CSET technical overview

James Frost, Sylvia I Bohnenstengel, Jorge Bornemann, James Warner, David Flack, John Edwards

This talk picks up from the CSET science overview talk and further outlines the technical aspects of CSET use and development. We will outline the main technical design principles of CSET, introduce how to use and contribute to CSET, and highlight existing diagnostics through an extreme weather case study.

CSET consists of three main components:

A repository of operators from which we produce (new) diagnostic recipes.

A Cylc 8 workflow to efficiently run diagnostics and METplus wrappers and orchestrate data retrieval and cleanup.

A website for visualising and comparing the diagnostics.

Operators are small code units that serve a single purpose such as reading, writing, filtering, or executing a specific calculation. Recipes then flexibly combine these operators to quickly build new diagnostics. These can be run individually on the command line or in parallel with the workflow. This design allows quickly adding new capabilities without major internal code changes.

The workflow allows running several diagnostics at the same time over several case studies and schedules fetching data, running recipes, and housekeeping. The website visualises diagnostics, gives access to the data that generated diagnostics and provides more detailed information on the diagnostics including their applicability.

This talk gives an overview of the technical aspects of CSET's code development and serves as an introduction to the CSET Tutorial on Friday. In addition, we cover the use of formal software development techniques to benefit reproducibility, portability, accessibility, maintainability, and quality assurance.