

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

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## Objectives

- Implement self-contained sensor-dependent noise model.
- Characterize noise propagation due to atmospheric correction.
- Characterize impact of noise in near-infrared bands
- Generate remote sensing reflectance uncertainty product.

## Introduction

- Ocean color missions subject to pre-specified uncertainty requirements.
- Uncertainty difficult to estimate consistently
- Typical uncertainty estimation done using potentially problematic comparisons with e.g.;
  - in-situ data [1, 2]
  - other ocean color mission[3]

## Methods

- Quantify noise propagation across bands by introducing perturbation at  $L_t$
- Model signal-to-noise Ratio (SNR) as a function of top-of-the-atmosphere radiance ( $L_t$ )
- 

## Results

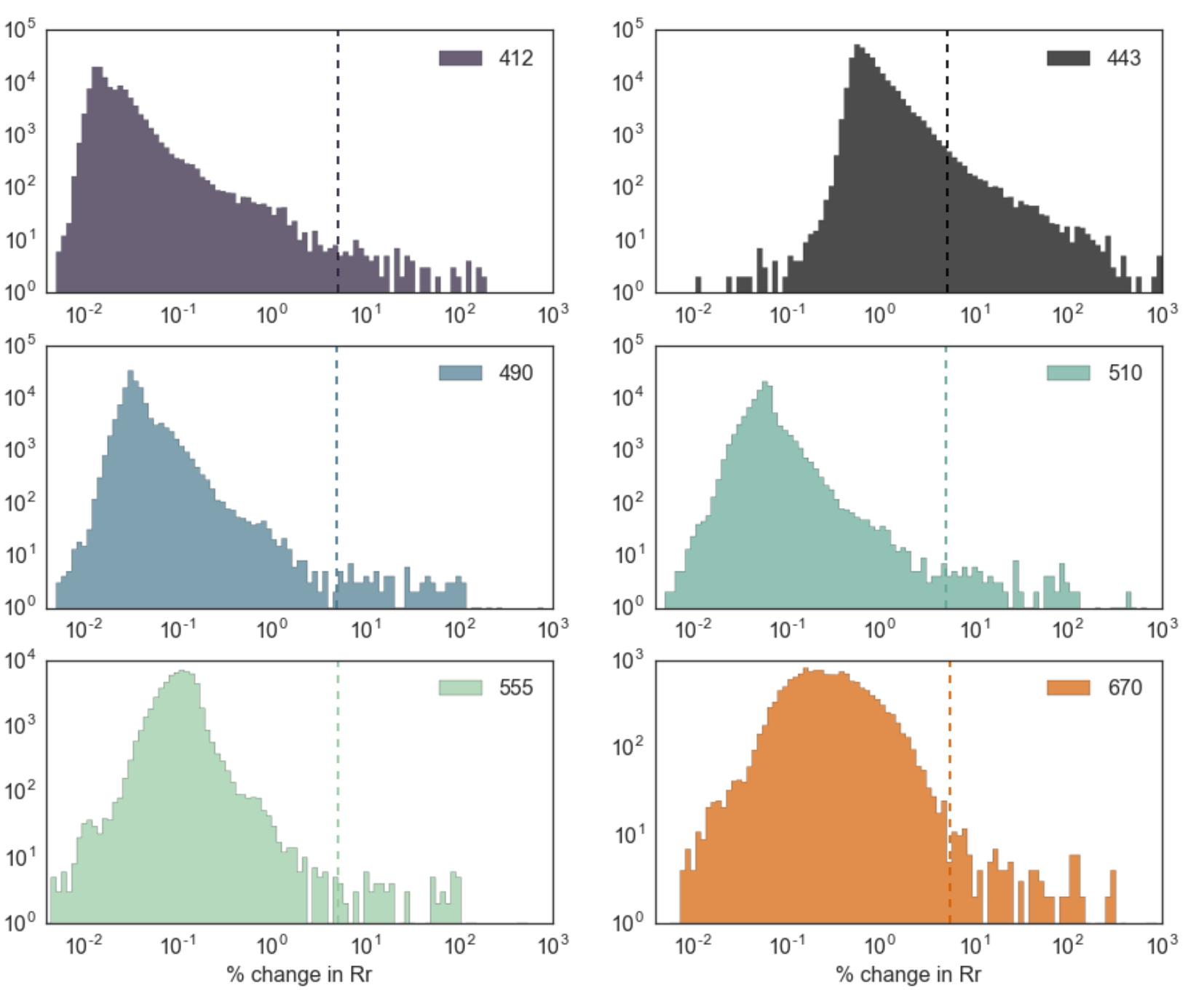
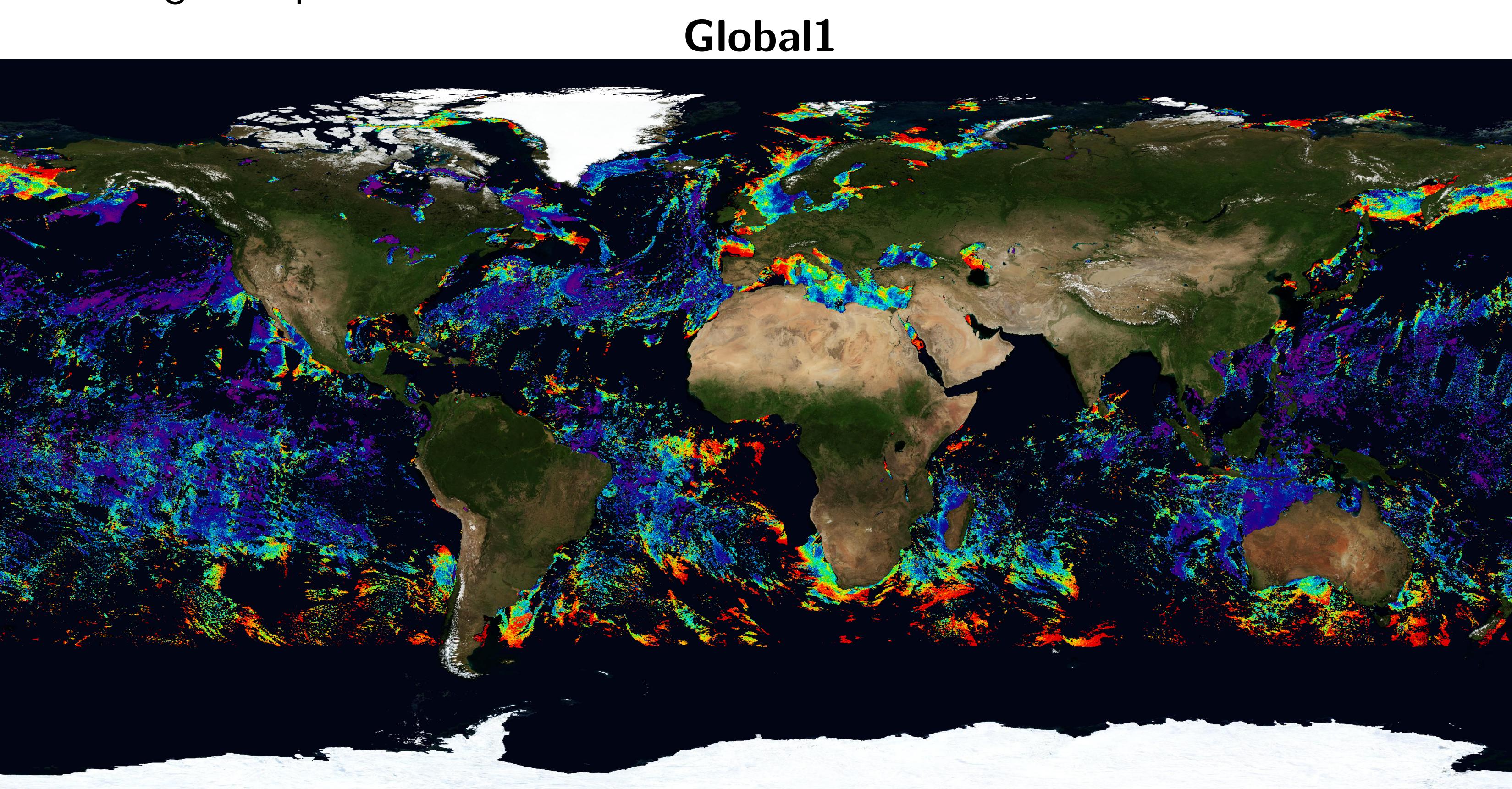


Figure caption

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## Next Steps

- Extend MC simulations to other sensors.
- MC simulations computationally costly;
  - 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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