First optical observations in the turbidity maximum zone in the Río de la Plata: A challenge for atmospheric correction algorithms

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INTRODUCTION

The Río de la Plata (RdP) estuary carries high amounts of nutrients, suspended particulates and dissolved organic matter to the adjacent shelf waters. It’s considered one of the most turbid estuaries in the world. Standard atmospheric corrections (AC) tend to fail in these highly turbid waters, being a critical step to retrieve in-water properties from remotely sensed data. Previous AC evaluations have been qualitative due to the lack of field data11. The objective of the present work is to validate for the first time different AC algorithms using in situ water reflectance measured in the highly turbid waters of RdP.

RESULTS

Typical spectral signatures of highly turbid waters (Fig. 1): $R_\lambda$ increases with $T$; wavelength of main peak increases from green to red and NIR with increasing $T$; non-zero $R_\lambda$ at NIR & SWIR (1071nm)

ATMOSPHERIC CORRECTION ALGORITHMS

Five AC algorithms have been evaluated using: 1) variable aerosol type and concentration (SWIR-V); 2) fixed aerosol type, $\alpha$(531) (F); 3) fixed aerosol type and concentration, $\tau_a$ (FF). For 2 and 3 the AC is run twice getting the aerosol optical properties from clear water pixels of the image (Fig.2) from either SWIR or NIR bands.

CONCLUSIONS

• First optical observations in the turbidity maximum zone in the Río de la Plata estuary have been presented (non-zero in the NIR & SWIR)
• All AC algorithms analyzed under-estimated measured $R_\lambda$ values (between -95% and -7%)
• Larger errors in the VIS (largest in the blue) and lower errors in NIR bands,
• SWIR-V had a poor performance (~90% in the blue) and SWIR-FF and NIR-FF performed better (~20% VIS, -10% NIR)
• Lower error were found in the 859 nm band (-7%)

REFERENCES


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