

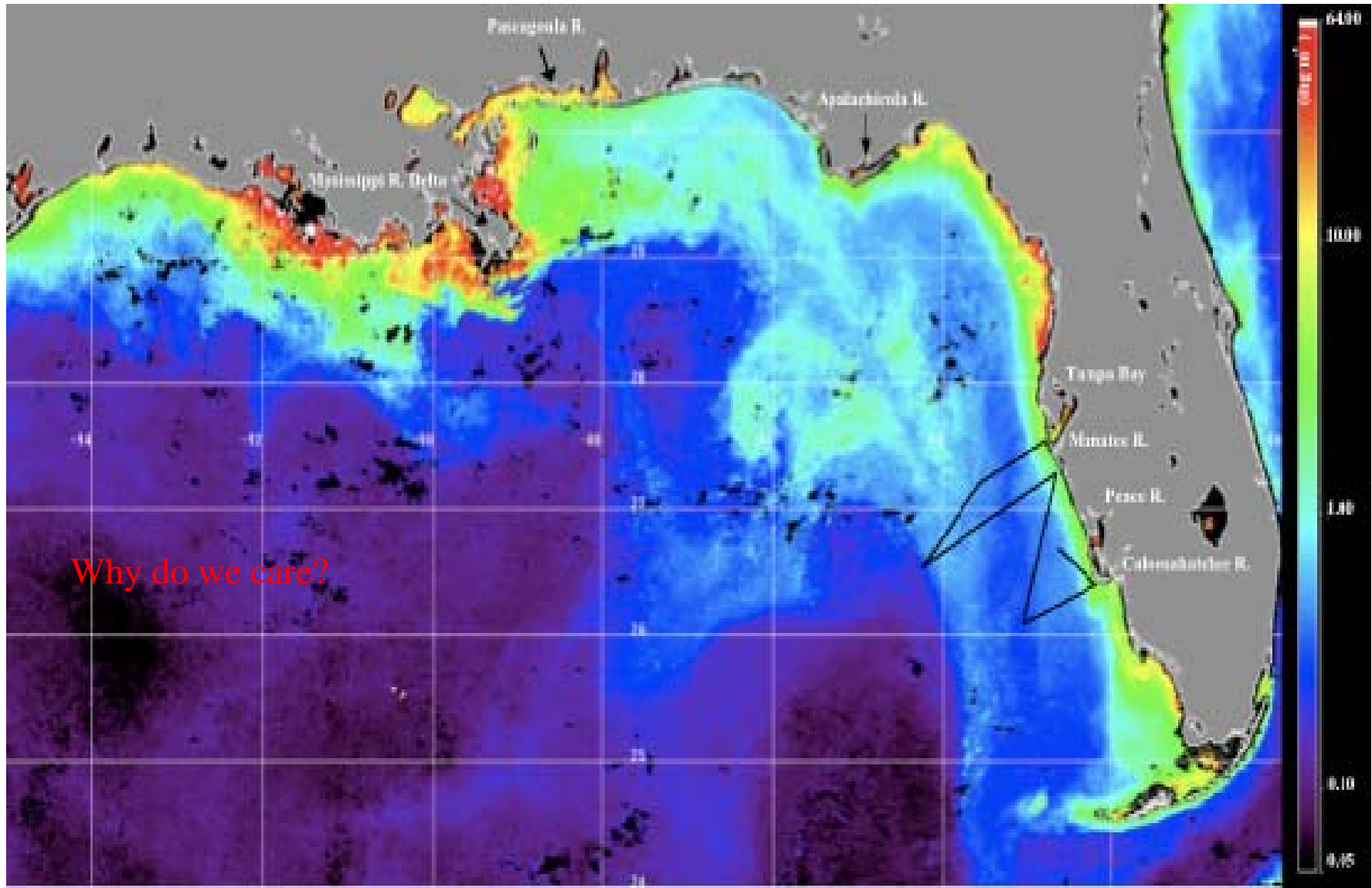
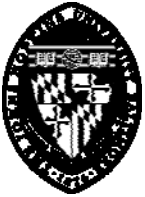
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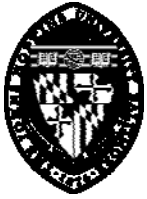
On the use of remote sensing to measure carbon transport by river plumes

Carlos E. Del Castillo

Space Department-Ocean Remote Sensing

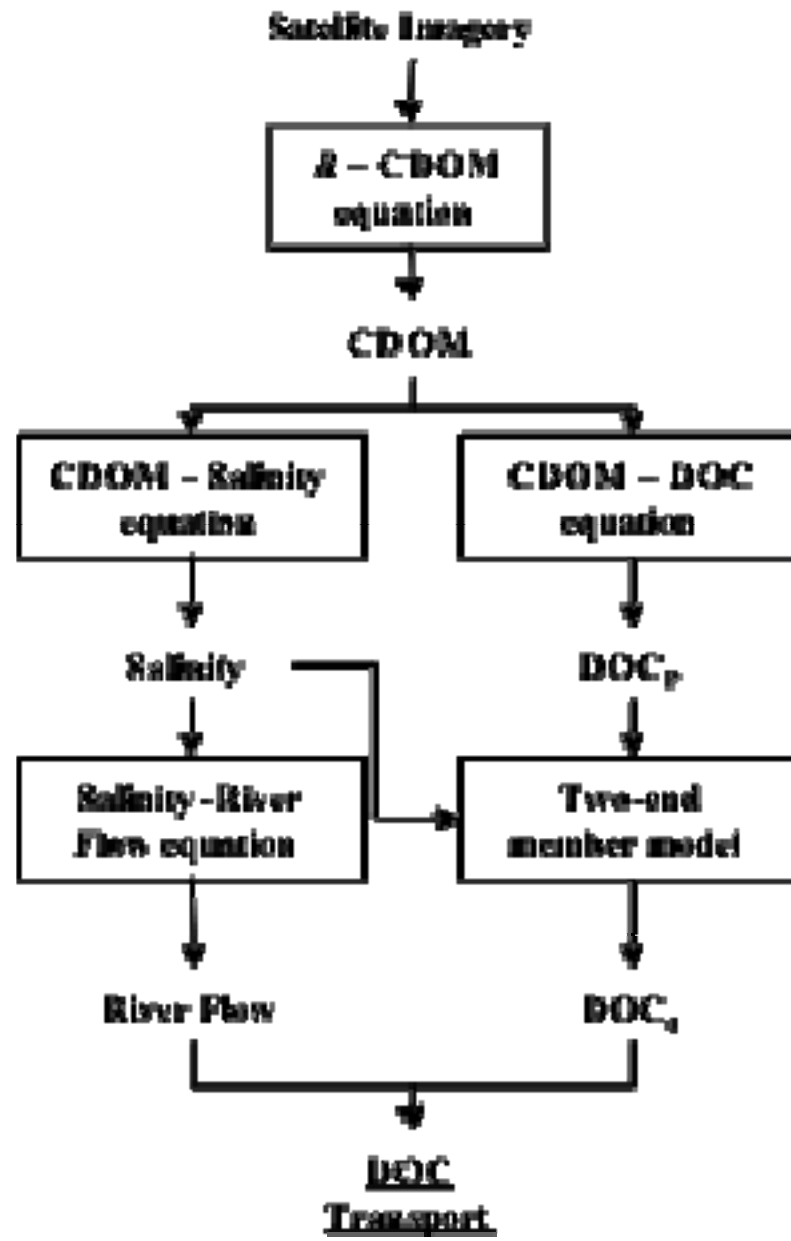
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Can we measure carbon transport by rivers from space?

- If we can measure CDOM from Space
- If CDOM and DOC correlate
- If CDOM and DOC are conservative
- If salinity and river flow correlate



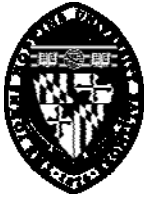




Why the Mississippi?
Important river
Large Basin
Levied (canalized)
Well studied
Good data from USGS
Close to home
Good fishing







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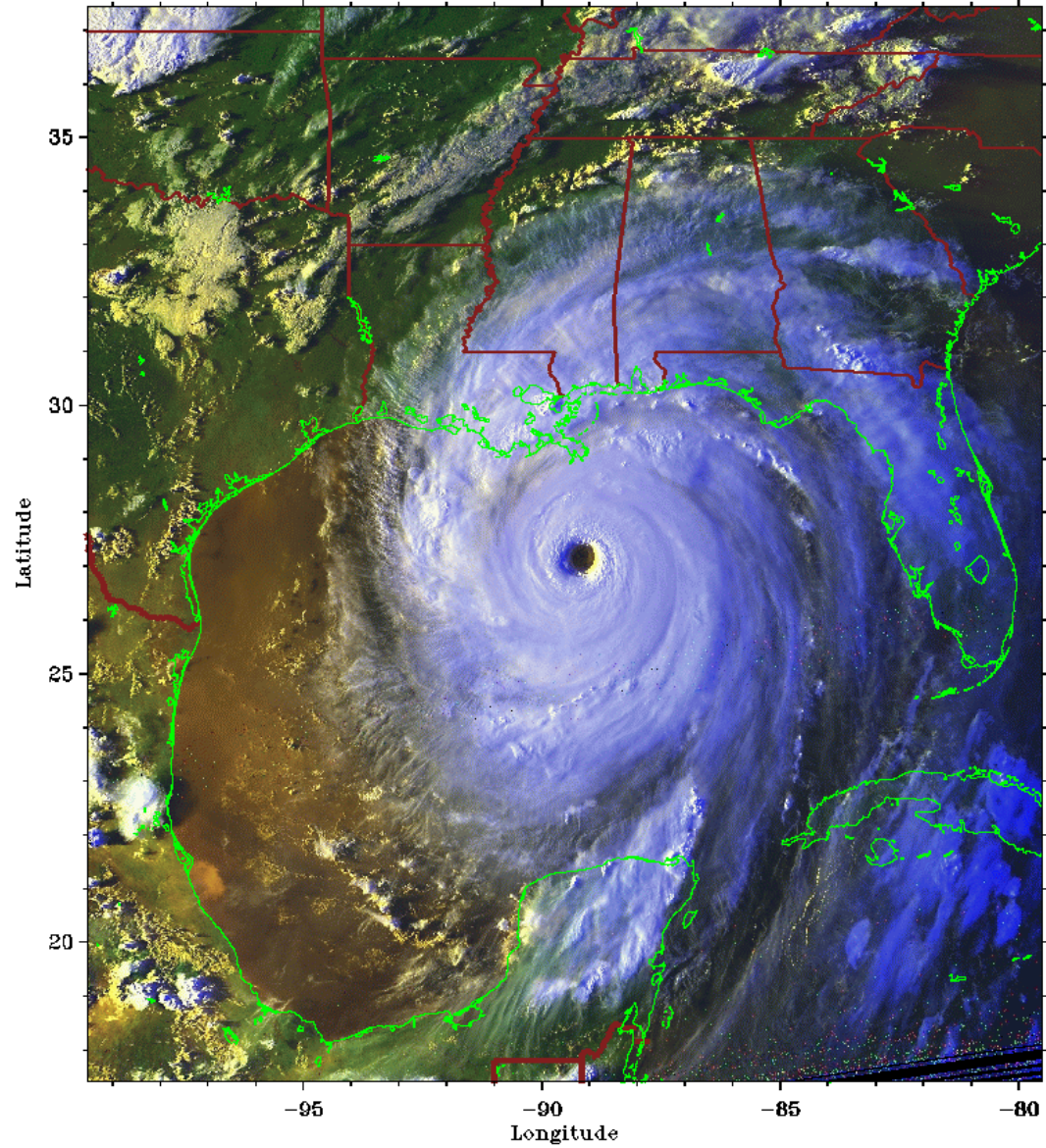
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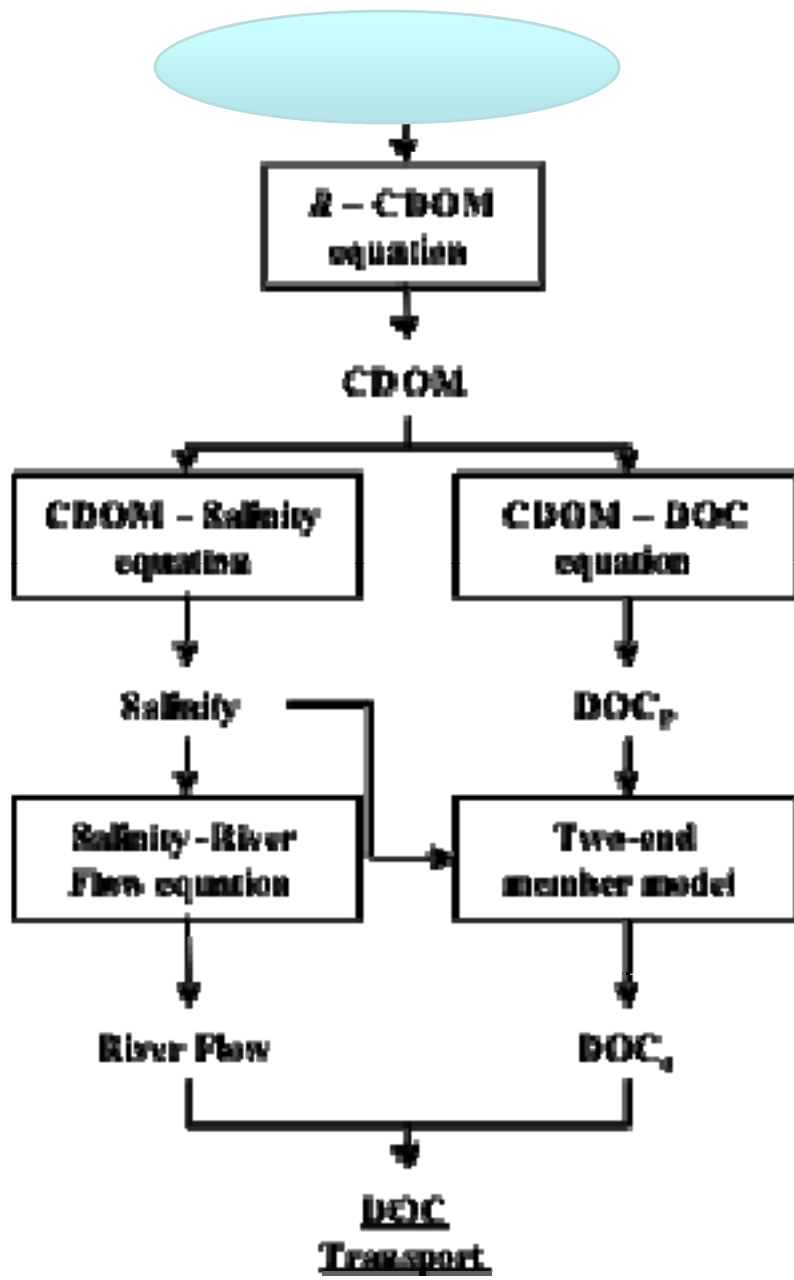


Hurricane Katrina

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AVHRR 3 Channel Color Composite
NOAA-15 AVHRR 2005 Aug 28 23:32 UT
Daytime: R=C1 G=C2 B=-C4





Instrument Bands

Band	Wavelength
1	402-422 nm
2	433-453 nm
3	480-500 nm
4	500-520 nm
5	545-565 nm
6	660-680 nm
7	745-785 nm
8	845-885 nm

Mission Characteristics

Orbit Type	Sun Synchronous at 705 km
Equator Crossing	Noon +20 min, descending
Orbital Period	99 minutes
Swath Width	2,801 km LAC/HRPT (58.3 degrees)
Swath Width	1,502 km GAC (45 degrees)
Spatial Resolution	1.1 km LAC, 4.5 km GAC
Real-Time Data Rate	665 kbps
Revisit Time	1 day
Digitization	10 bits

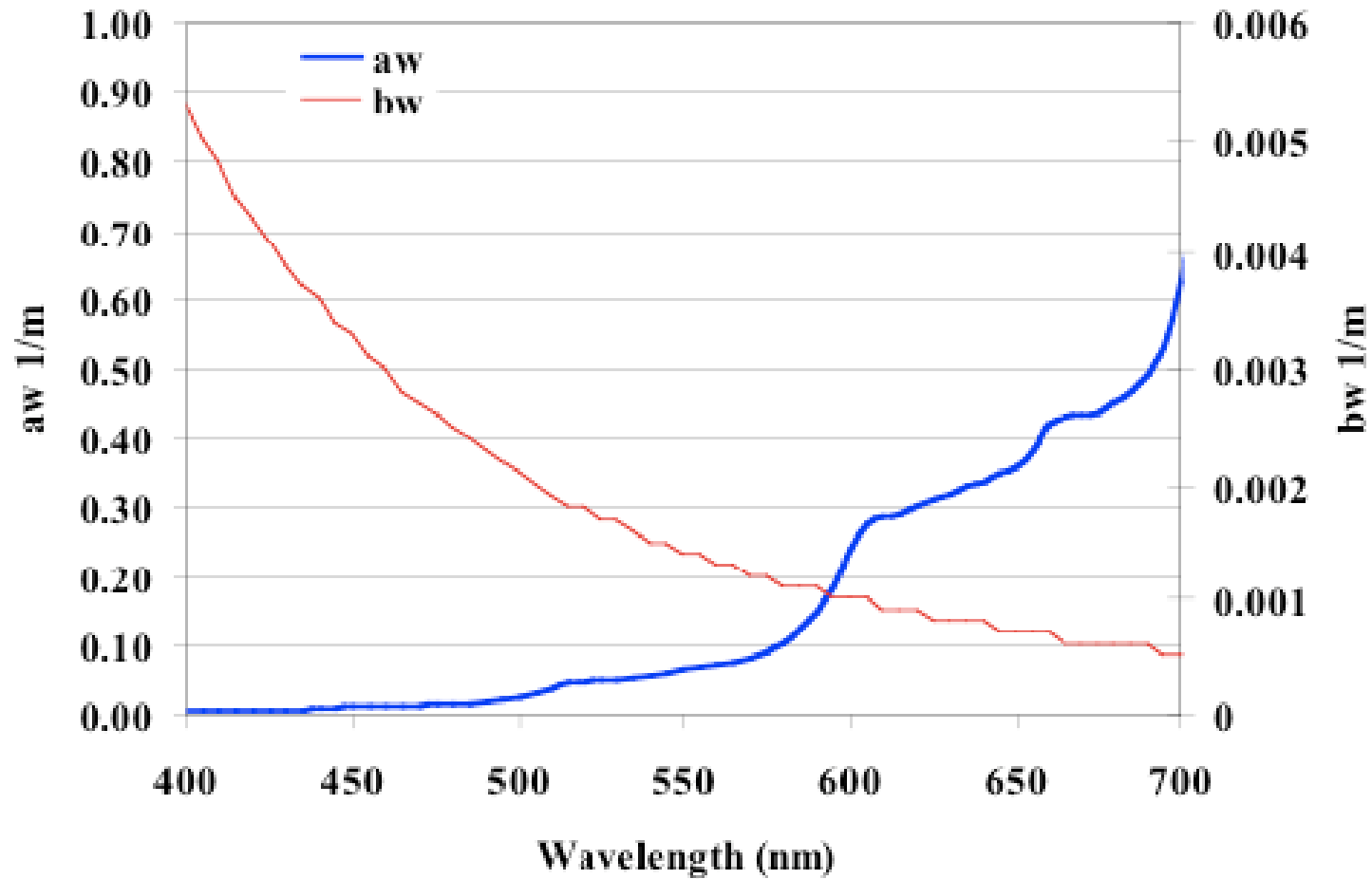


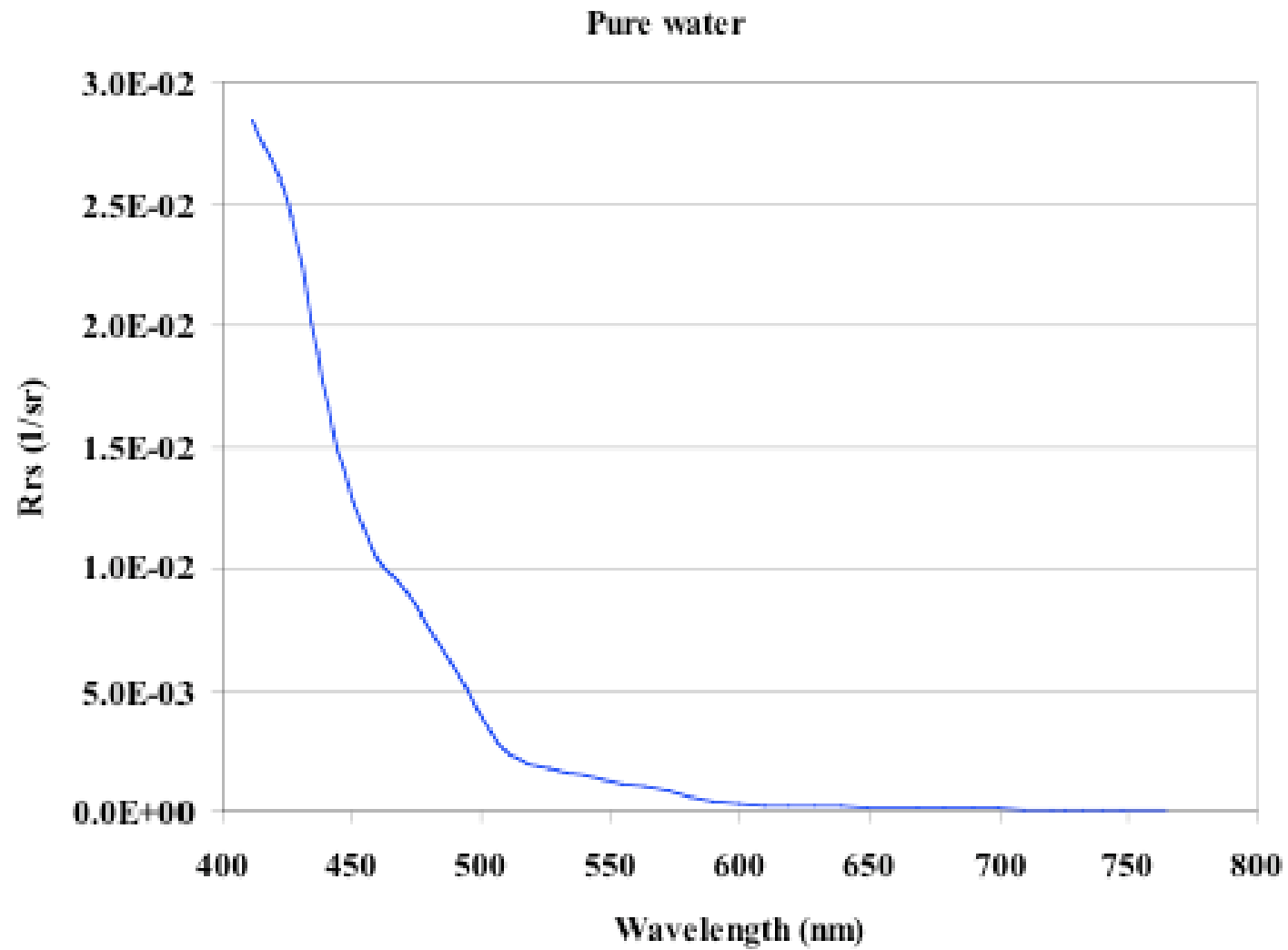
SeaWiFS





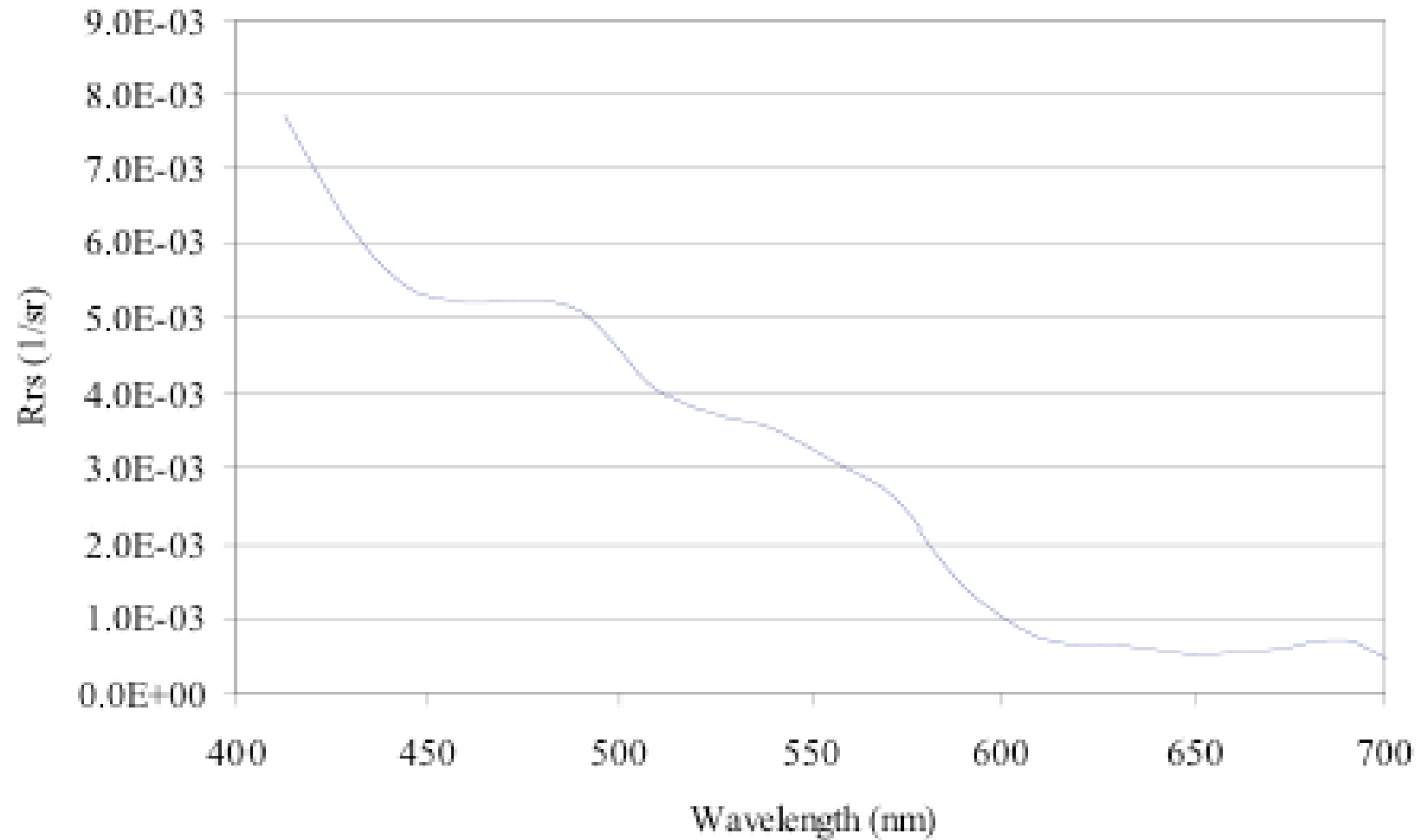
a and b for pure water (1/m)





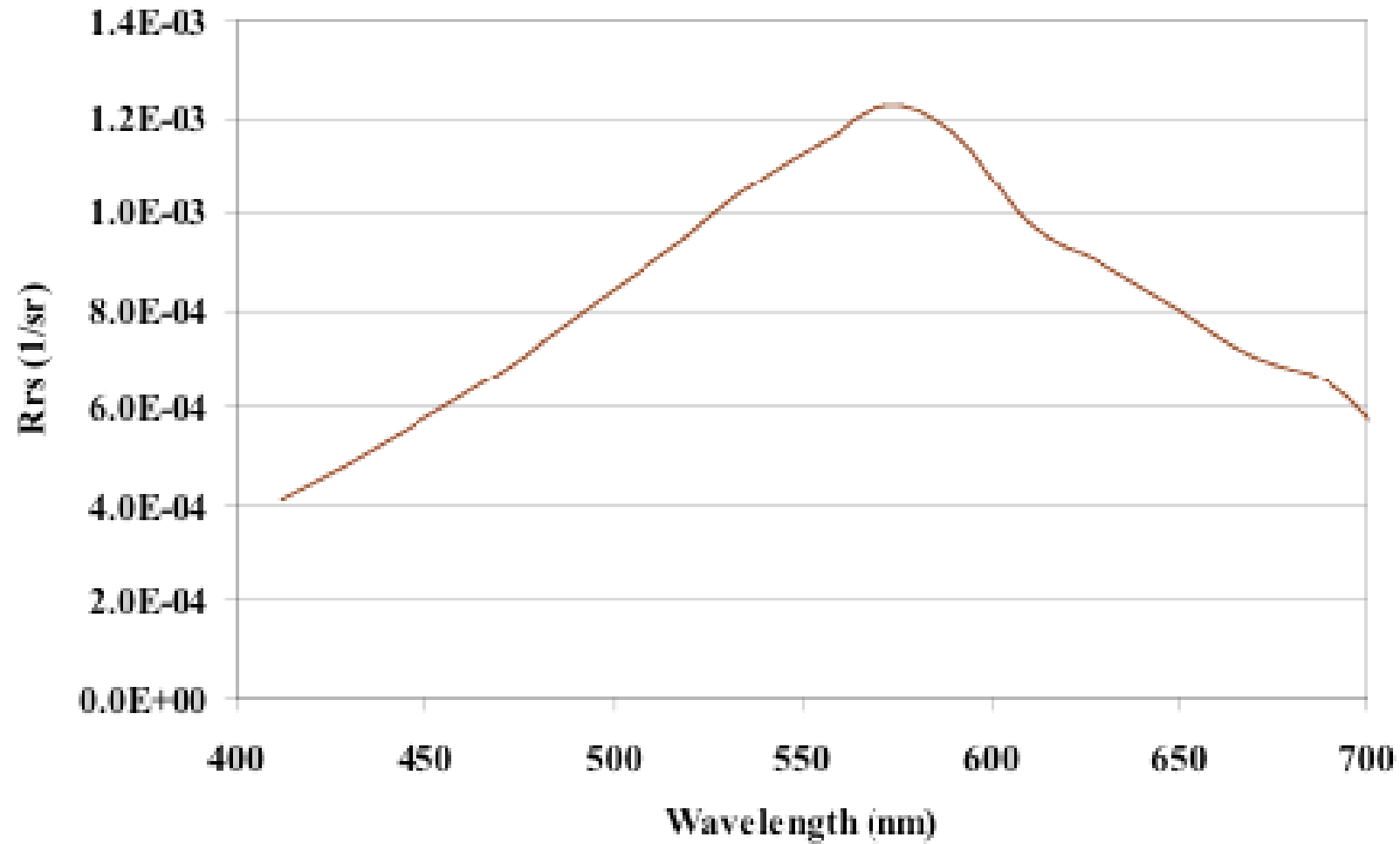


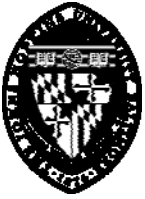
1 ug/l chl



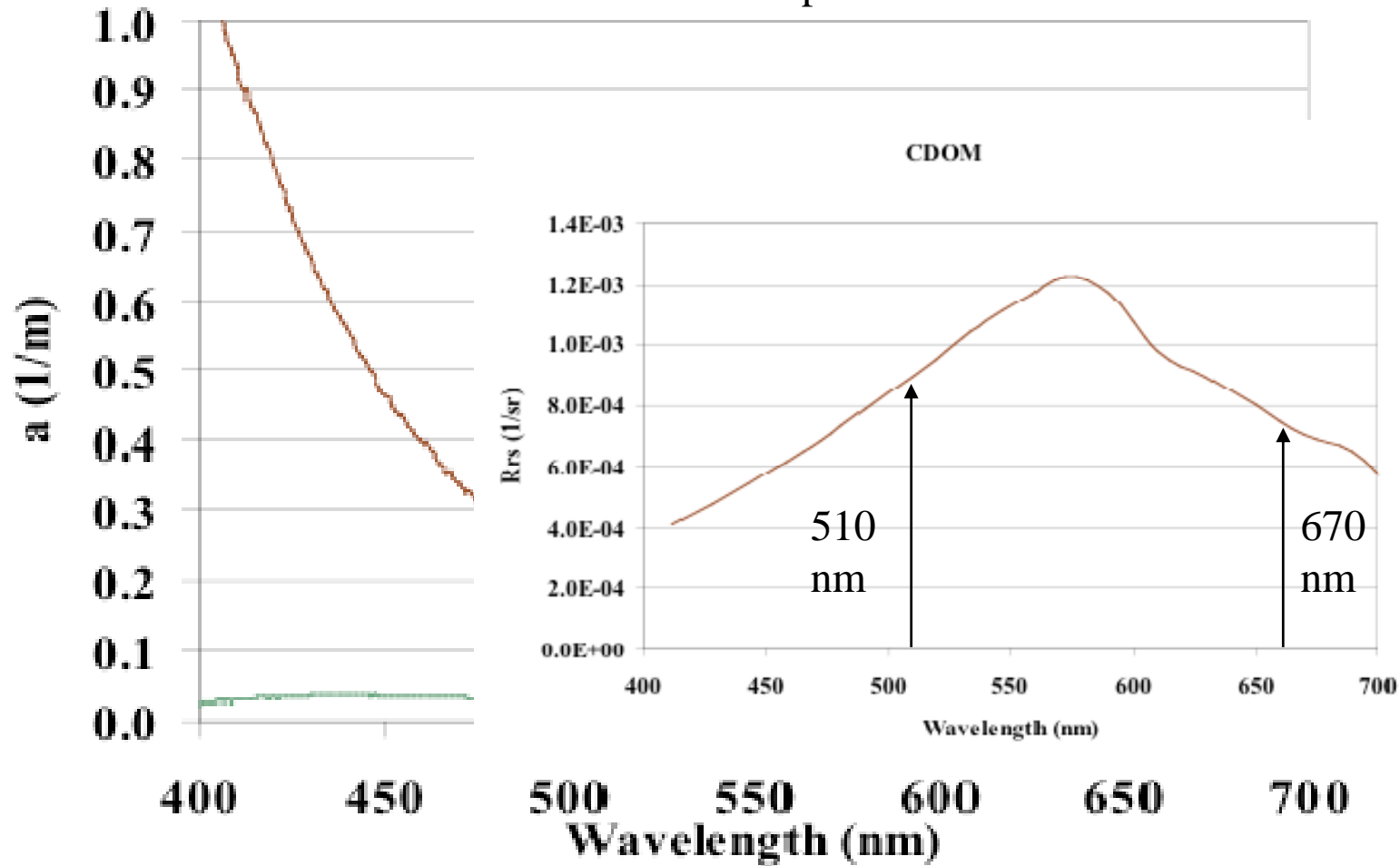


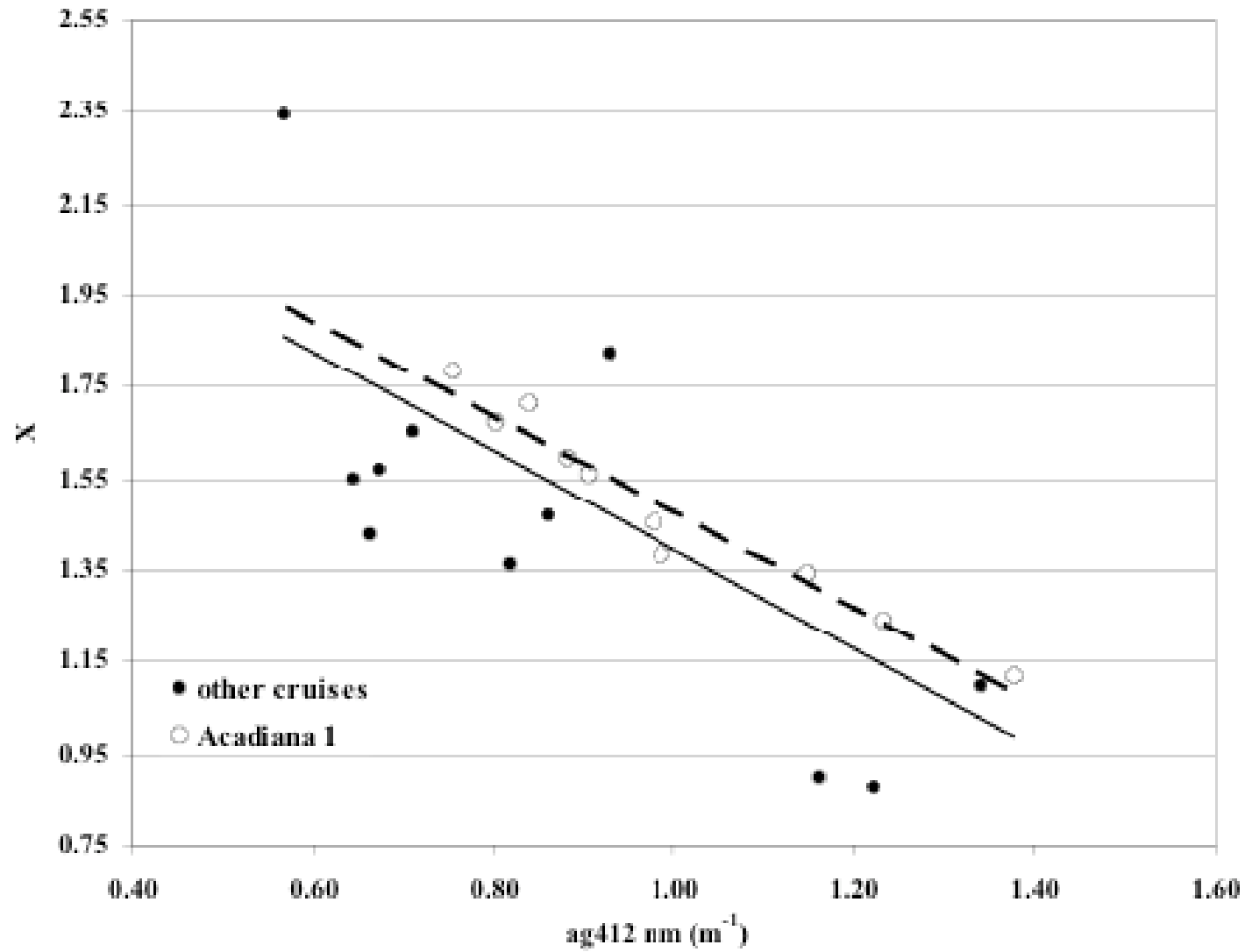
CDOM

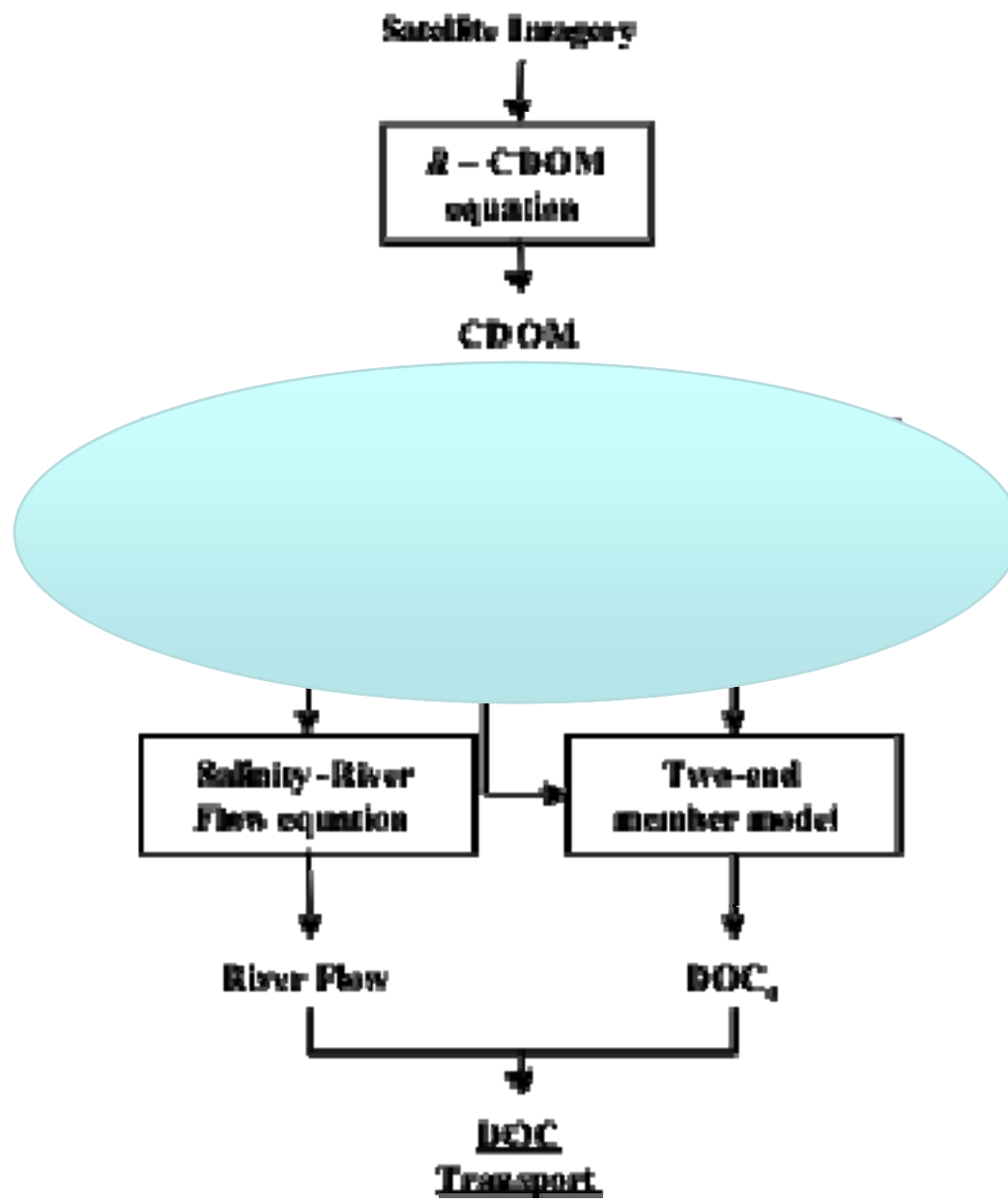


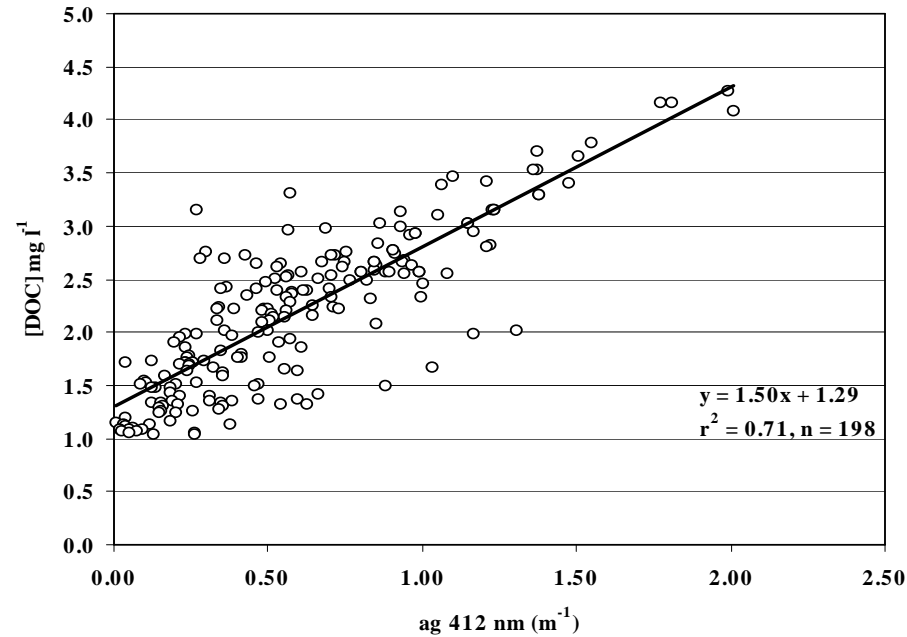


Can we measure CDOM from Space?



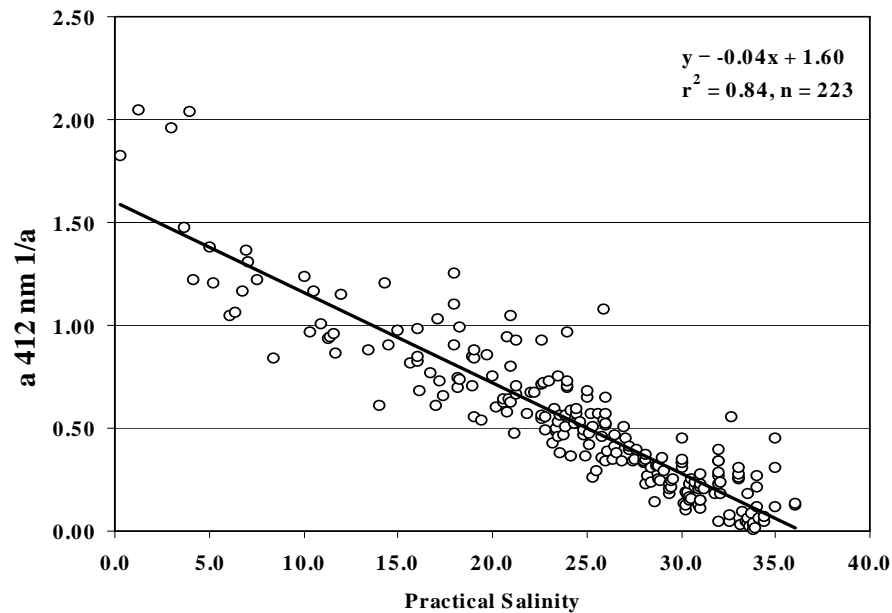




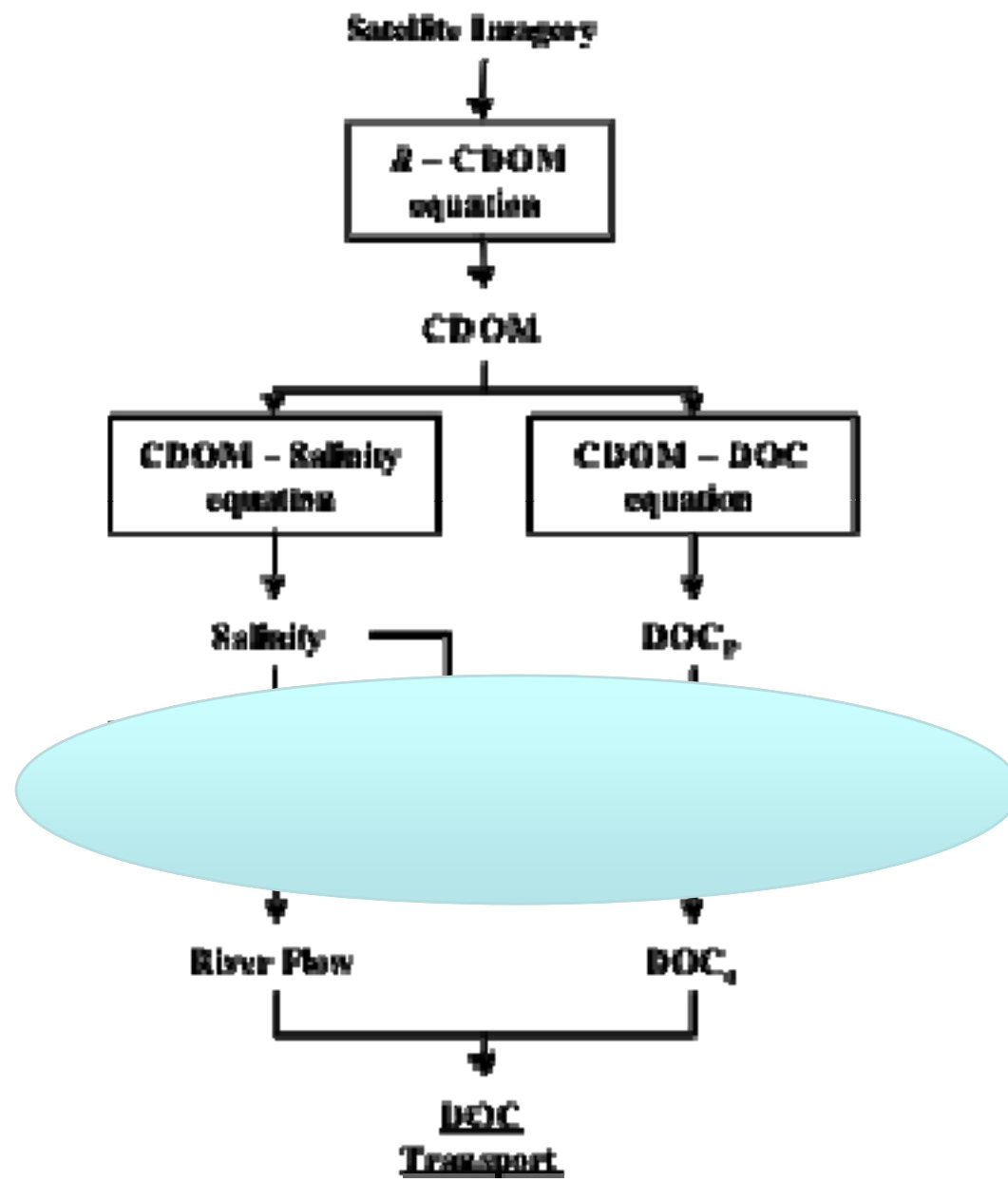


Do CDOM and
DOC correlate?

Is CDOM
conservative?

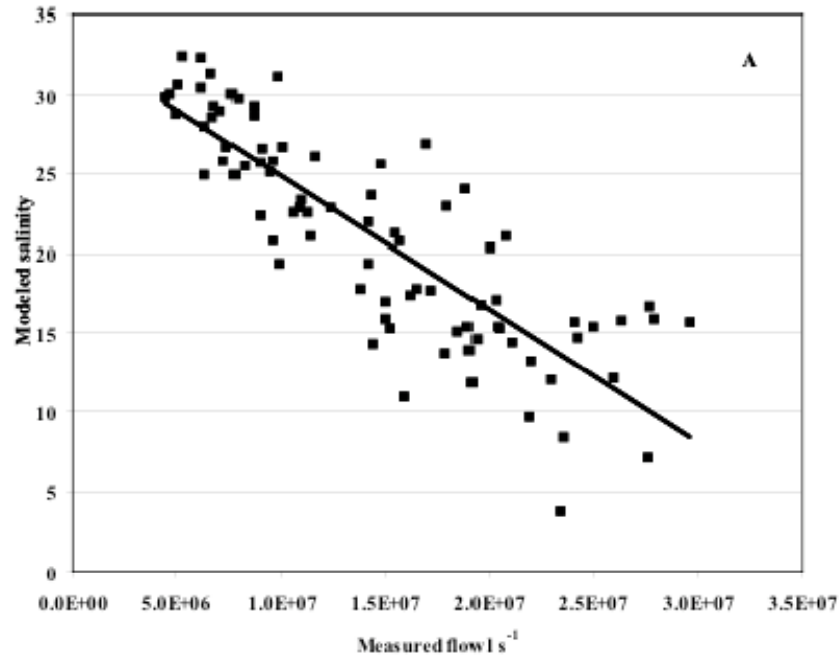
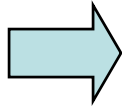


Yes!. So, we can derive
DOC and salinity from
space



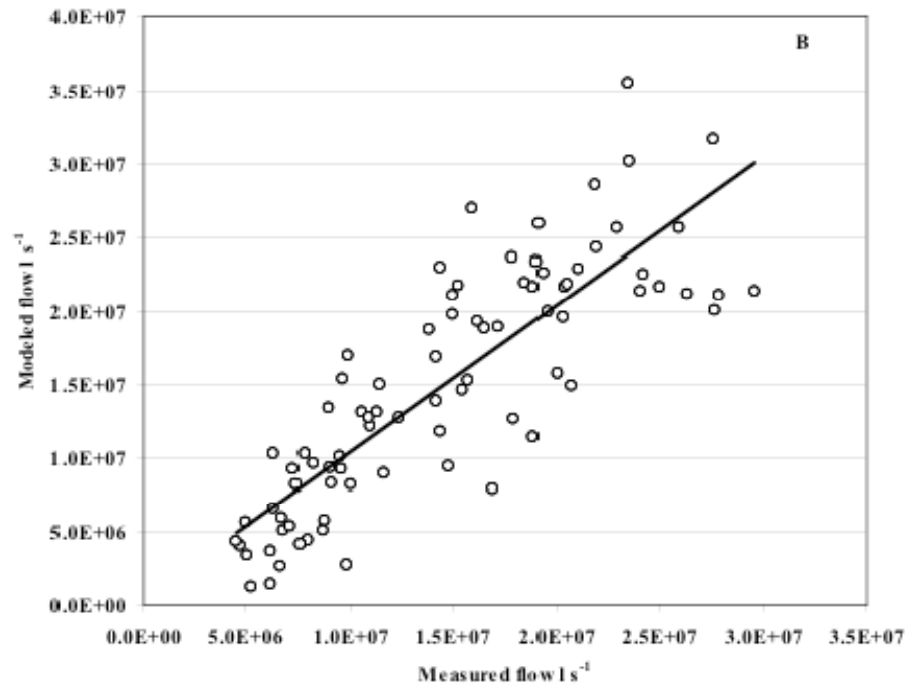


Satellite
retrievals
of salinity
from CDOM



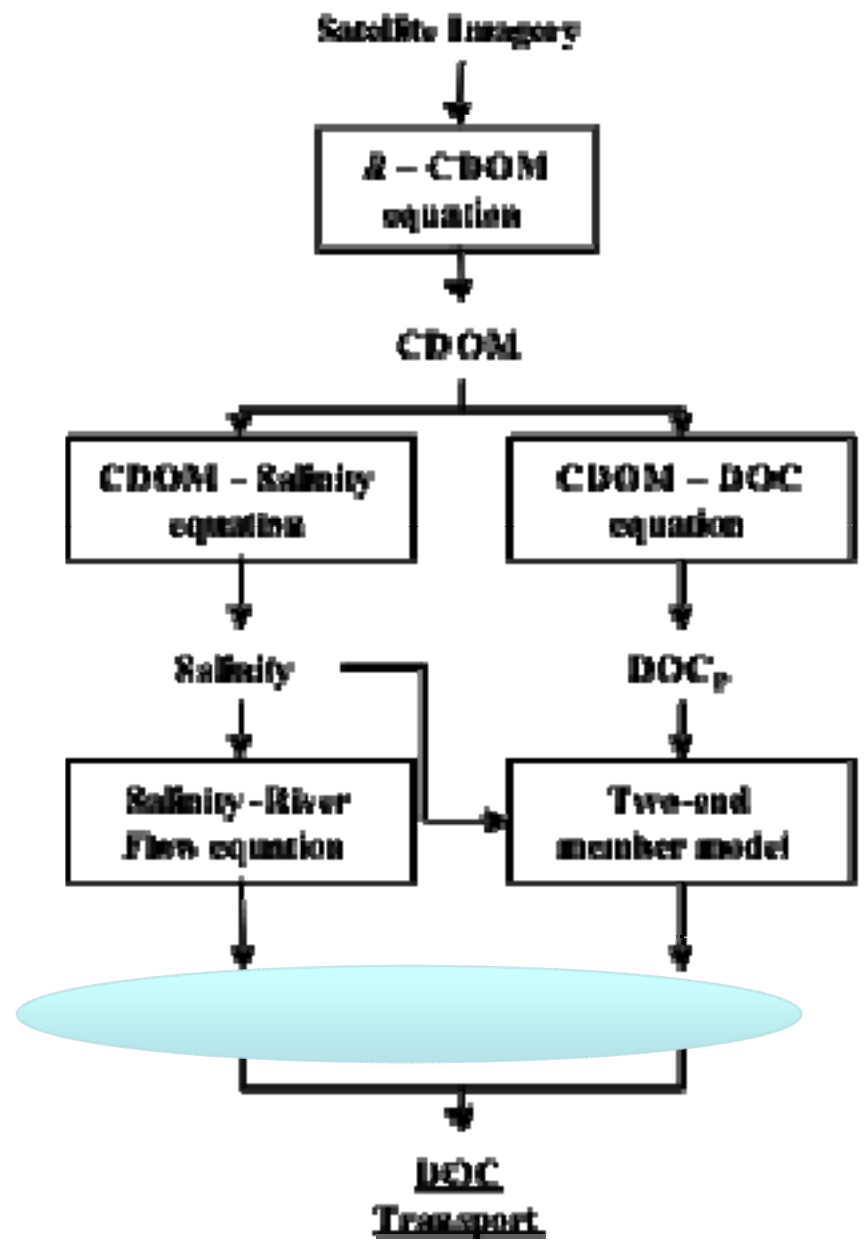
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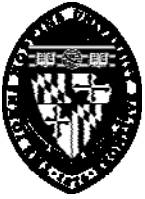
Is salinity related
to river flow?



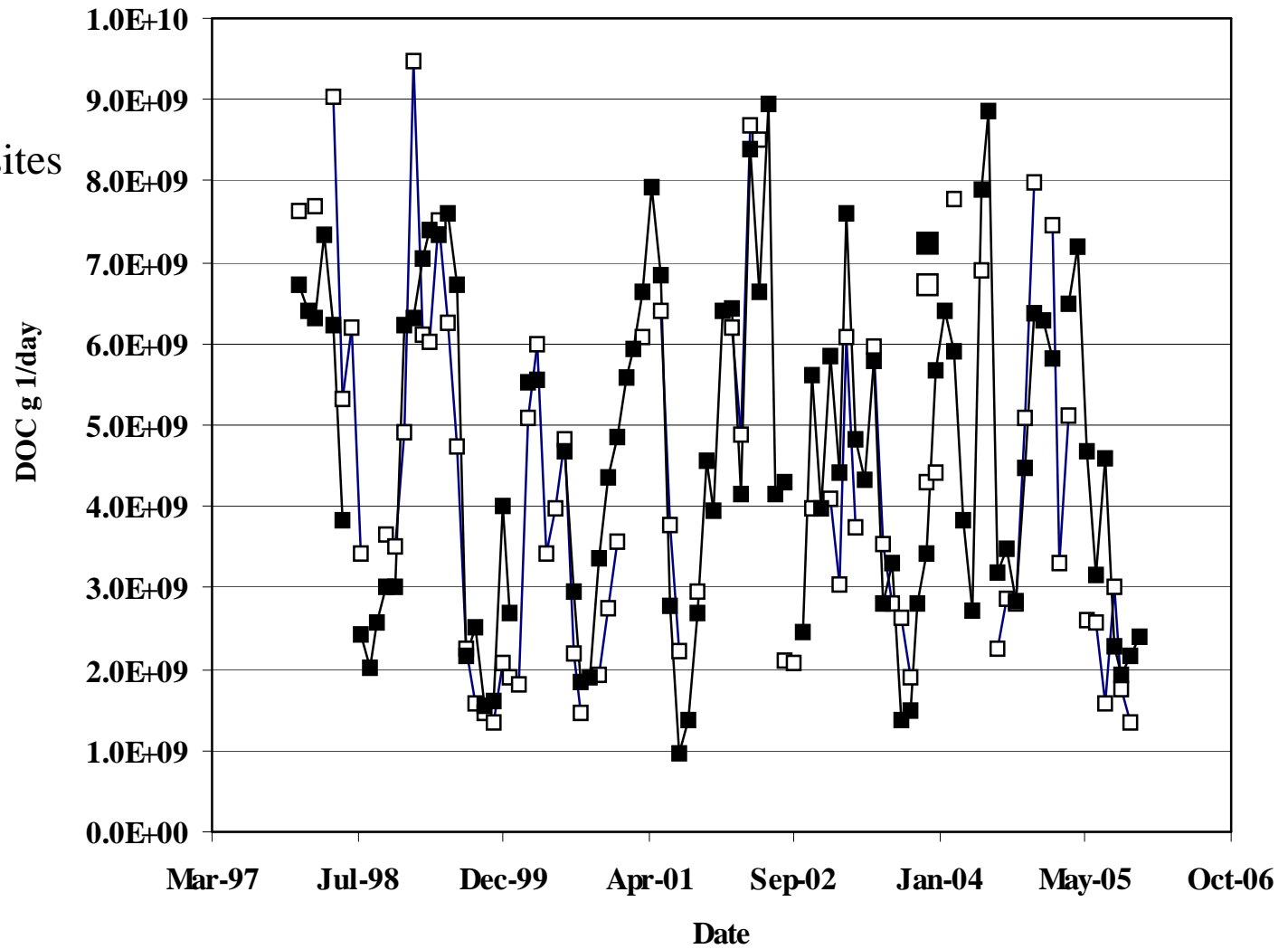
Monthly composites
1997-2005

Can we model
river flow?





Monthly composites
1997-2005





What about POC???

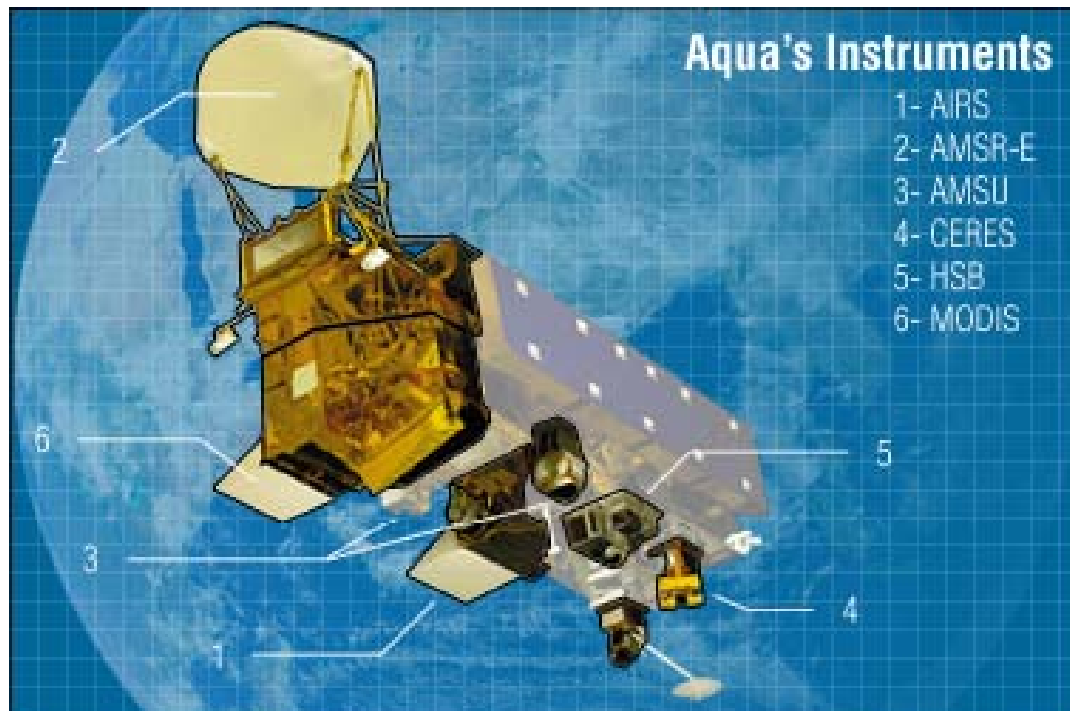


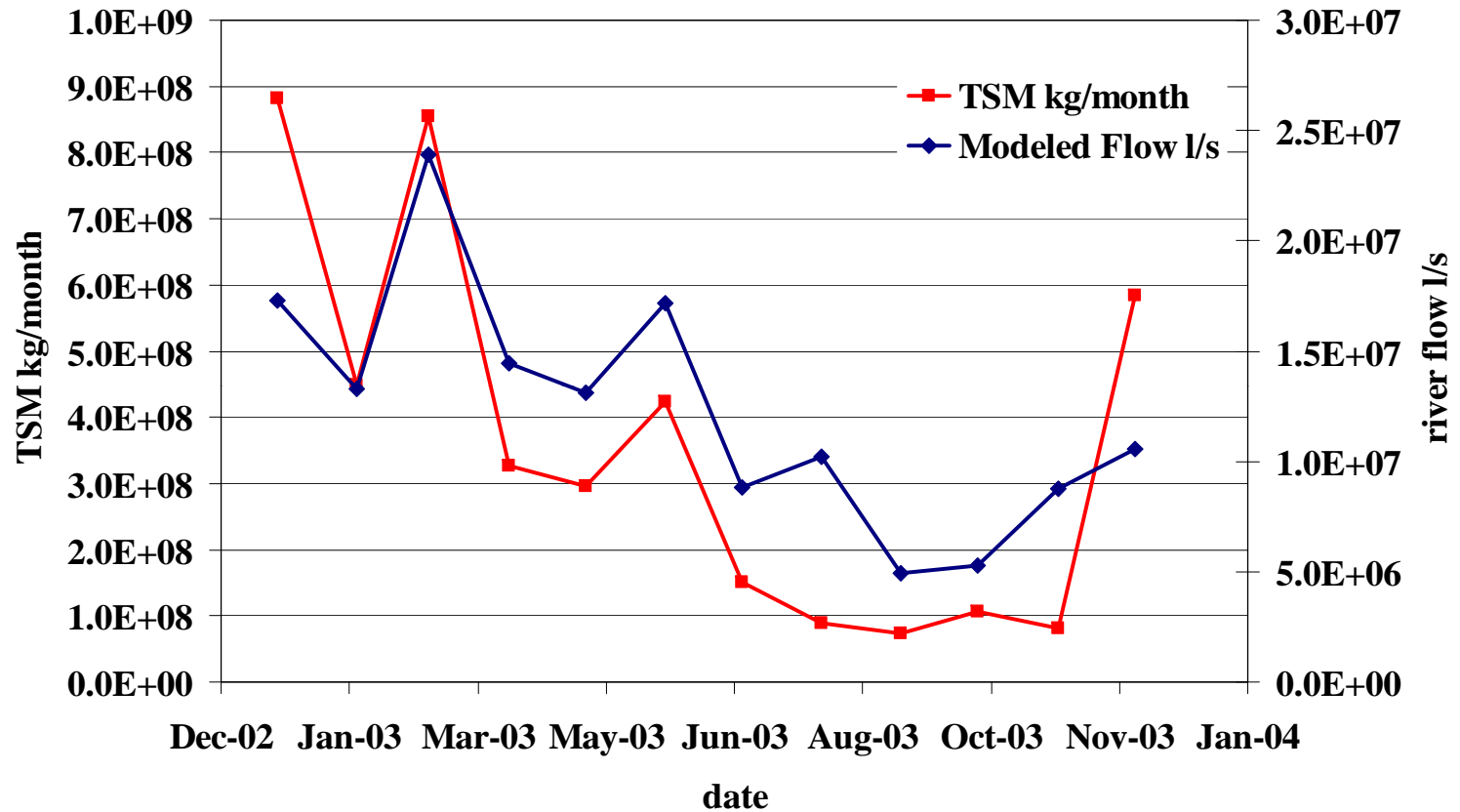


Moderate Resolution Imaging Spectroradiometer (MODIS)

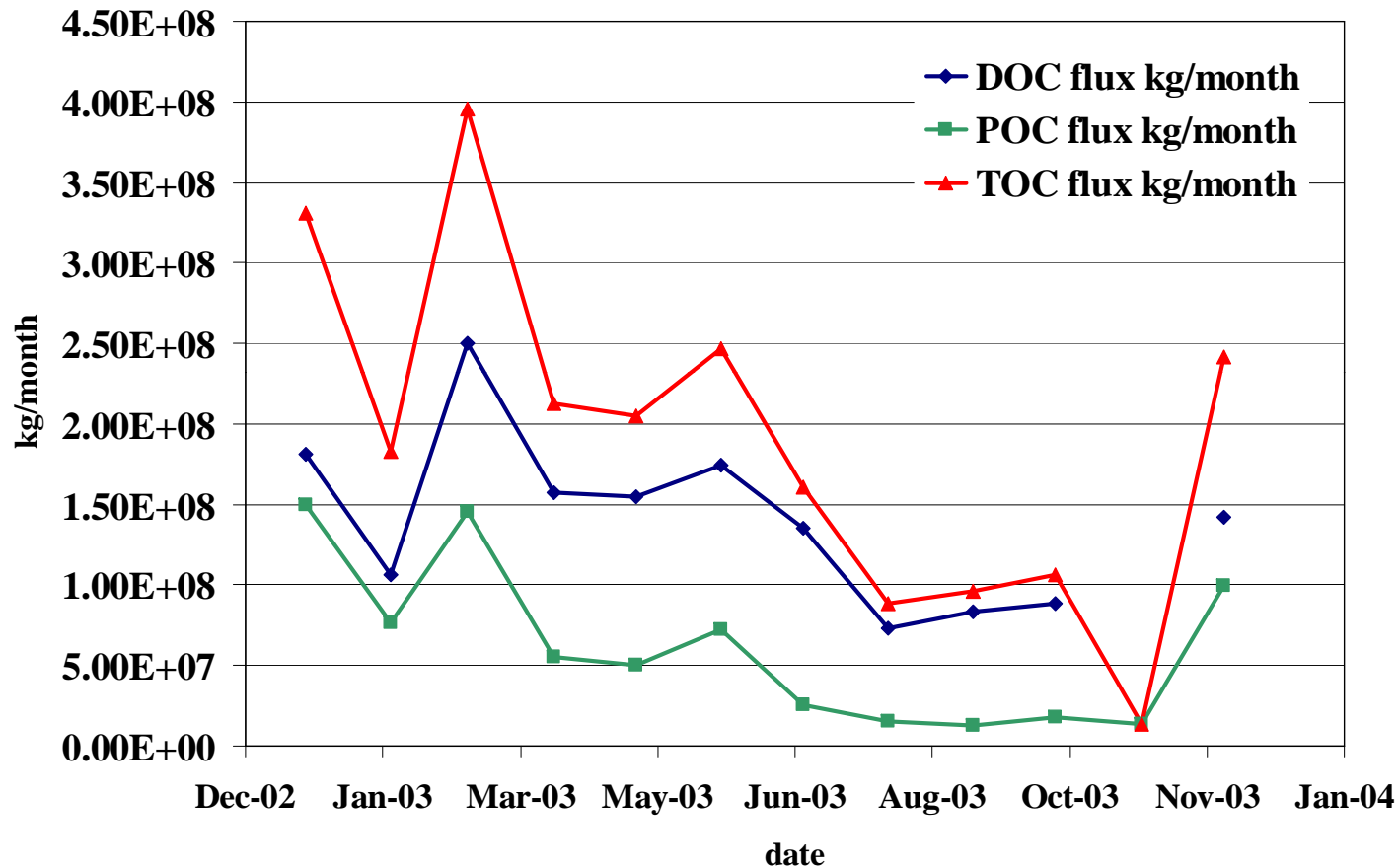
1. 405-420 nm
2. 438-448 nm
3. 483-493 nm
4. 526-536 nm
5. 546-556 nm
6. 662-672 nm
7. 673-683 nm
8. 743-753 nm
9. 862-877 nm

TERRA and AQUA





Values of TSM derived from MODIS-Aqua bands 1 and 2 using the algorithm of Miller and McKee (2004). River flow values were derived from SeaWiFS.



Transport of DOC, POC, and TOC (as DOC+POC) derived from ocean color imagery from SeaWiFS (DOC) and MODIS (POC). POC was estimated from TSM based on field data on percentage of organic content (~17%).

