A Monte-Carlo based approach for estimating remote sensing reflectance uncertainty

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Objectives

- Quantify uncertainty due to atmospheric correction.
- Generate remote sensing reflectance uncertainty product.
- Characterize uncertainty with respect to potential drivers

Introduction

- Ocean color missions are subject to pre-specified uncertainty requirements.
- Requirements are borne out of guesswork
- Typical uncertainty estimation uses problematic comparison with in-situ data;
  - in-situ data sampling is potentially biased to easily accessible areas[1],
  - difficult to separate noise from in-situ and satellite measurements[2]
  - differences in sampling scale also confounding.[3]

Methods

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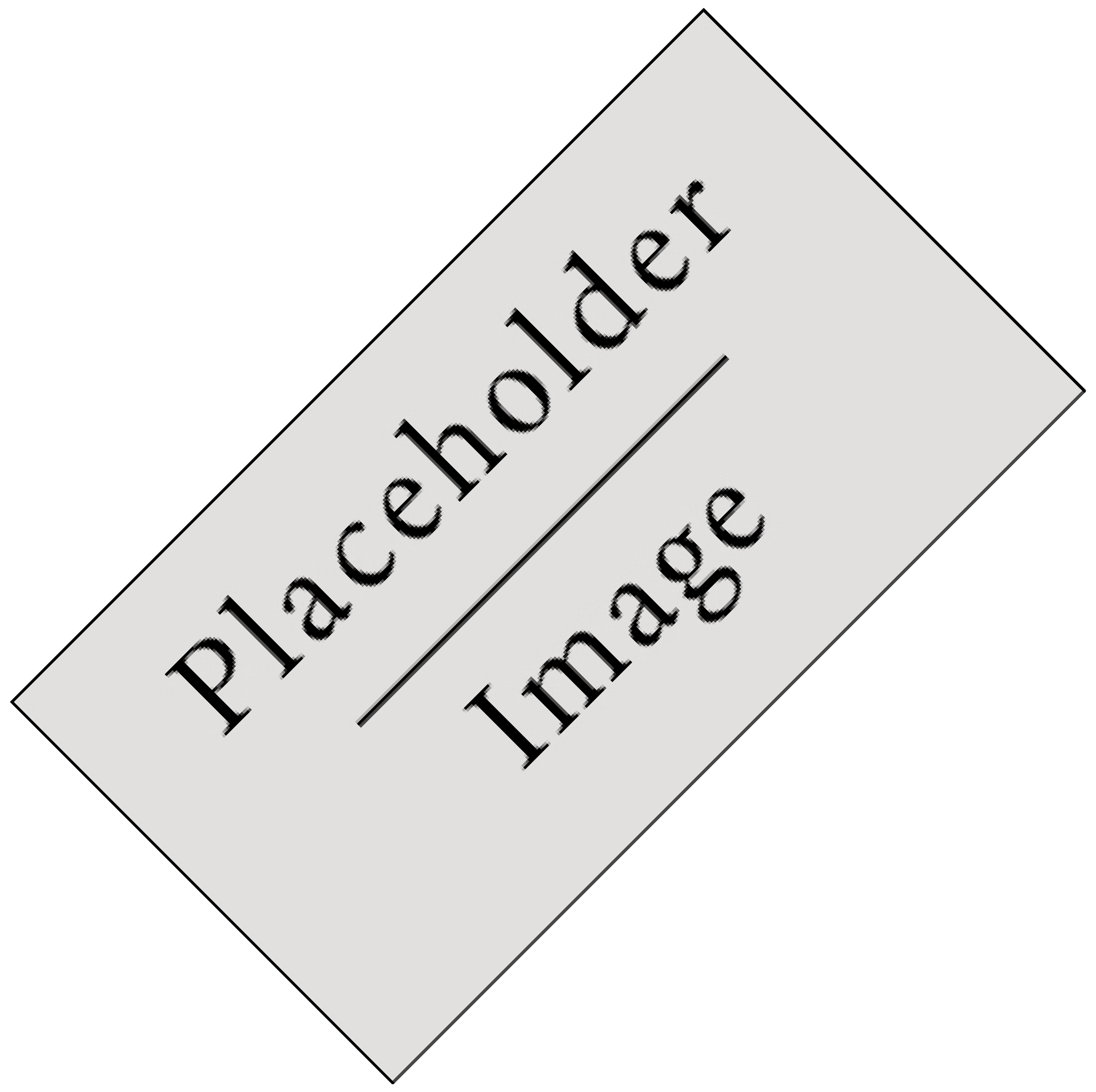
Results



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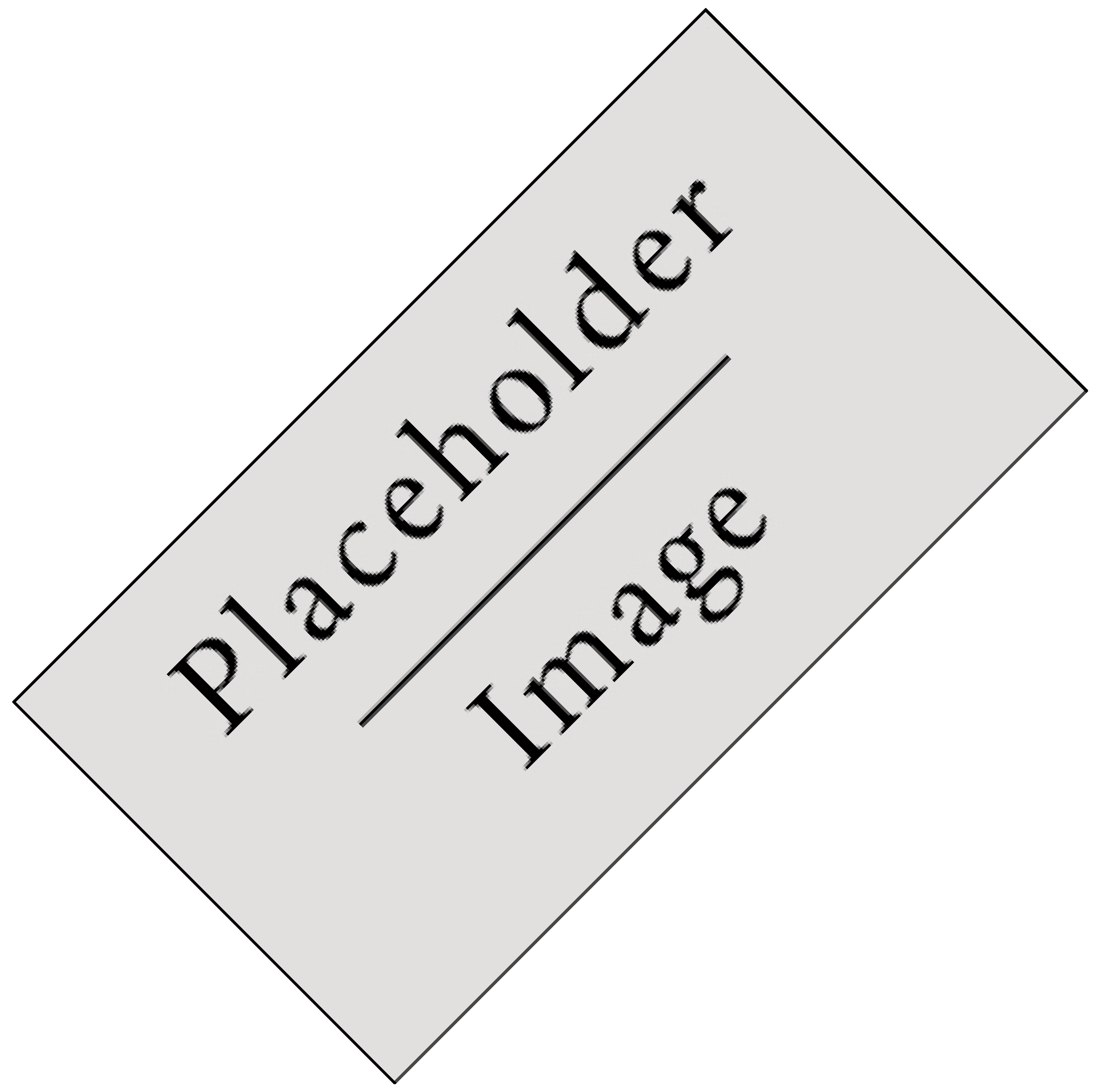

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Important Result

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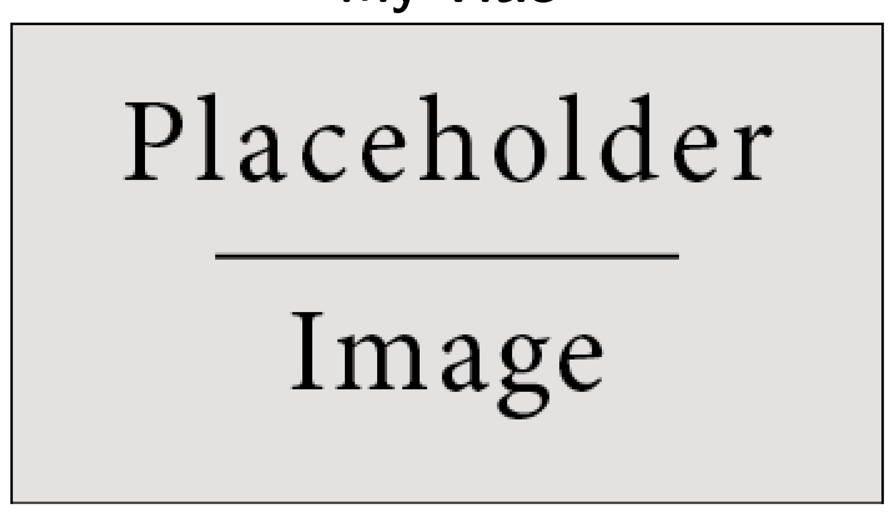

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Next Steps

- Extend MC simulations to other sensors.
- MC simulations computationally costly - requires many runs;
  - Finding an alternative to build on this work, a priority
  - Develop machine learning (ML) approach (e.g. neural network);
  - Identify uncertainty drivers in MC as potential inputs to ML;
  - Use ML to shorten uncertainty product generation to one run.

References

[1] S. Bailey and P. Werdell, "A multi-sensor approach for the on-orbit validation of ocean color satellite data products," *REMOTE SENSING OF ENVIRONMENT*, vol. 102, no. 1-2, pp. 12–23, 2006.

[2] D. Toole, D. Siegel, D. Menzies, M. Neumann, and R. Smith, "Remote-sensing reflectance determinations in the coastal ocean environment: impact of instrumental characteristics and environmental variability," *APPLIED OPTICS*, vol. 39, no. 3, pp. 456–469, 2000.

[3] C. Hu, L. Feng, and Z. Lee, "Uncertainties of seawifs and modis remote sensing reflectance: Implications from clear water measurements," *REMOTE SENSING OF ENVIRONMENT*, vol. 133, pp. 168–182, 2013.

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