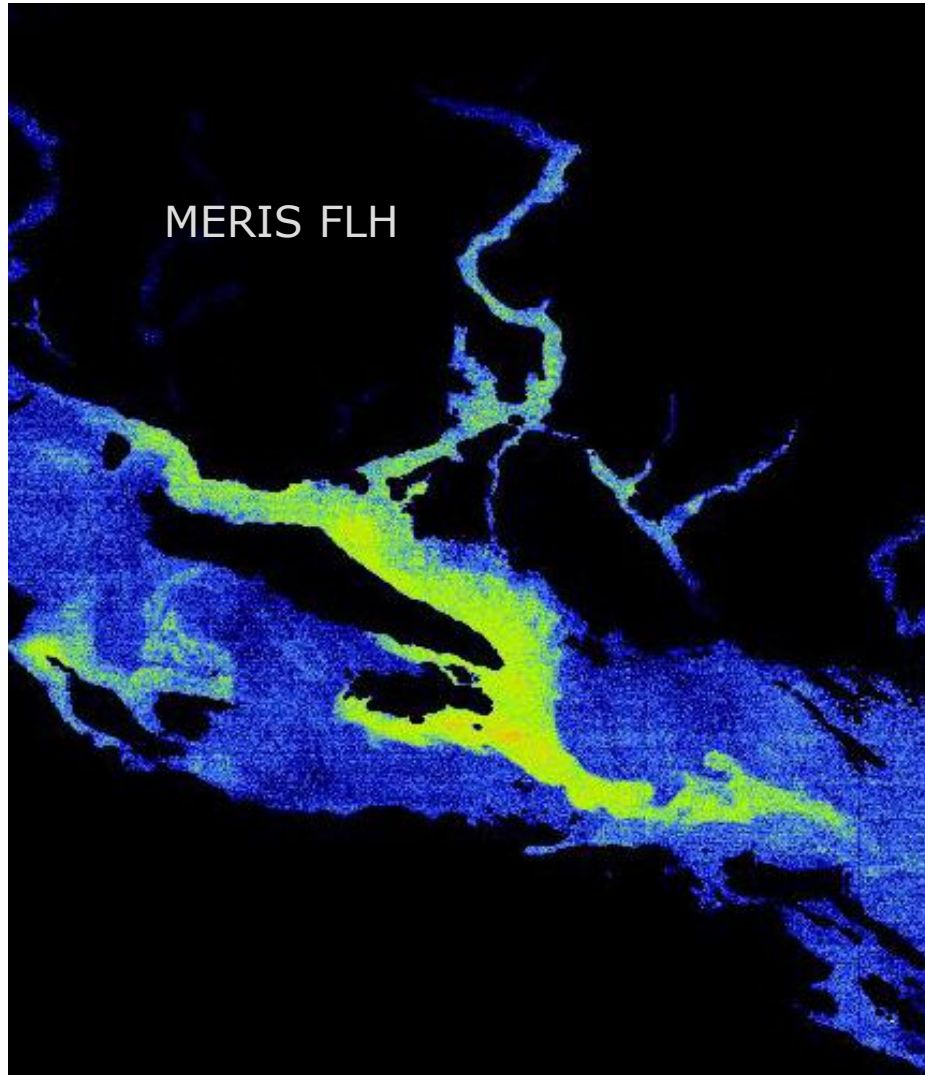
MERIS February 18 2009

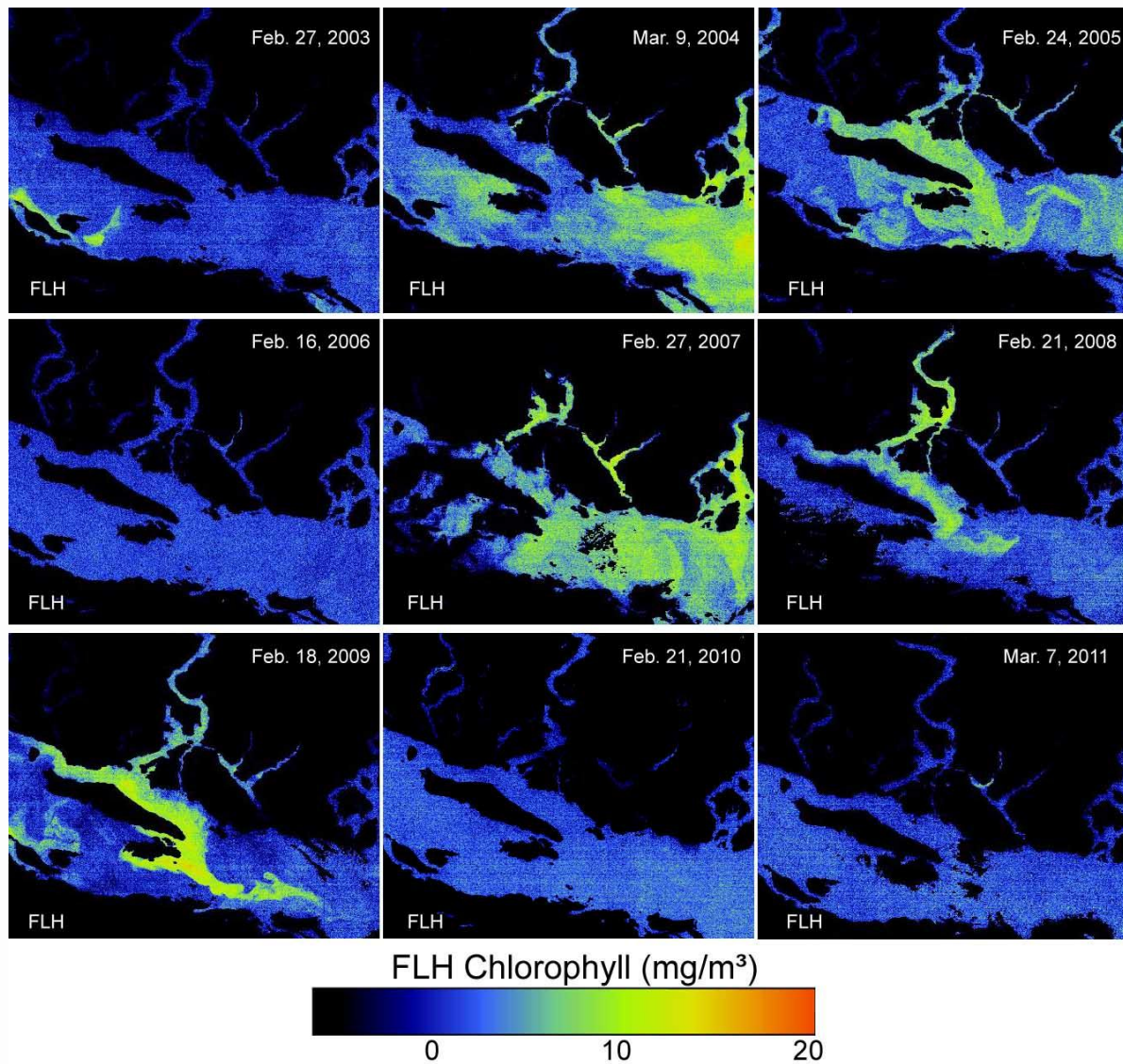


MERIS FLH February 18, 2009



Malaspina Dragon



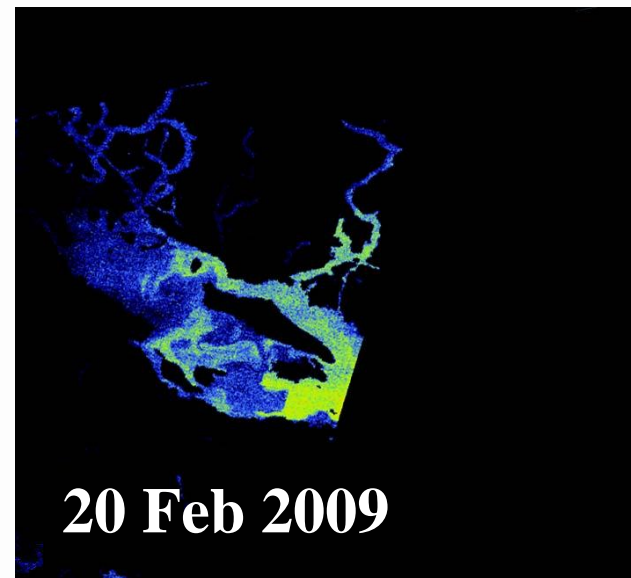
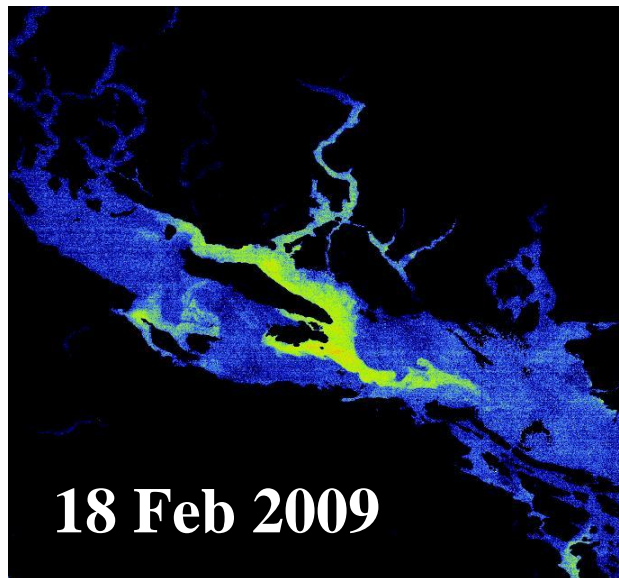
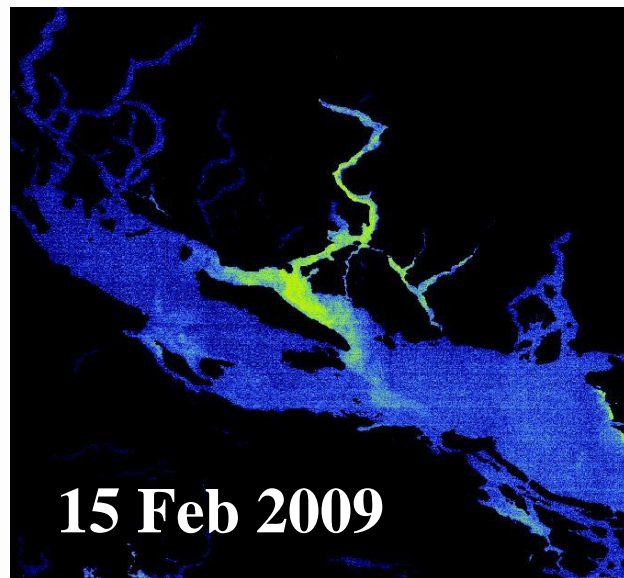
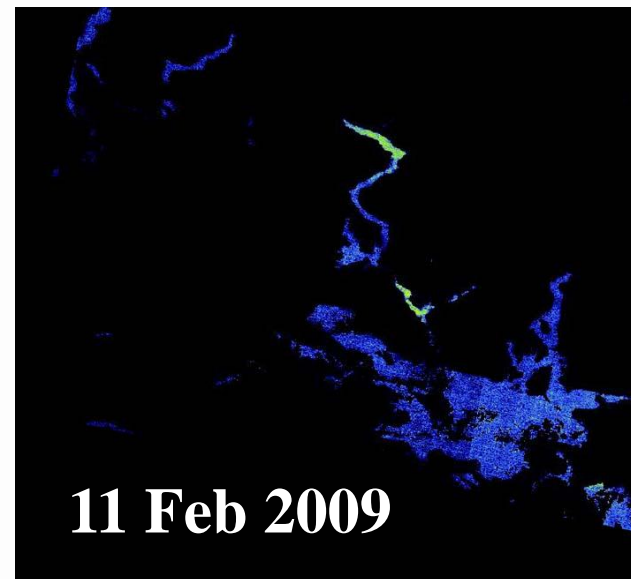
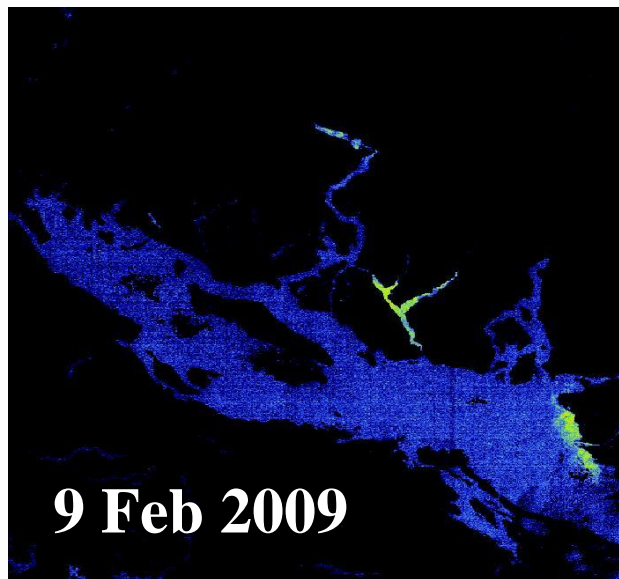
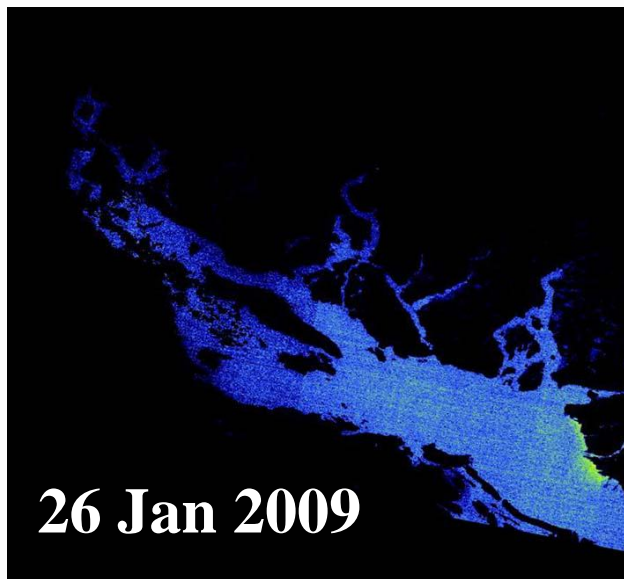


Surface chlorophyll patterns at one selected day in each year, 2003 to 2011, showing seeding in 2004, 2005, 2007, 2008, 2009 and 3 dragons



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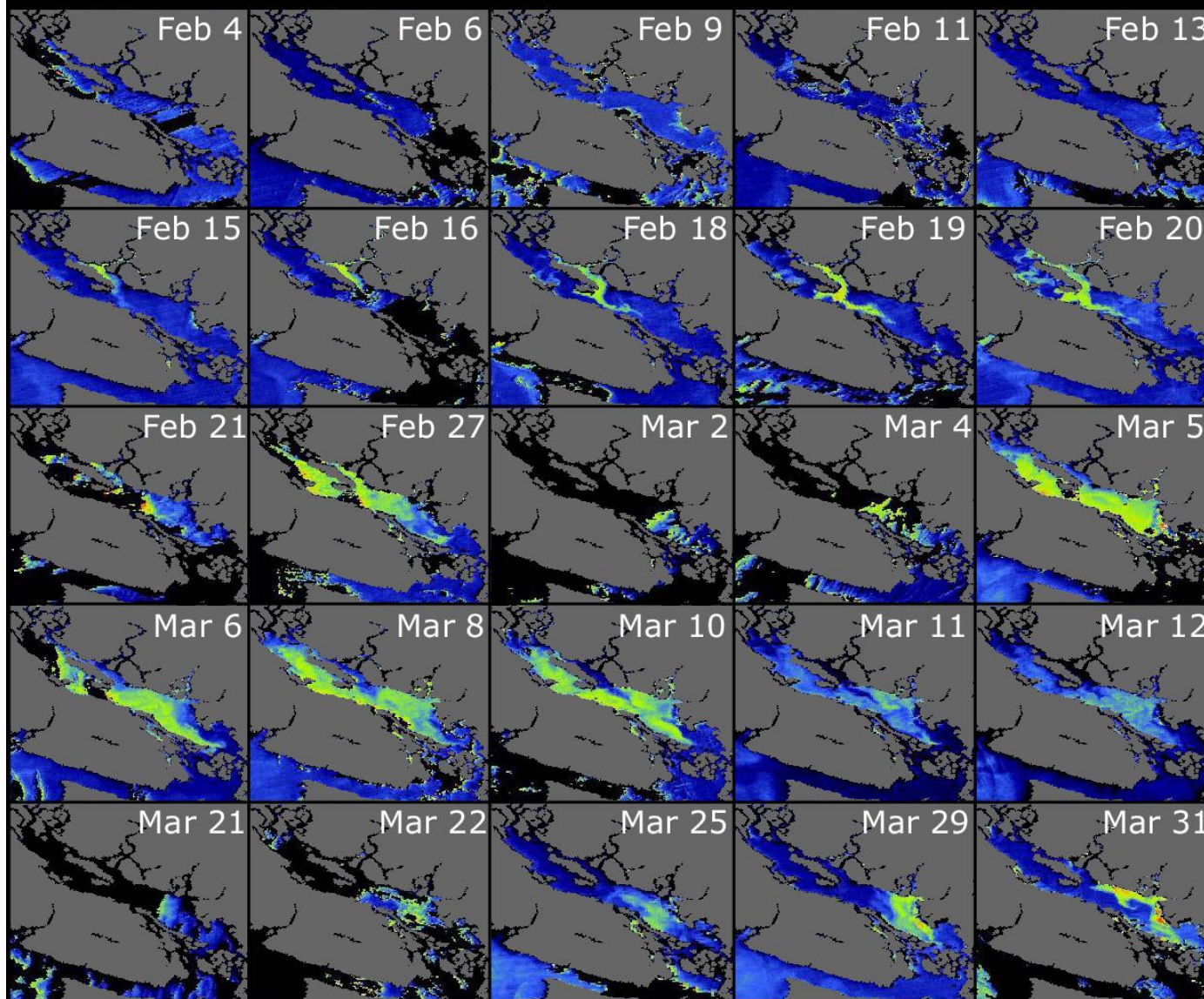
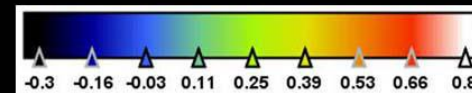
Blooms in Jervis and Sechelt Inlets imaged with MERIS FR FLH

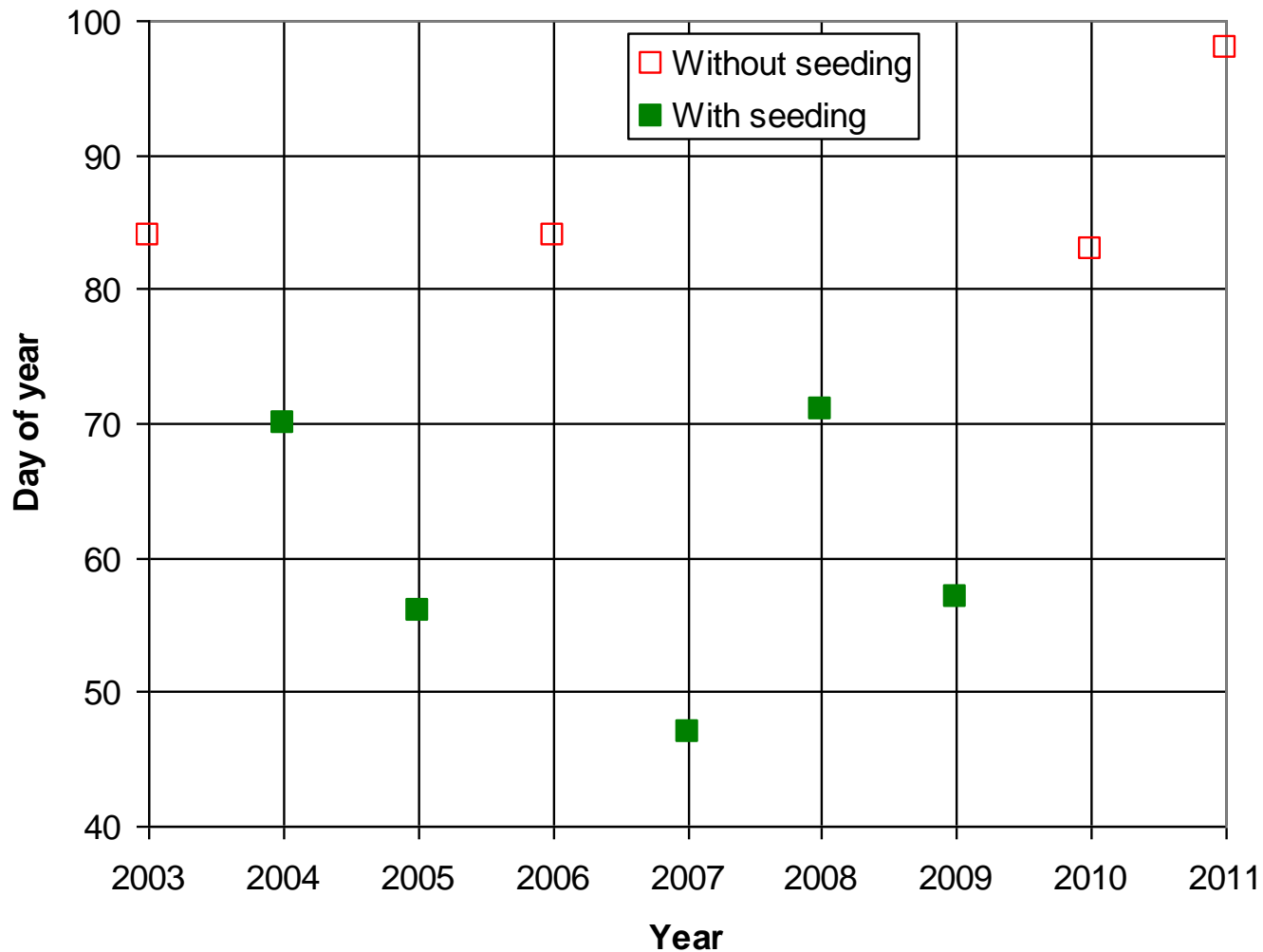


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MODIS (FLH) Time Series of the Strait of Georgia Spring Bloom February/March 2009

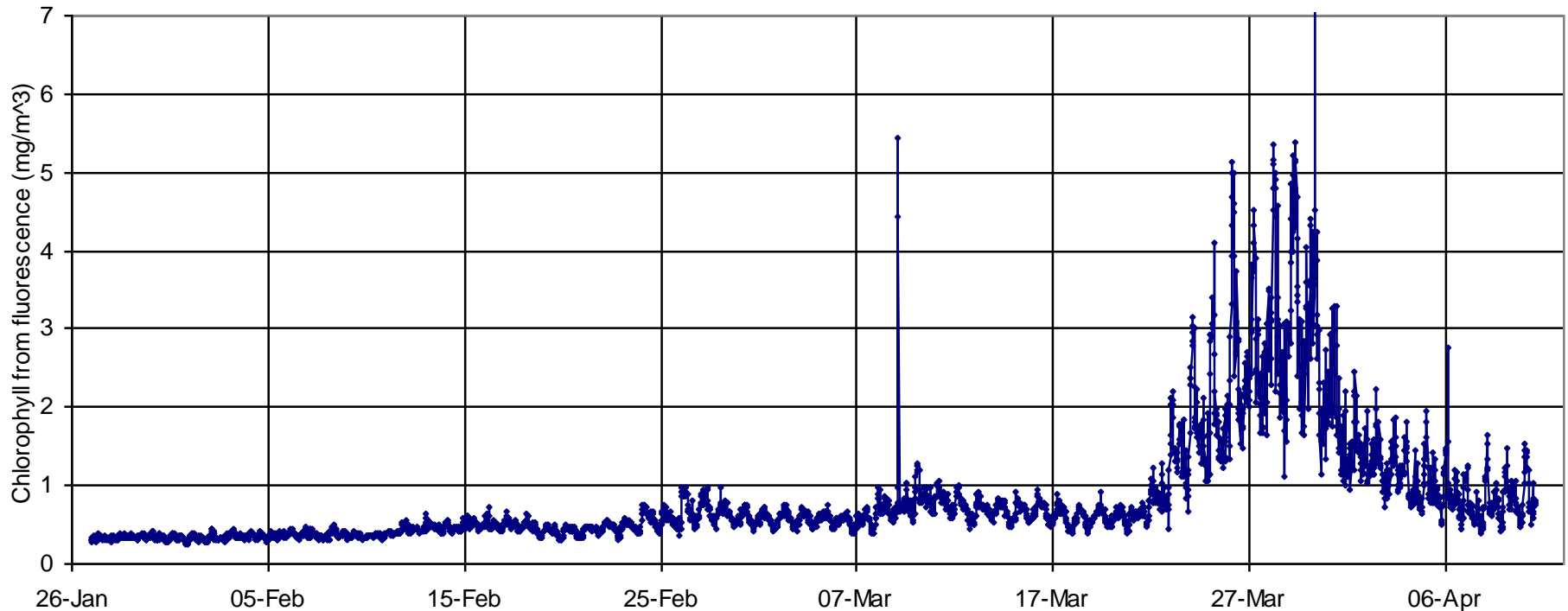




Spring bloom start dates in the Strait of Georgia for 2003 to 2011 expressed as “day of the year.” For non-leap years, day 50 is February 19 and day 80 is March 21. Years in which early “seeding” blooms were observed in northern inlets are plotted as solid green squares.

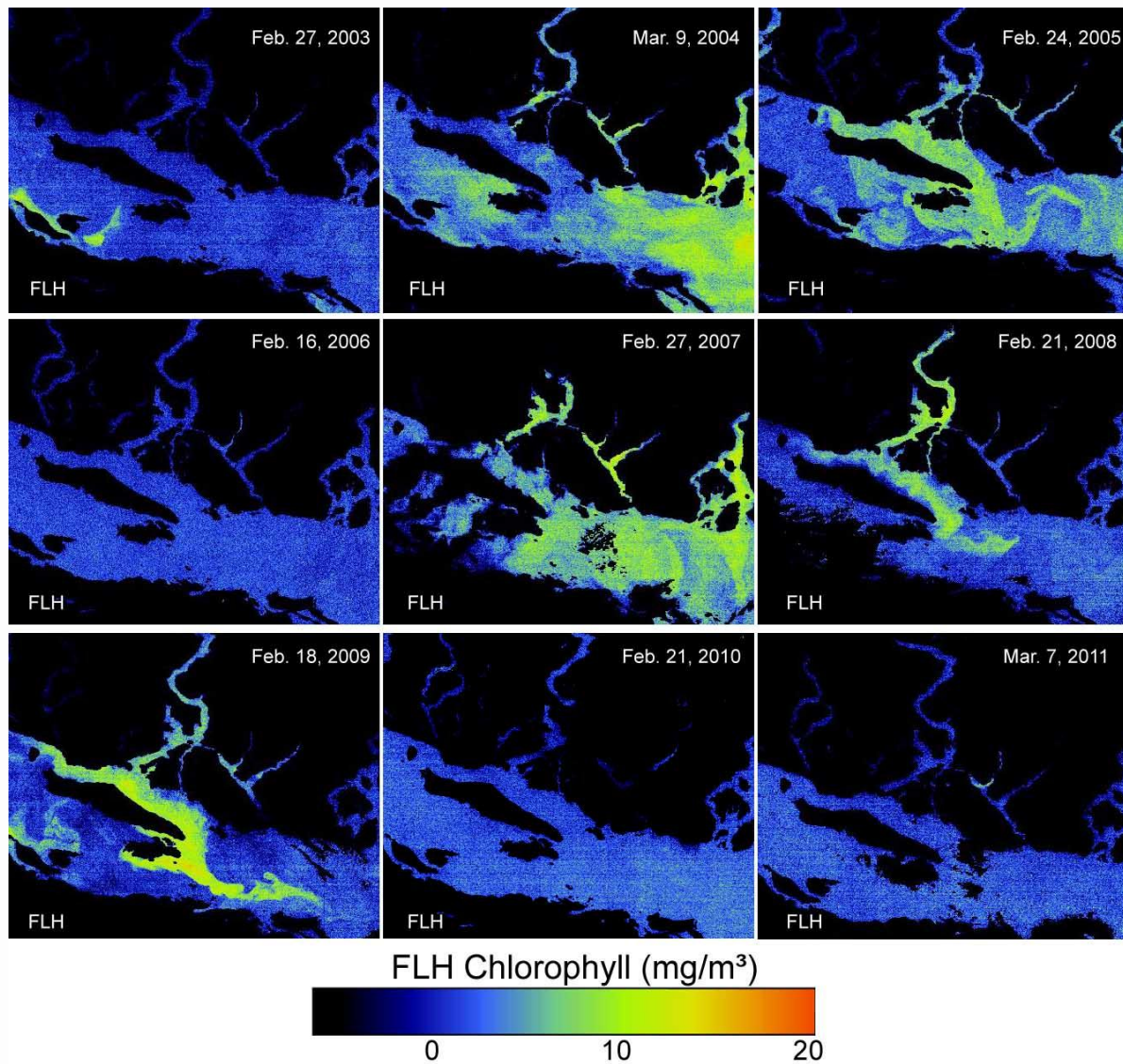


Egmont Fluorometer 2011



Egmont surface fluorometer time series, 2011. Chlorophyll fluorescence is low to March 20. Tide predictions show the bloom at March 27 came from Sechelt and not Jervis Inlet. The spike on March 9 is probably from a bloom in Narrows Inlet. The spring bloom came even later in 2011.





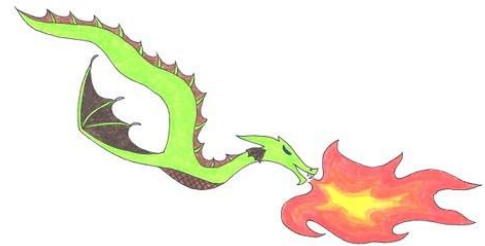
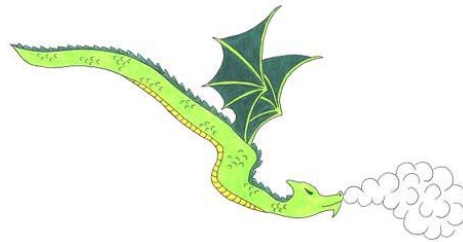
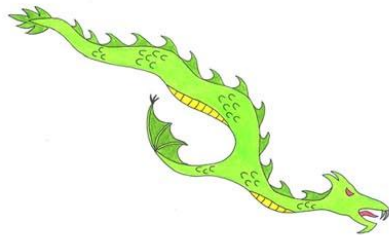
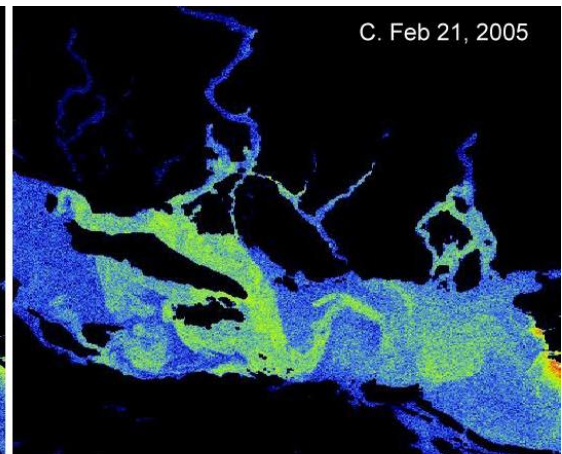
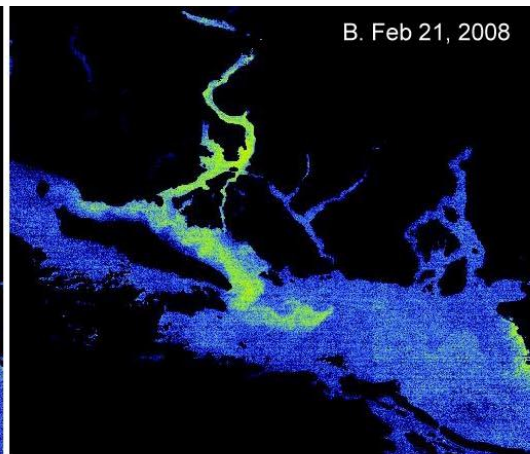
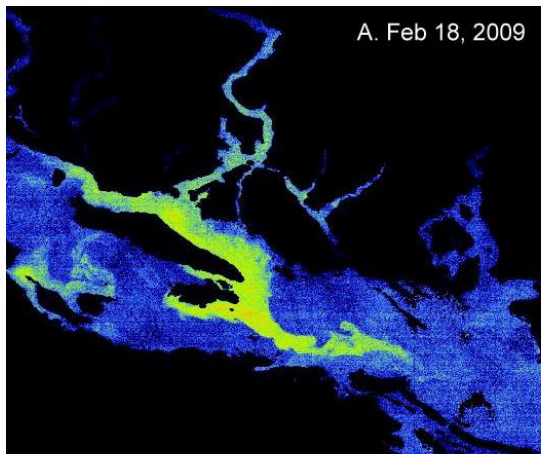
Surface chlorophyll patterns at one selected day in each year, 2003 to 2011, showing seeding in 2004, 2005, 2007, 2008, 2009 and 3 dragons



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Dragons





Port Aransas Texas, April 2011



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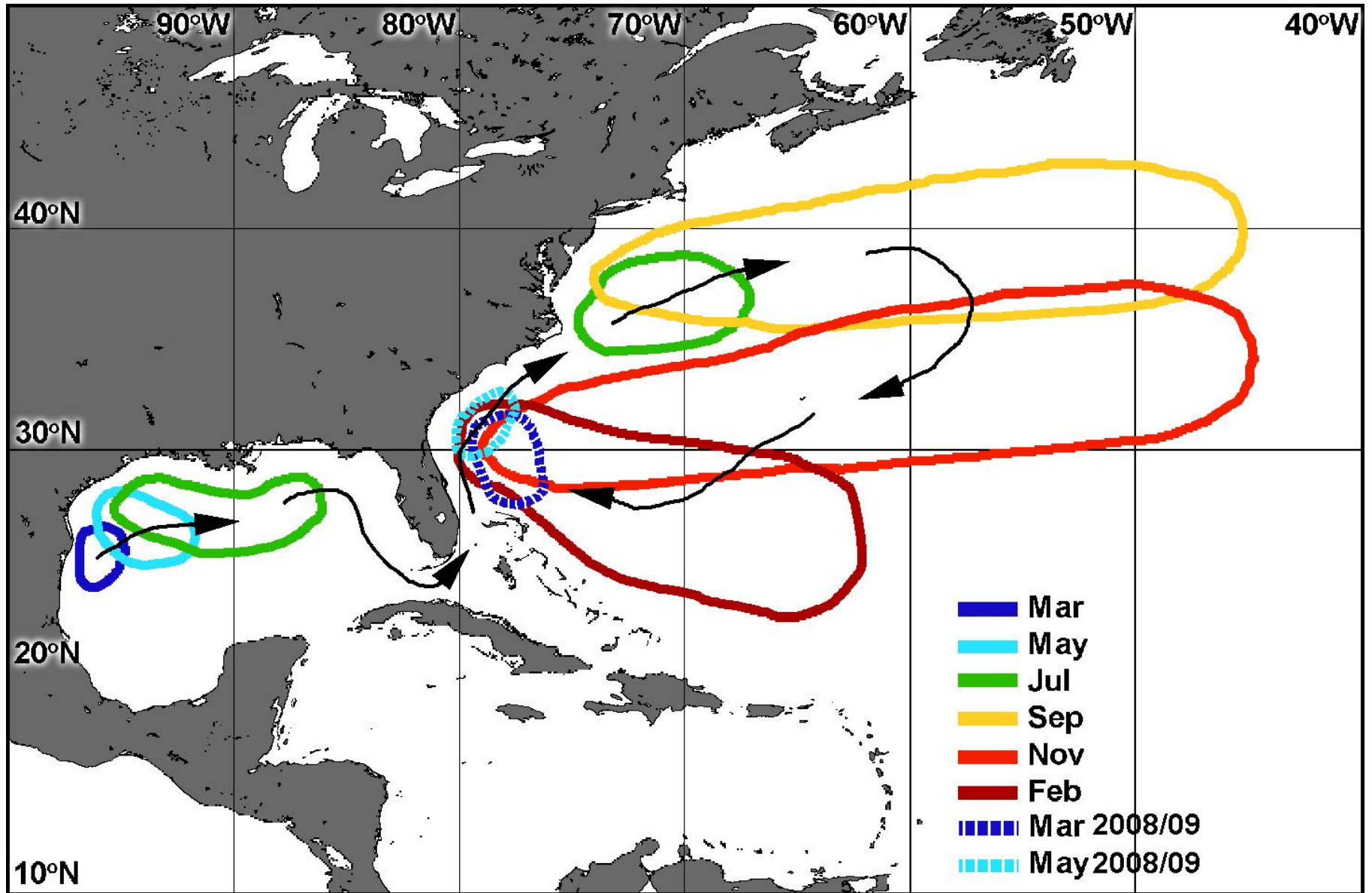
Barbados 2 Aug 2011

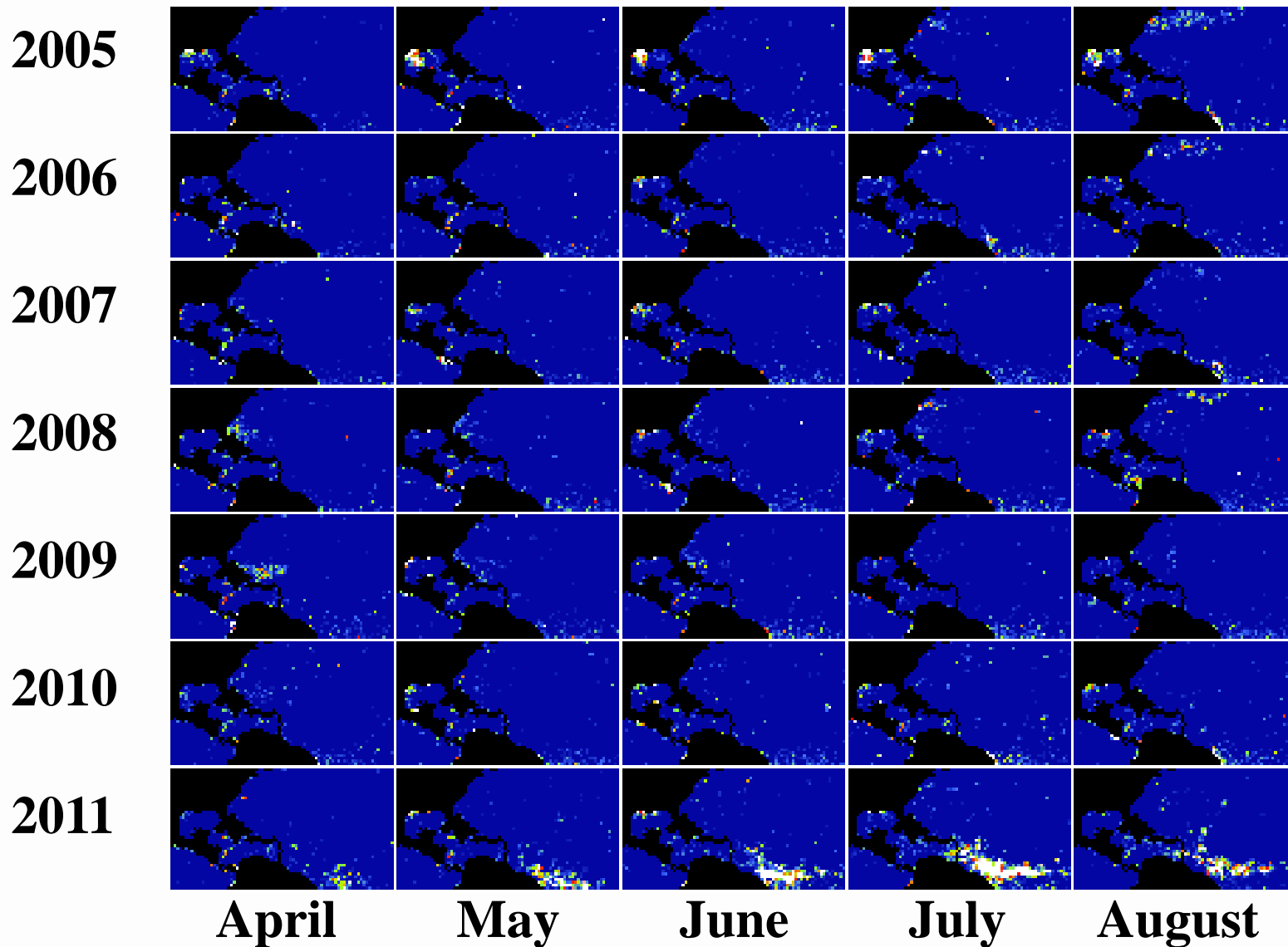


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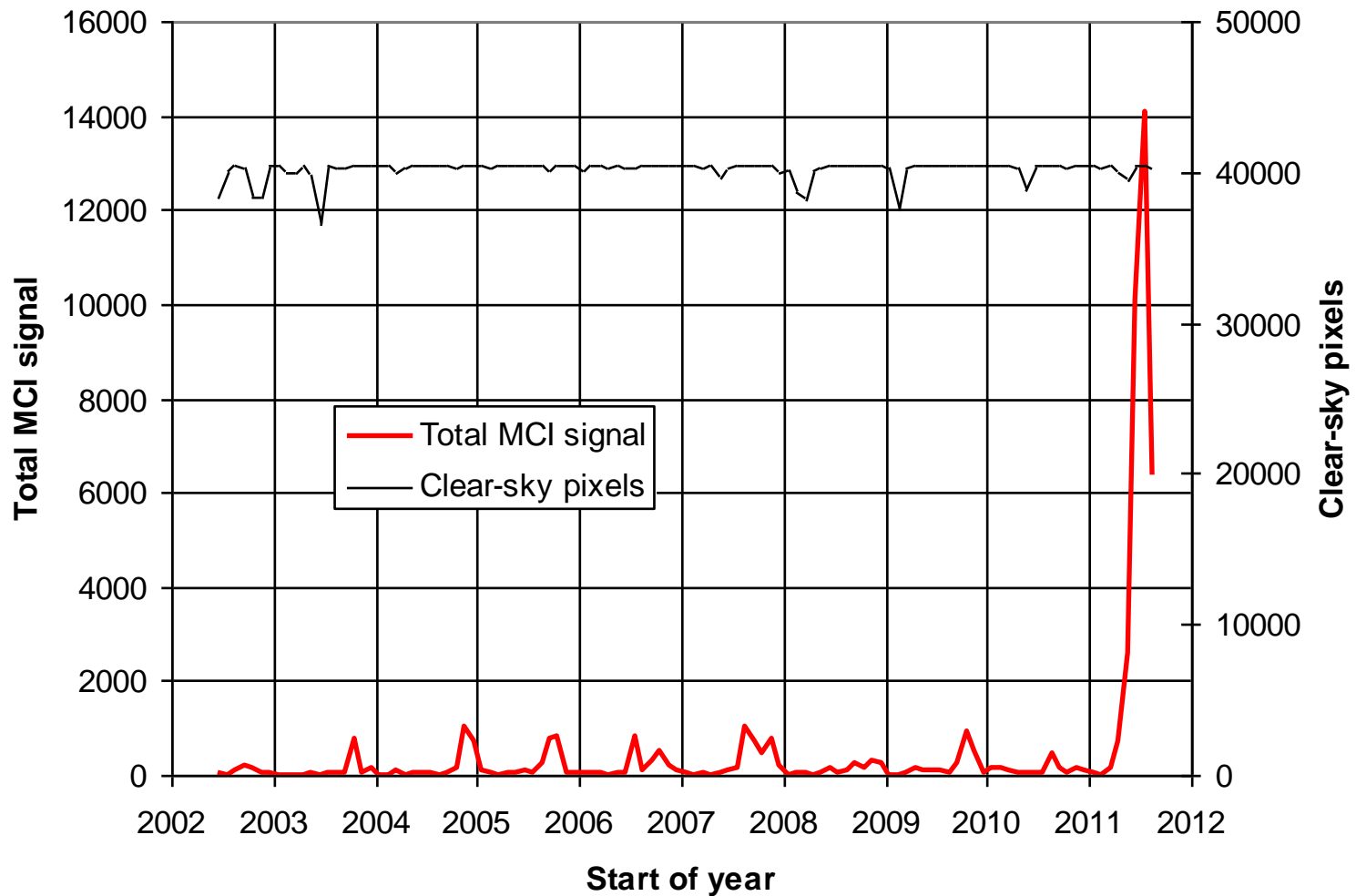
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Sargassum distribution summary 2002 to 2010





Sargassum distribution computed for 1-degree squares, showing the high growth in the north equatorial Atlantic in 2011



Time series of total MCI signal in area 38 to 51W, 5 to 9N, showing unprecedented growth in May to August 2011 (peak in July)





Sierra Leone 24 August 2011

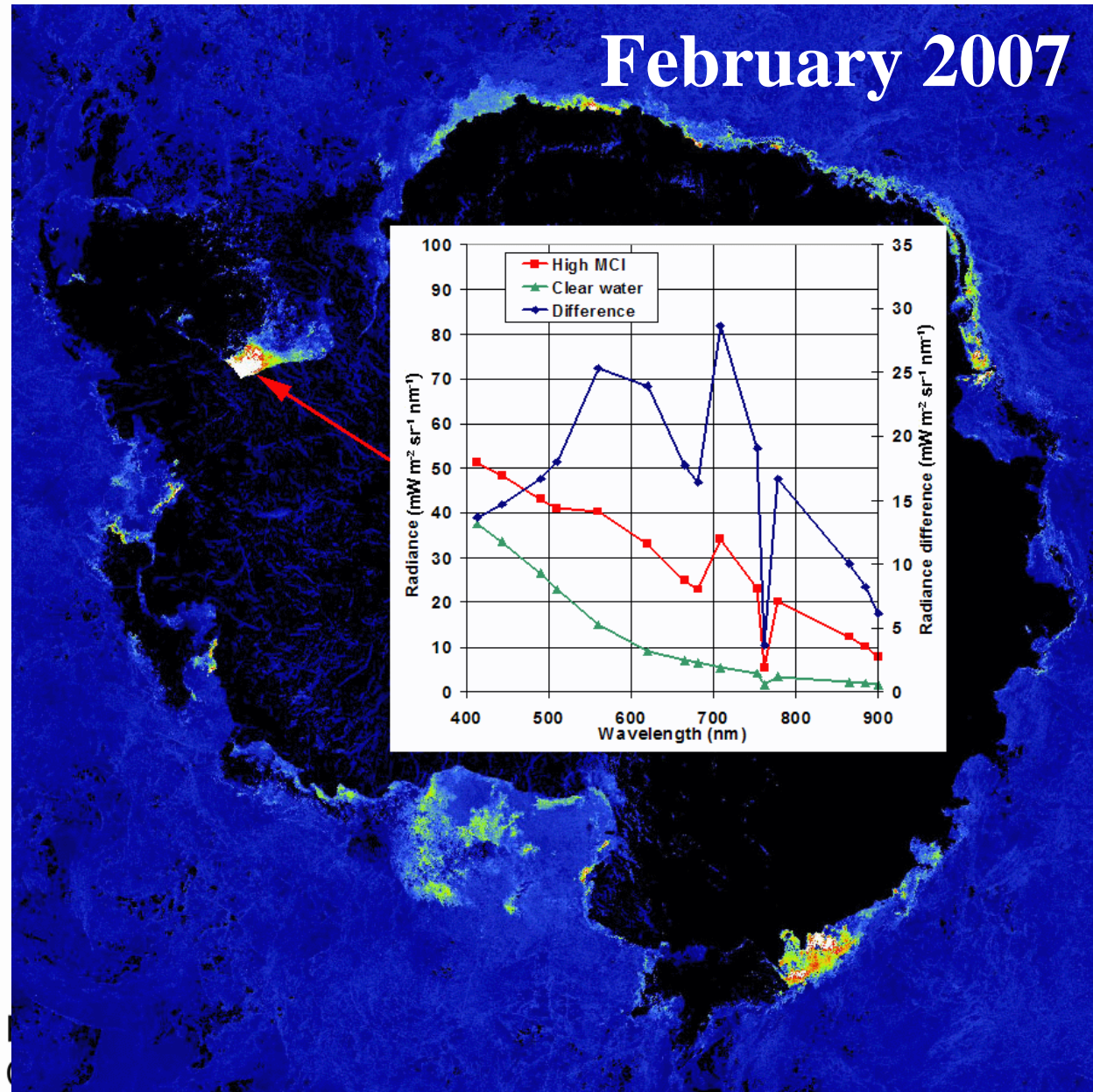


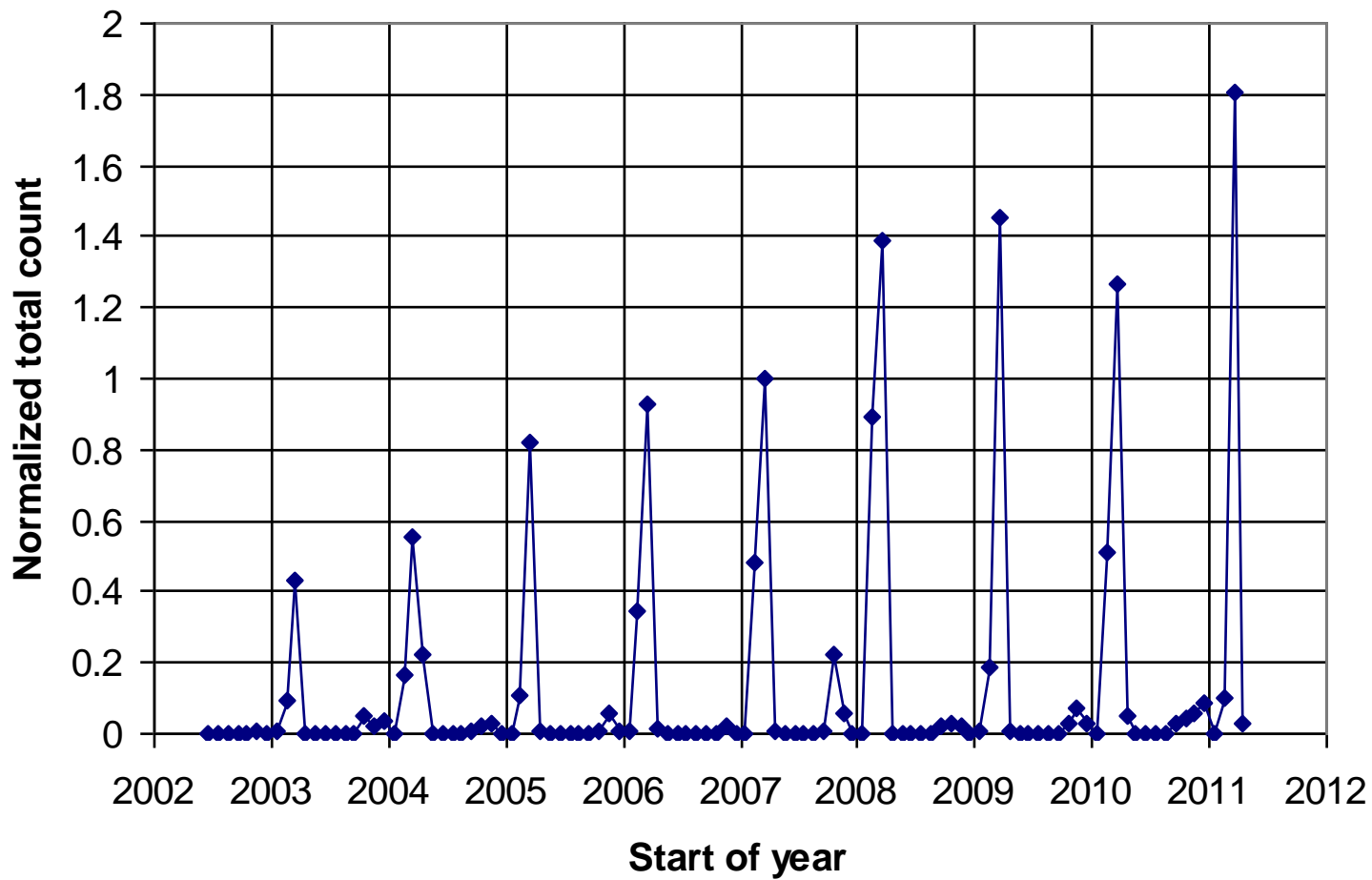
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Antarctic blooms

- Antarctic superblooms detected with global MCI composites
- Spectrum indicates chlorophyll absorption in ice/water mixture
- Similar blooms not yet seen in northern high latitudes.





Monthly time series of MERIS MCI, summed over Antarctic waters (all longitudes for the latitude range 60 to 80S) showing increase in signal from mixed ice/algae blooms



Conclusions

- Satellite images are giving the first observations of “seeding from inlets” into the Strait of Georgia
- Dragons seem associated with earlier spring blooms.
- We need to improve in-situ monitoring of these types of blooms, and of the evolution of the spring bloom (fluorometers at Egmont and Halibut Bank, glider?).
- The FLH (Fluorescence) images from MERIS and MODIS are especially useful in the Strait of Georgia and local inlets.
- High resolution images from MERIS (often through Canadian ground stations) are essential for satellites to see blooms in BC inlets. (Our thanks to CSA)
- From space, these blooms really do look like dragons

