

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

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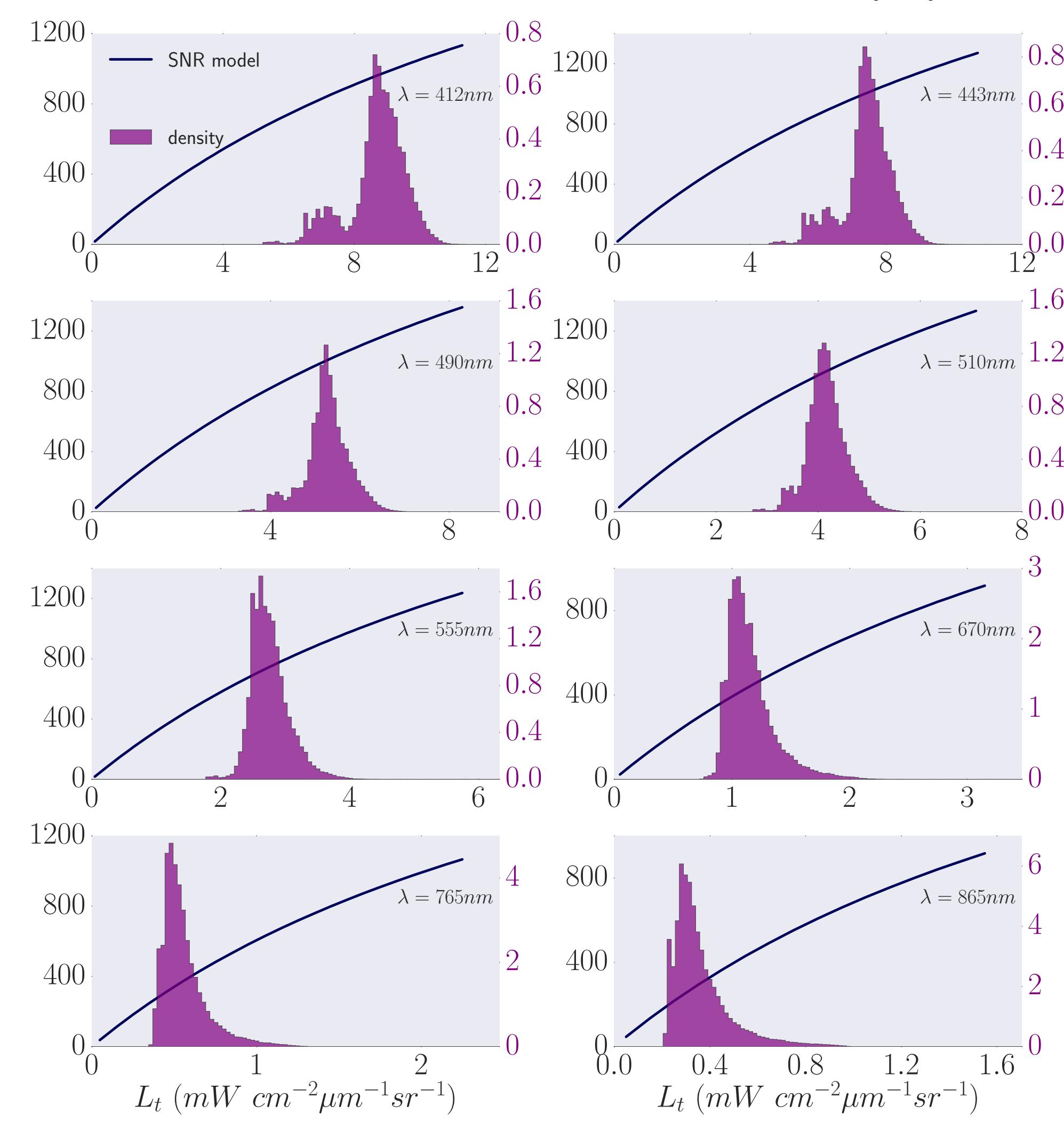
## Objectives

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

## Methods

- Model signal-to-noise Ratio (SNR) as a function of  $L_t$ [4].
- Spread in noise distribution given by  $\sigma = \frac{L_t}{SNR}$ .
- $L_{t,NOISE} = N(L_t, \sigma^2)$
- Propagate noise through atmospheric correction, retrieve remote sensing reflectance ( $Rrs$ ).
- Use steps above to run Monte-Carlo Simulation.

### Signal-to-noise ratio as a function of top-of-the-atmosphere radiance ( $L_t$ )



## Results

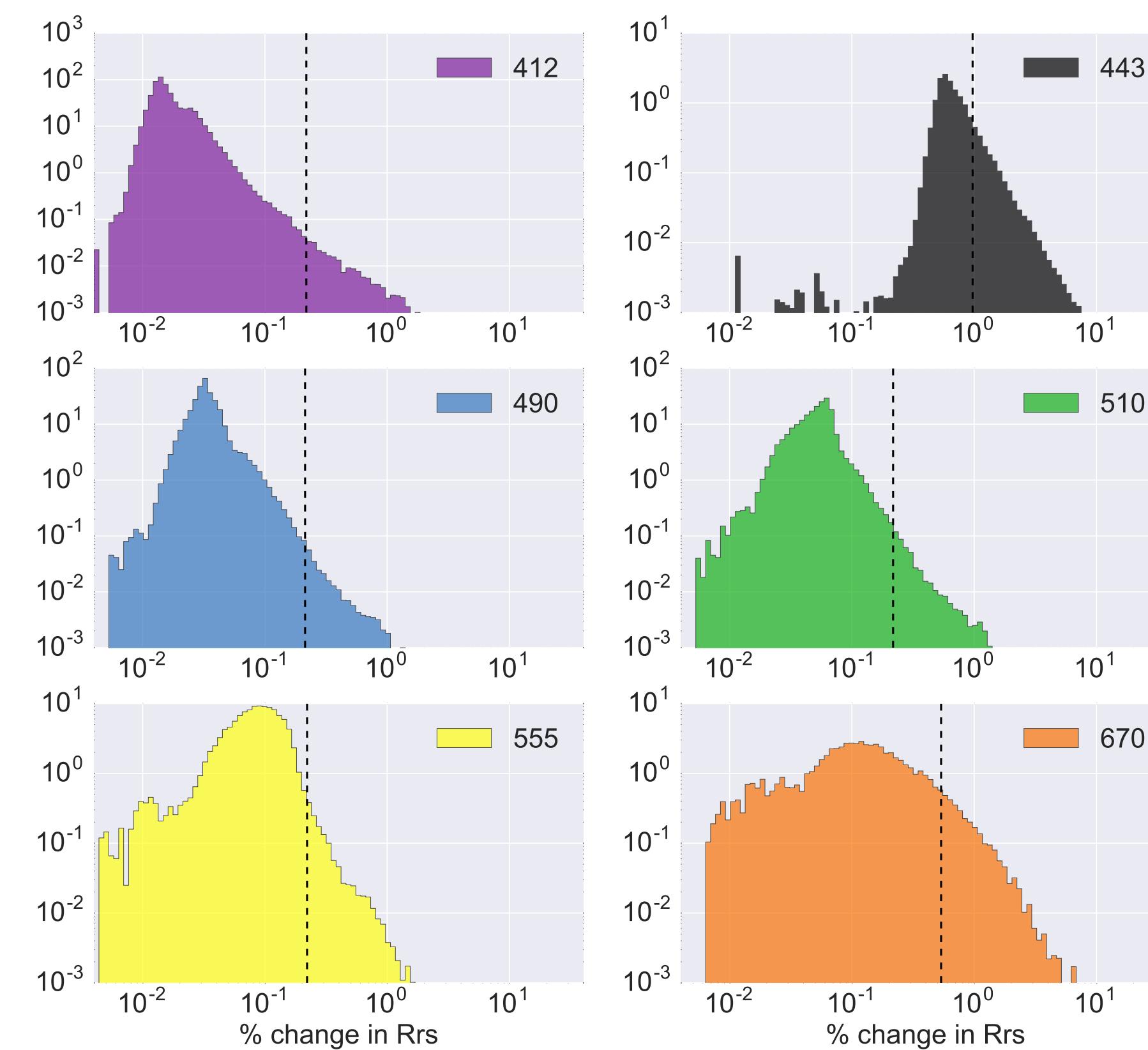


Figure caption

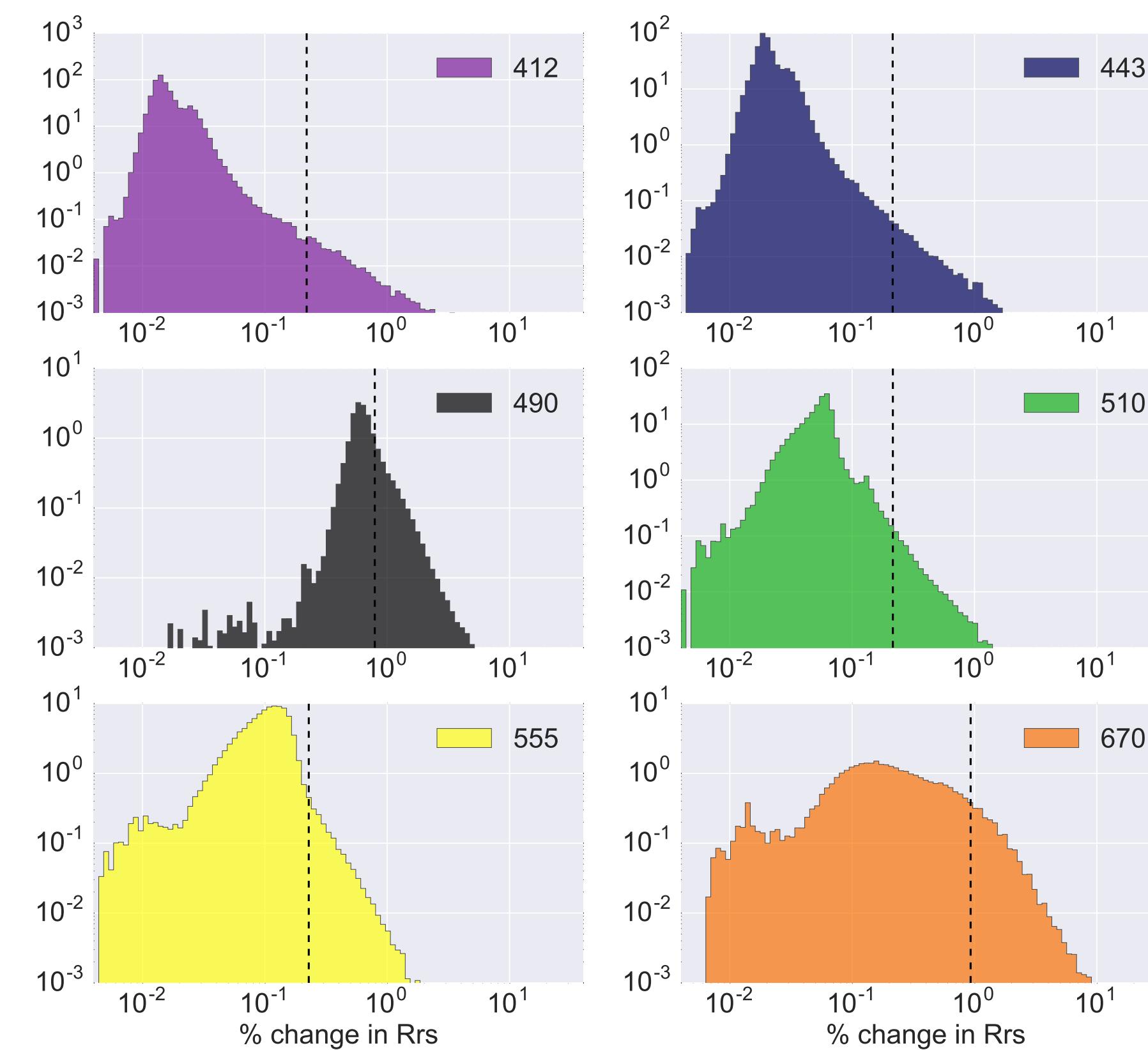


Figure caption

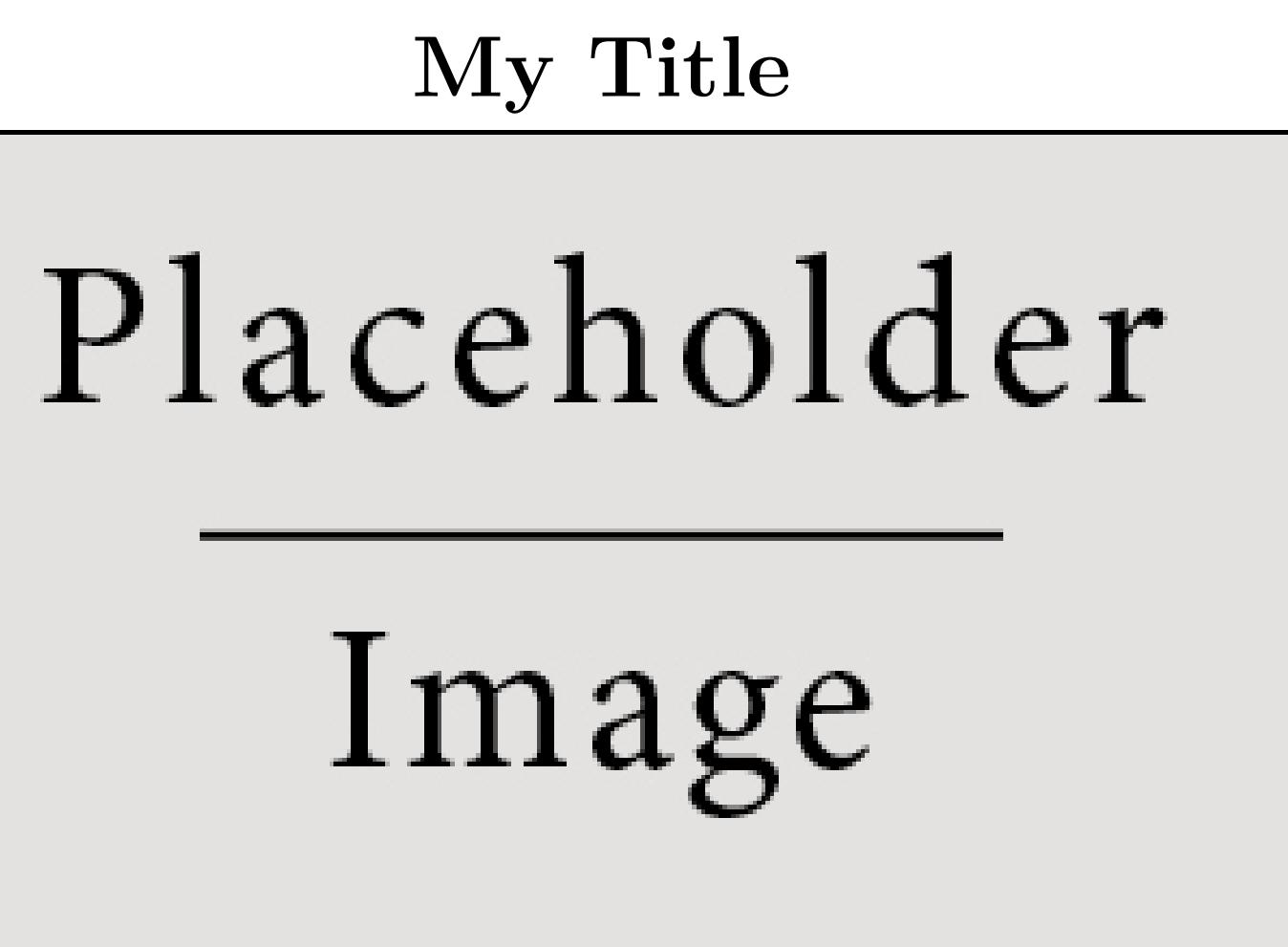


Figure Caption

## 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

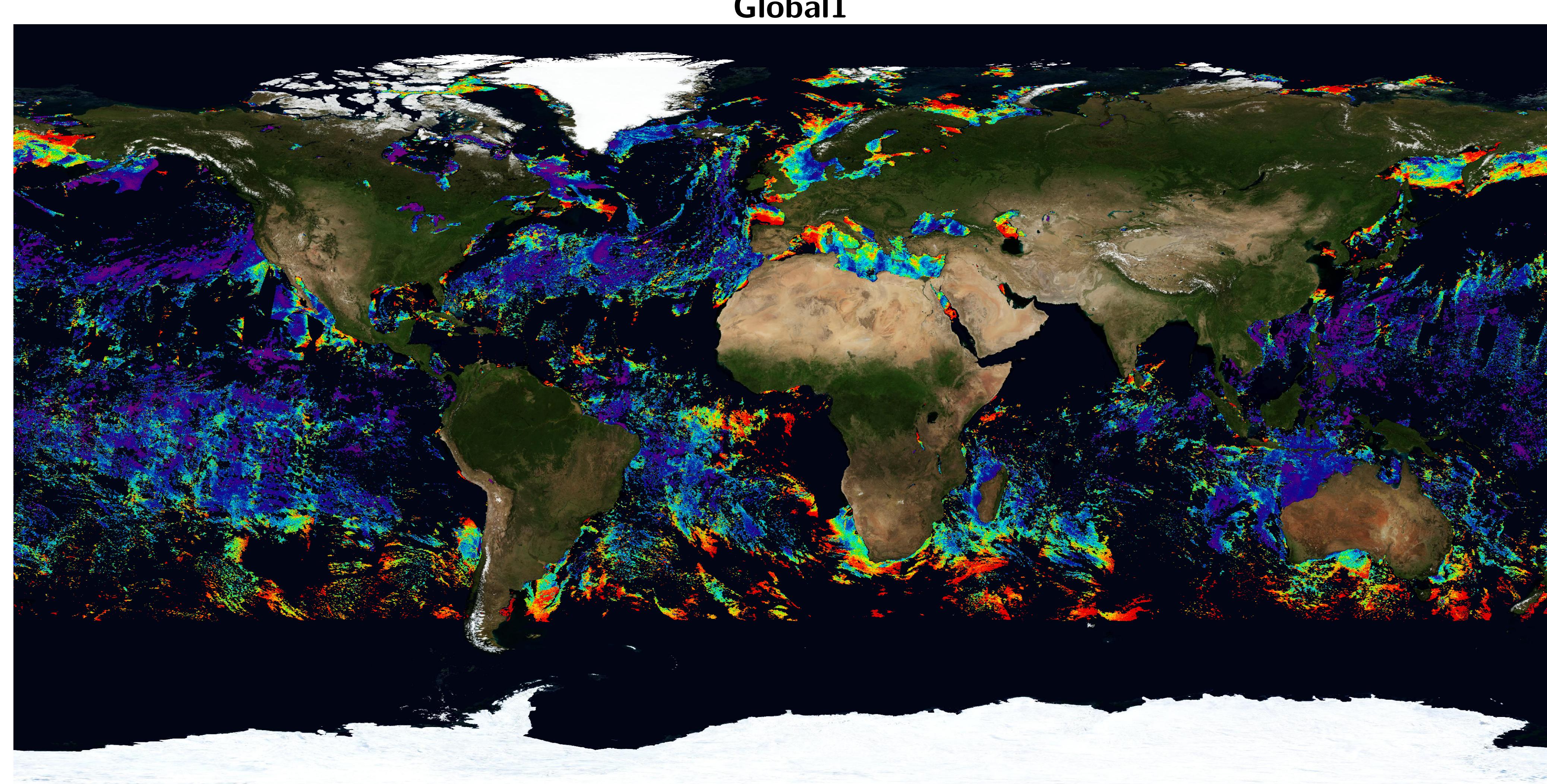
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- [2] T. D.A., S. D. M. D.W., N. M.J., and S. R.C., "Remote-sensing reflectance determinations in the coastal ocean environment: impact of instrumental characteristics and environmental variability," *Applied Optics*, vol. 39, no. 3, pp. 456–469, 2000.
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- [4] B. R.A., B. W.L., E. W.E., and M. C.R., "Prelaunch acceptance report for the seawifs," 1994.

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