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Frequentist UQ for CO2 retrievals

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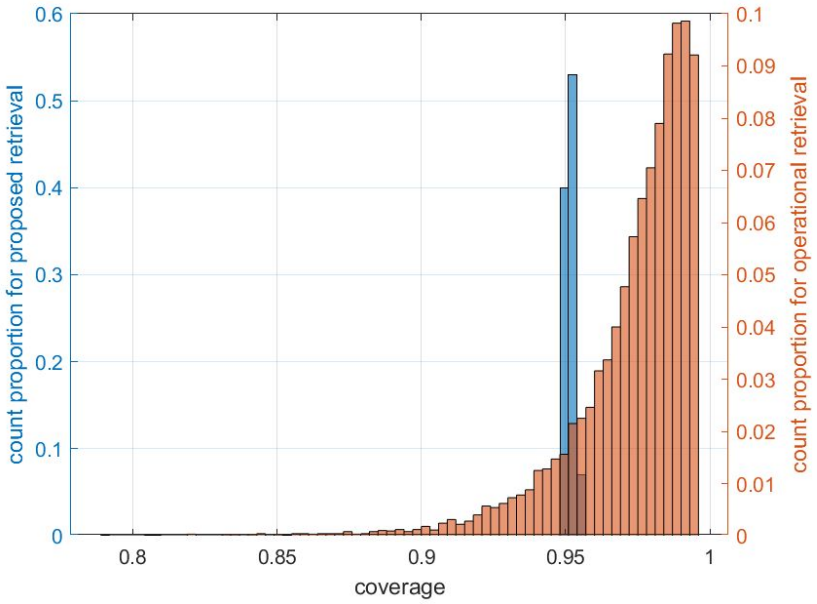

Frequentist coverage (fraction of times uncertainty interval contains true value) for 95% operational intervals (orange) and proposed intervals (blue) for retrieving XCO2

- **We investigate frequentist UQ (as opposed to Bayesian UQ) for XCO2 retrievals in OCO-2**
- **We find that the operational retrieval uncertainty is poorly calibrated and propose a new UQ procedure that achieves nominal coverage at the expense of increased interval length**
- **The miscalibration of the operational method is due to spatially correlated biases caused by the use of explicit regularization in the inversion**
- **Our method avoids this by instead implicitly regularizing the problem using physical constraints and the functional of interest (XCO2)**
- **These results have potential implications for inferring CO2 fluxes and developing future retrieval UQ algorithms**

P. Patil, M. Kuusela and J. Hobbs. Objective Frequentist Uncertainty Quantification for Atmospheric CO2 Retrievals. SIAM/ASA Journal on Uncertainty Quantification 10(3):827-859, 2022.
https://doi.org/10.1137/20M1356403

This work was supported by JPL subcontract 1629749.