CDM Absorption Forward and Inverse Model Comparisons

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Ocean Optics

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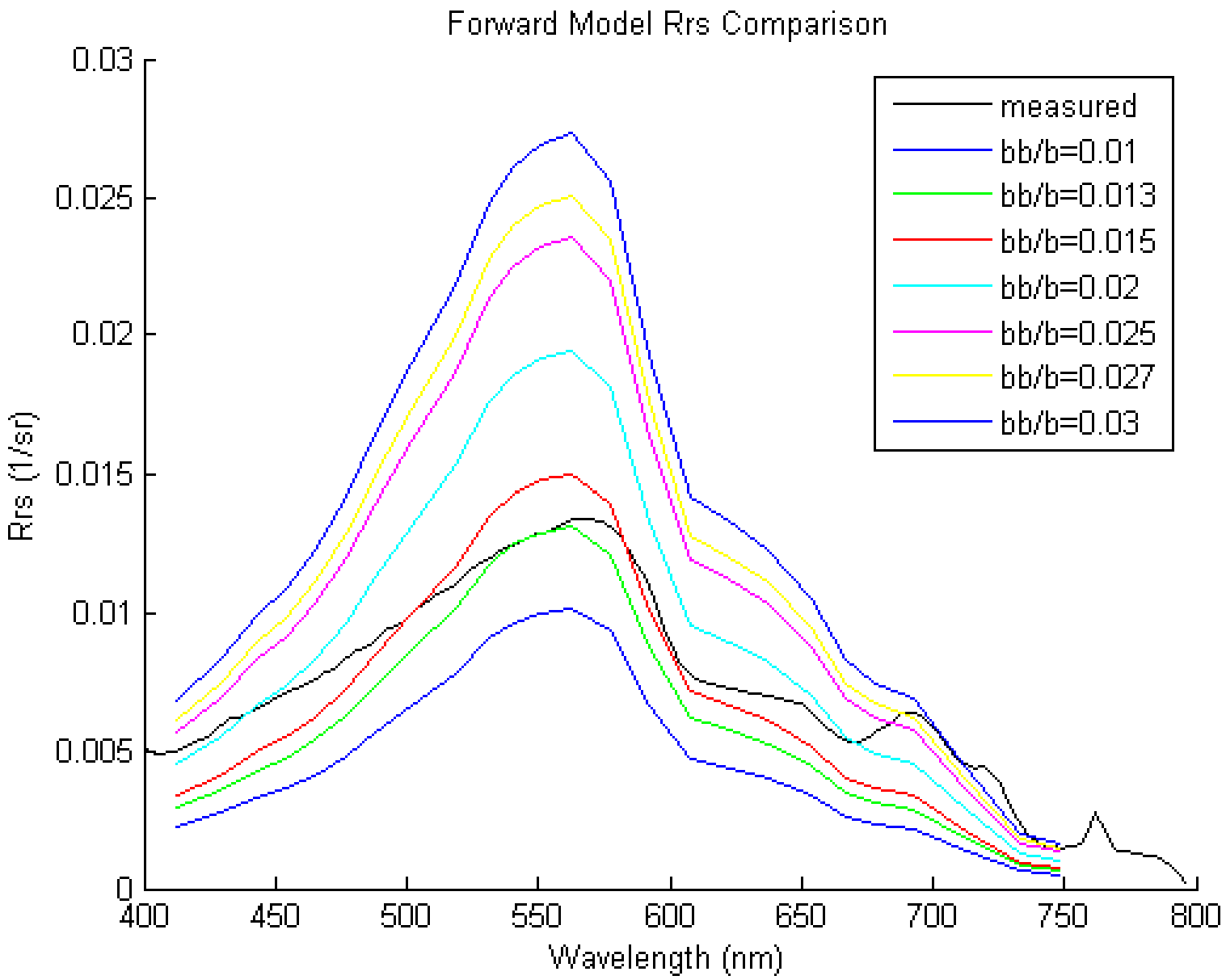
Motivation

- To study the relationships between CDM absorption and Remote Sensing Reflectance
- To evaluate inversion model methods for CDM absorption
- To evaluate the sensitivity of Hydrolight output by varying bb/b
- To evaluate the sensitivity of inversion model by varying spectral slope

Forward Model: Hydrolight

- apart & cpart → Rrs, Ed, Eu at surface

- Station 1 bb/b = 0.013 (estuary)
- Station 2 bb/b = 0.01 (mouth)


Forward Model Rrs Comparison
Rrs (1/sr)
Wavelength (nm)
0.03
0.025
0.02
0.015
0.01
0.005
0
400
450
500
550
600
650
700
750
800
measured
bb/b=0.01
bb/b=0.013
bb/b=0.015
bb/b=0.02
bb/b=0.025
bb/b=0.027
bb/b=0.03

Inverse Model Methods

- MODIS OC4 aCDOM(400)

  Rrs → aCDOM(400)

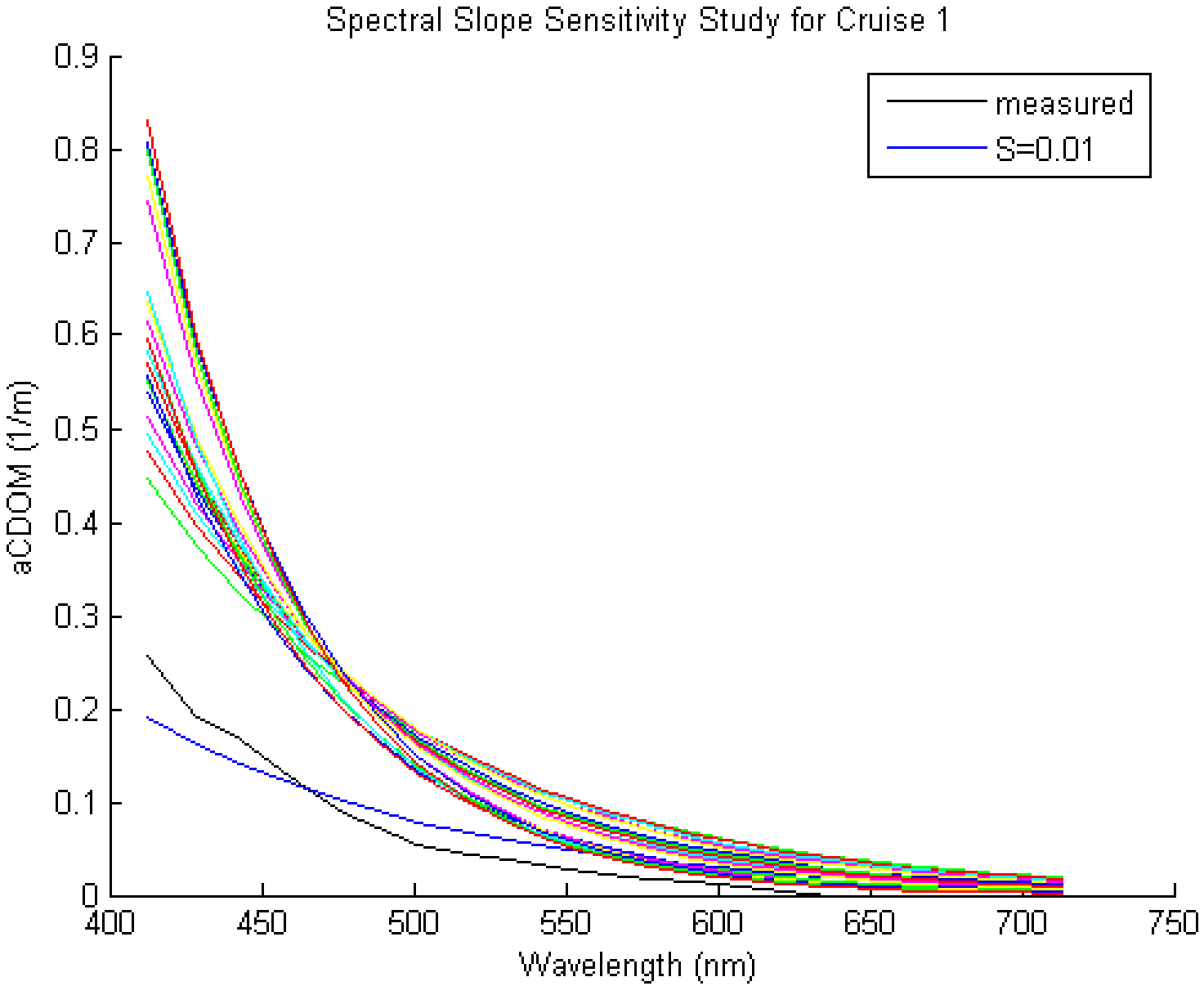
- Roesler & Perry 1995 aCDM(440)

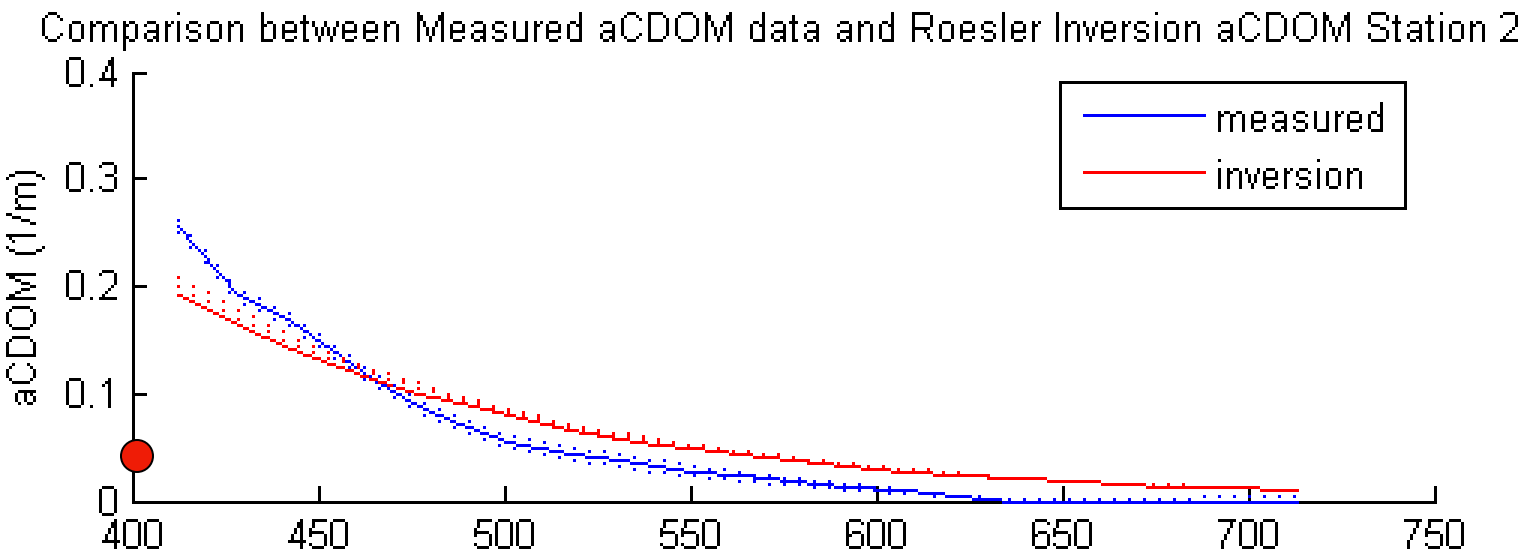
  Eu/Ed → aCDOM(440)

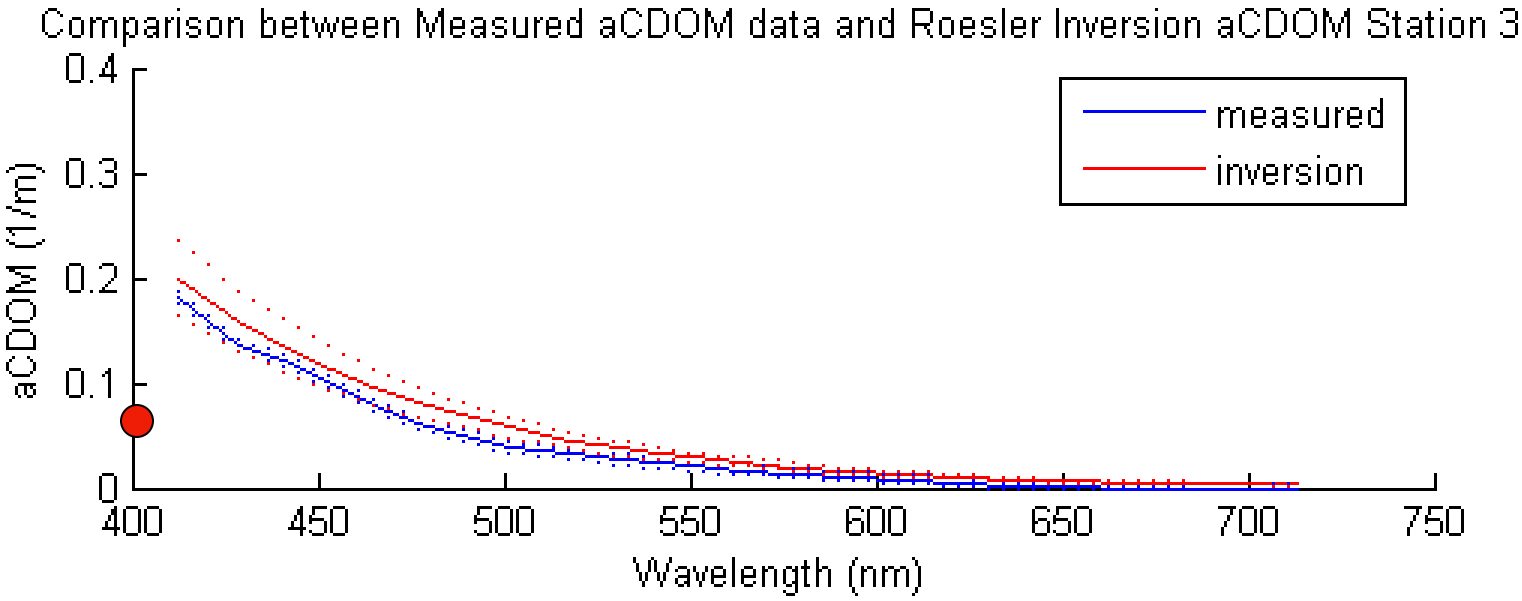
Inverse Model Results

- MODIS OC4 aCDOM(400)
  - poor agreement between model and measured data
    model aCDOM(400) < 0.05
    measured aCDOM(400) = 0.3

- Roesler & Perry 1995 aCDM(440)
  - excellent agreement between model and measured data
    Station 2: measured = 0.019
    model = 0.016
    Station 3: measured = 0.013
    model = 0.014


Spectral Slope Sensitivity Study for Cruise 1
measured
S=0.01
aCDOM (1/m)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
400
450
500
550
600
650
700
750
Wavelength (nm)


Comparison between Measured aCDOM data and Roesler Inversion aCDOM Station 2
aCDOM (1/m)
0.4
0.3
0.2
0.1
0
400
450
500
550
600
650
700
750
measured
inversion


Comparison between Measured aCDOM data and Roesler Inversion aCDOM Station 3
aCDOM (1/m)
0.4
0.3
0.2
0.1
0
400
450
500
550
600
650
700
750
Wavelength (nm)
measured
inversion

Conclusions

- Excellent aCDOM agreement between modeled and measured data for Roesler & Perry 1995 inversion method
- Roesler & Perry 1995 inversion method may work better in coastal waters than in estuarine waters (more data needed)
- MODIS OC4 inversion method yield poor results for this sample set