A Python API for Dakota

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Agenda

- Uncertainty quantification
- Dakota
- The CSDMS Dakota Interface (a.k.a. Dakotathon)
- An experiment
- Summary and future work









(image courtesy J. Adam Stephens and Laura Swiler, SNL)

dakotathon



Given uncertain T and P, what's the likelihood of the Waipaoa producing hyperpycnal plumes?

An experiment

https://github.com/mdpiper/AGU-2016

- 1000-yr Hydrotrend runs with defaults, except for T and P, which are uniformly distributed about ±10% from default values, and L = 3.0
- 100 samples from T-P parameter space are selected using LHS
- Count of daily output $C_s > 40 \text{ kg m}^{-3}$ is the response statistic
- Use moments, correlations, PDF, and CDF to assess RI



 $RI = 8.4 \pm 0.4 yr$

https://github.com/csdms/dakota



Summary

- Uncertainty quantification is vital for communicating model predictions to policymakers and to the public
- Dakota is powerful, but it requires user code to interface with a model
- Dakotathon presents an easier-to-use Python interface

Future work

- Expose more Dakota analysis techniques
- Incorporate Dakotathon into the CSDMS Web Modeling Tool, WMT
- Perform a sensitivity study on Hydrotrend's L

Thank you!

Dakotathon https://github.com/csdms/dakota Experiments https://github.com/mdpiper/AGU-2016 Email mark.piper@colorado.edu GitHub, Twitter @mdpiper