Evaluation of Scattering Correction Schemes for AC-S Absorption Measurements

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Abstract:

The AC-S meter (WETLabs Inc.) is wildly used for measuring the absorption (*a*) and attenuation (*c*) of the water. Quality of the measurements are, however, subject to the validity of subsequent correction procedures, including the scattering correction. Based on simultaneous measurements of two AC-S meters, we evaluated five existing scattering correction methods. The results suggest that the revised based line method and revised proportional method have much better performance than other methods.

1. Background: scattering correction

Method 1: Base Line (B) $a(\lambda) = a_m(\lambda) - a_m(715)$

Method 2: Proportional (P) $a(\lambda) = a_m(\lambda) - a_m(715)\frac{[c_m(\lambda) - a_m(\lambda)]}{[c_m(715) - a_m(715)]}$

Method 3: Kirk (K) $a(\lambda) = a_m(\lambda) - \varepsilon[c_m(\lambda) - a_m(\lambda)] \quad \varepsilon = 0.14 \text{ or } 0.18$

Method 4: Revised Base Line (B+) (Rudiger, 2013) $a(\lambda) = a_m(\lambda) - [a_m(715) - a(715)] \quad a(715) = 0.212 \cdot a_m(715)^{1.135}$

Method 5: Revised Proportional (P+) (Rudiger, 2013)

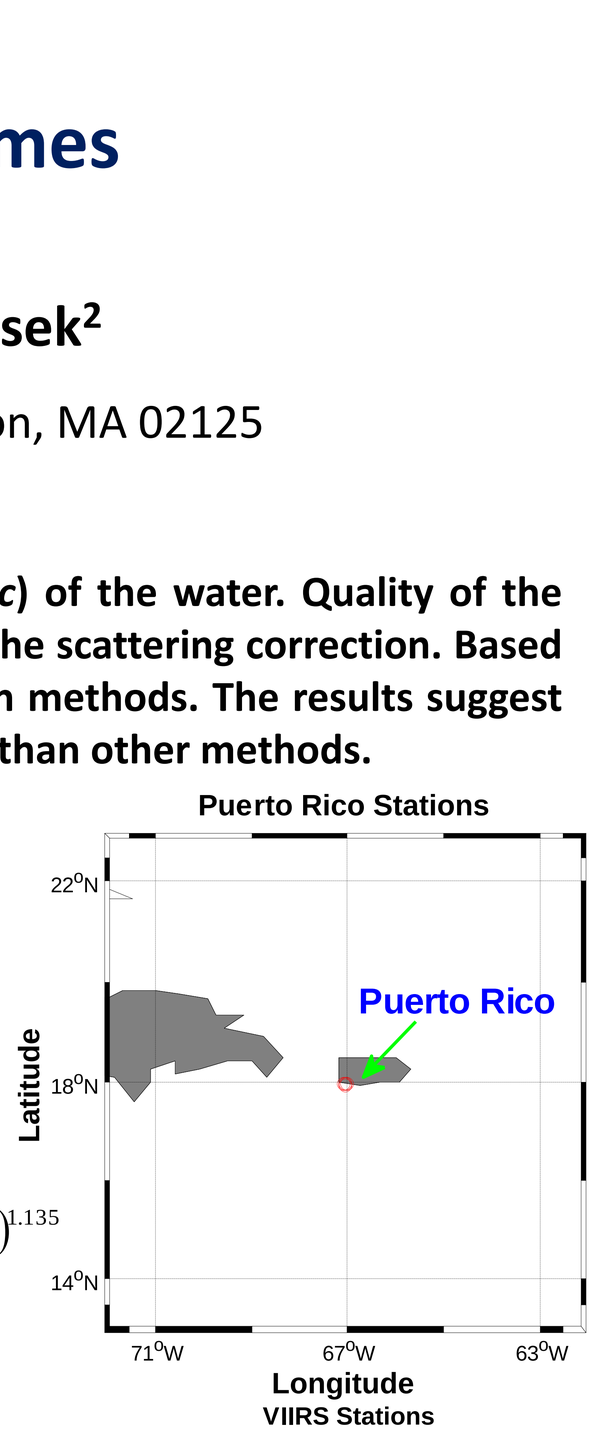
$$a(\lambda) = a_m(\lambda) - [a_m(715) - a(715)]\frac{[(1/e_c)\cdot c_m(\lambda) - a_m(\lambda)]}{[(1/e_c)\cdot c_m(715) - a_m(715)]} \quad e_c = 0.56 \quad a(715) = 0.212 \cdot a_m(715)^{1.135}$$

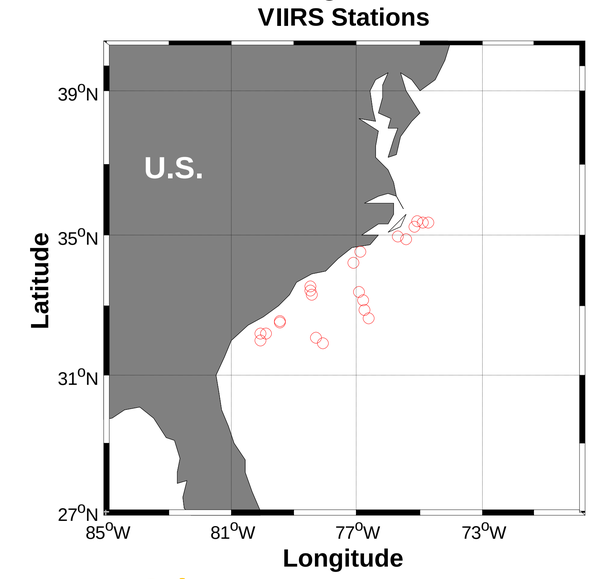
2. Field experiments

Field measurements were collected from two cruises (NOAA VIIRS cruise and Puerto Rico cruise). Two AC-S meters (s/n 105 and 180) and one HyperPro (SBA) are deployed (Table 1).

Table 1. List of Field Measurements

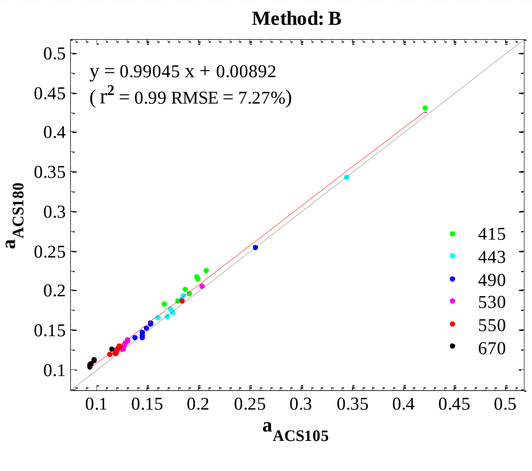
Cruise	ACS105 & ACS180 Simultaneously	ACS105 Only	ACS180 Only	SBA (*Rrs*)
Puerto Rico (Mar-2015)	8 stations	---	---	---
VIIRS (Nov-2014)	---	7 stations	11 stations	18 stations

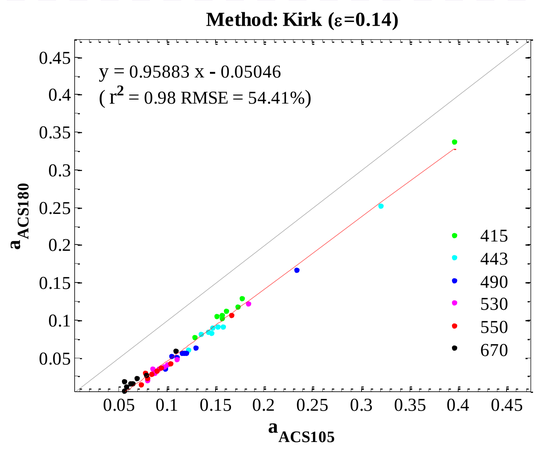


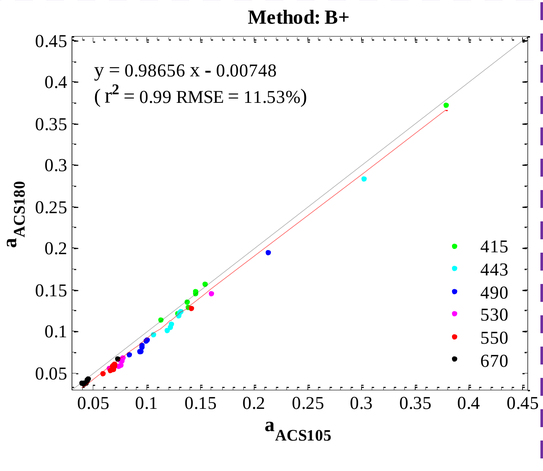


3. Results

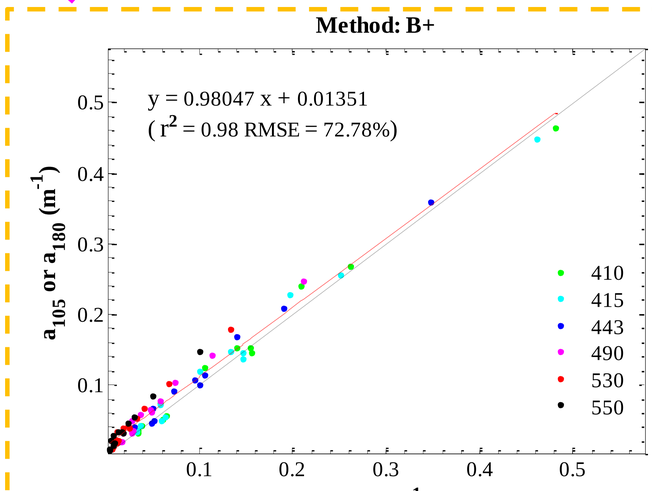
Puerto Rico

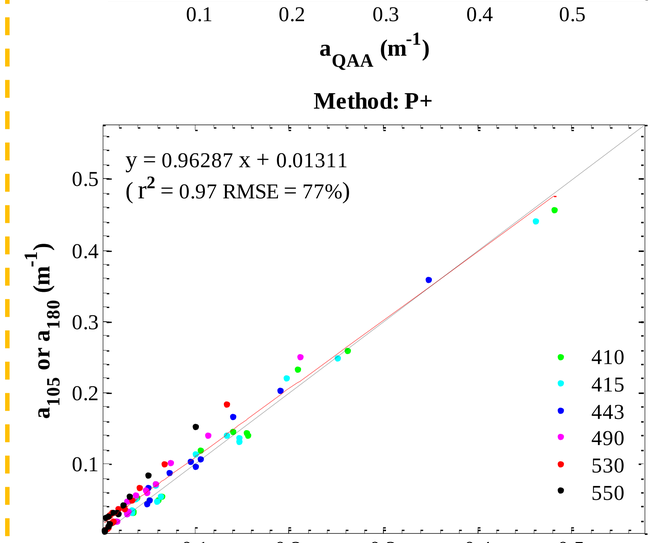






VIIRS (Only B+ and P+ show relatively good performance for both datasets)





4. Conclusions:

a. **The scattering at near-infrared waveband cannot be neglected.**
b. **The revised based line method (B+) and revised proportional method (P+) have much better performance than other methods.**

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