



Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

The Smoke and Emissions Model Intercomparison Project

Neil Wheeler¹, Kenneth Craig¹, Adam Pasch¹, Sean Raffuse¹, Dana Coe Sullivan¹, Sim Larkin², Tara Strand², Robert Solomon²
¹Sonoma Technology, Inc., Petaluma, California, USA
²U.S. Forest Service Pacific Northwest Research Station, Seattle, Washington, USA



INTRODUCTION TO SEMIP

Fire emissions and smoke impacts from wildland fires are a growing concern due to increasing fire season severity, the public's dwindling tolerance of smoke, more rigorous air quality regulations, and the role of fire in climate change. While numerous smoke and emissions models are available to address these issues, a lack of information and guidance on the strengths, limitations, and uncertainties of these models impedes their use in real-world applications by decision makers and regulators.

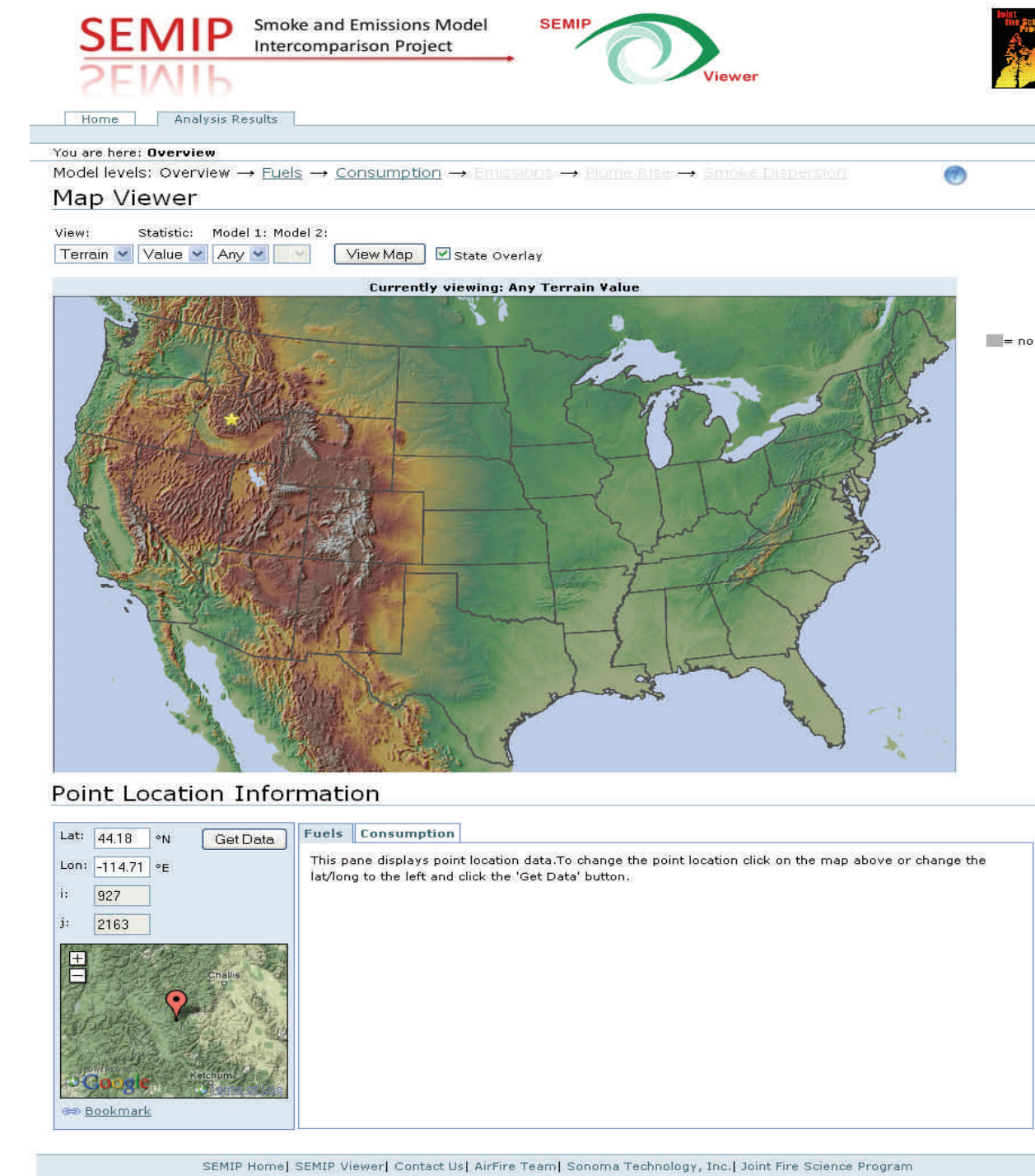
To address this need, the Smoke and Emissions Intercomparison Project (SEMIP) is being developed by the U.S. Forest Service (USFS). SEMIP is an ongoing community effort to evaluate and intercompare the growing number of fire smoke and emissions models developed by the fire sciences community. SEMIP will be based on principles developed by previous successful model intercomparison projects and will provide a valuable model evaluation and intercomparison framework for the fire impact modeling community.

THE SEMIP VIEWER

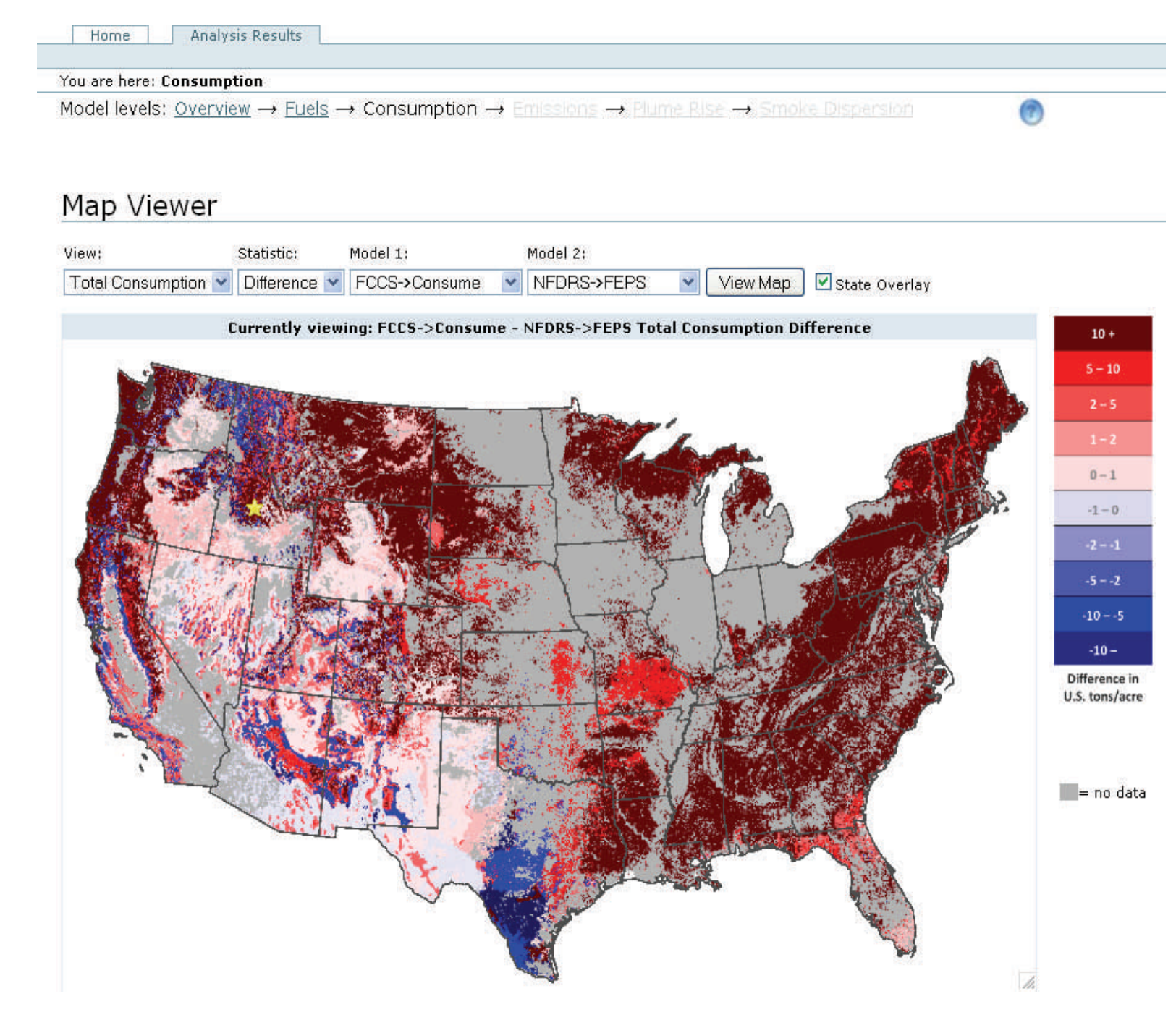
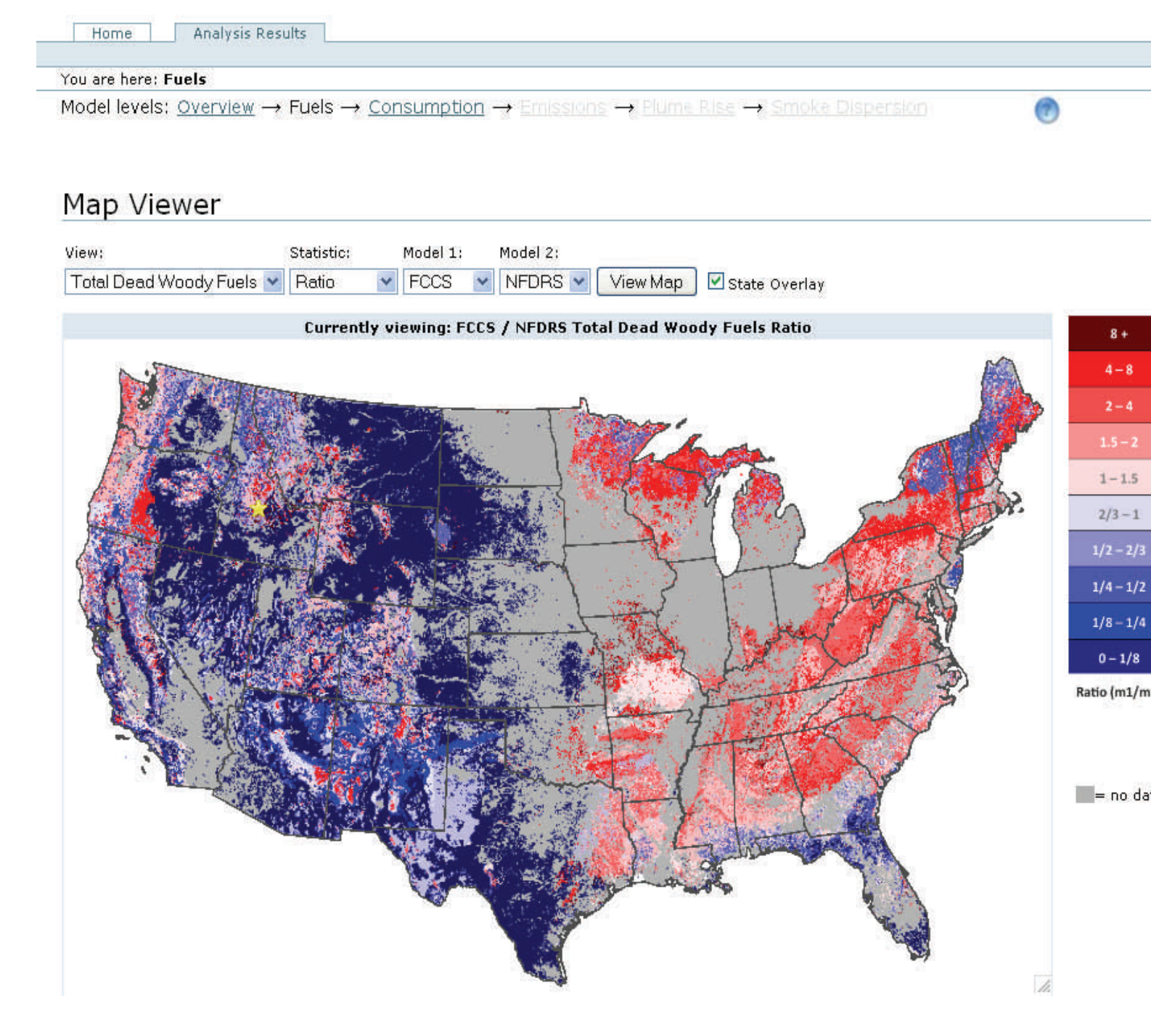
SEMIP results will be accessible to the fire sciences community through the SEMIP Viewer. This web interface allows users to interactively browse SEMIP analysis results and search for data sets and analyses by location and date range.

The SEMIP Viewer enables the user to see the big picture through maps and other large-scale analyses, then focus the view on a regional level by clicking on a location of interest.

The SEMIP Viewer is also the interface to the SEMIP data warehouse, where users can access archived data sets or submit new data sets to the SEMIP project.



EXAMPLE RESULTS



SEMIP APPROACH AND DESIGN

SEMIP Design Goals

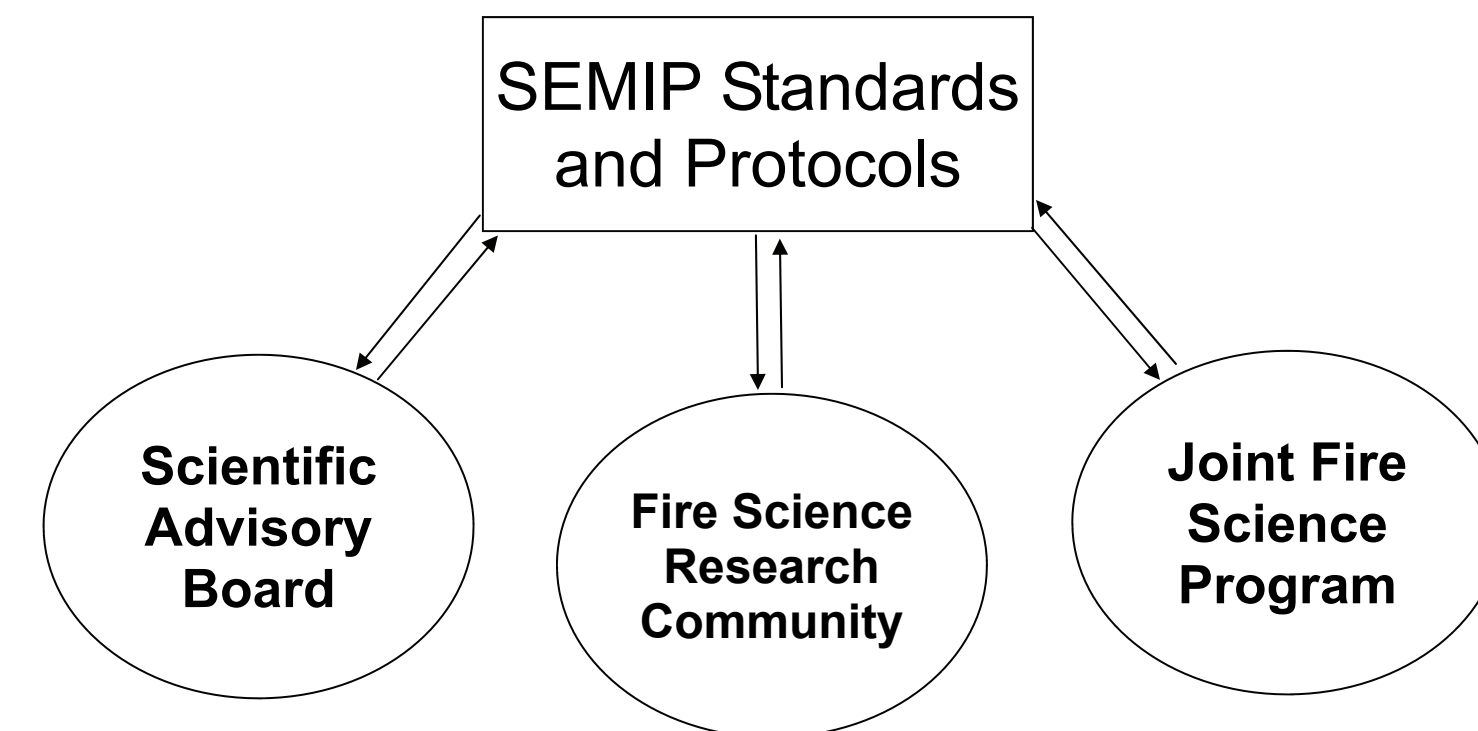
SEMIP will provide a flexible and enduring framework for evaluating and intercomparing present and future fire impact models.

The specific design goals of SEMIP include:

- Creating an open standard for comparing smoke and emissions models against each other and against real-world observations.
- Performing rigorous evaluations of selected publicly available smoke and emissions models through a sequence of standard case studies identified by the open standard.
- Translating results into user-accessible guidance as to which models perform best under which circumstances.

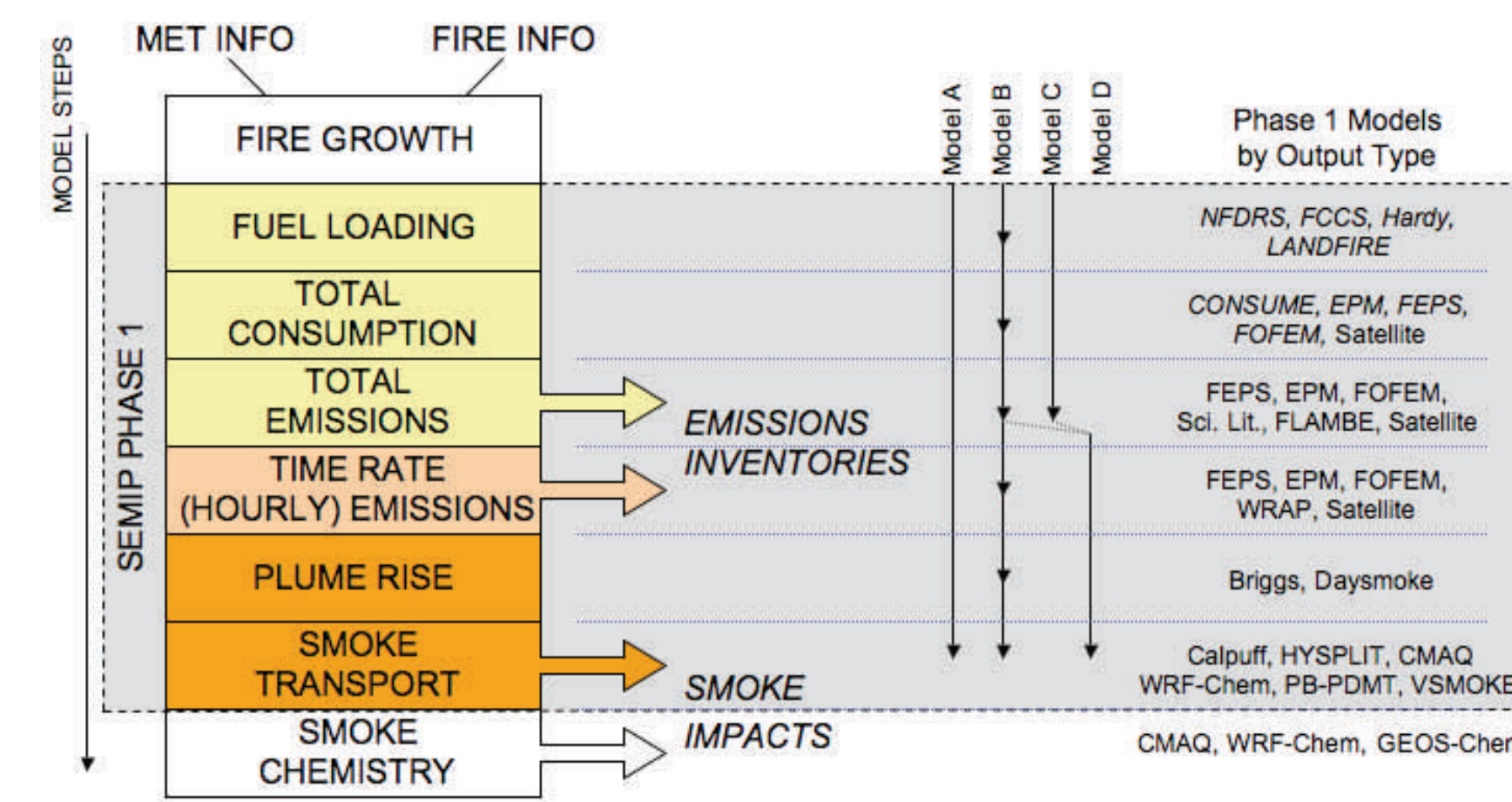
Standards and Protocols

SEMIP standards and protocols specify open criteria for data set inclusion, test case scenarios, evaluation metrics, and analysis procedures. These standards are being developed in association with the larger scientific and fire management communities through the creation of a Scientific Advisory Board and Governing Board.



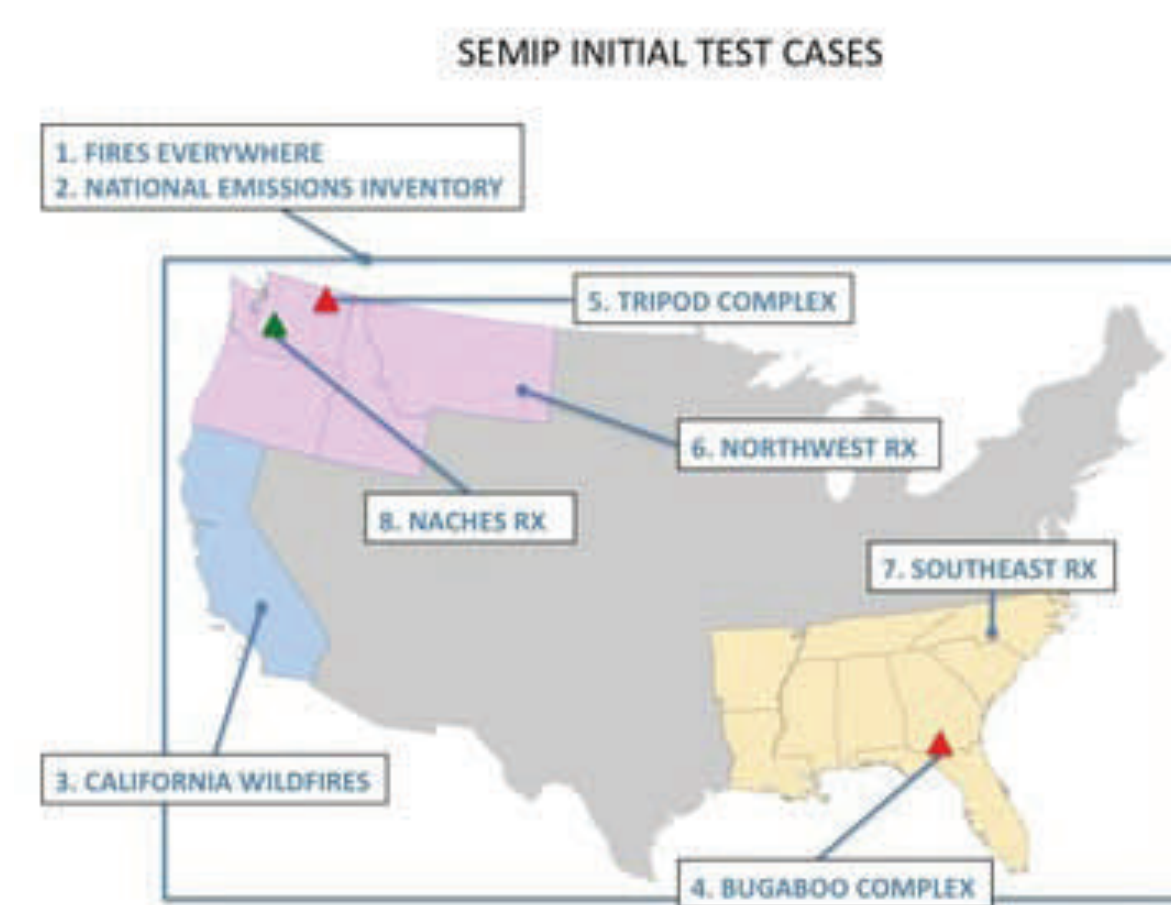
Process-Level Evaluation and Intercomparison

Modeling smoke emissions and transport involves the sequential linking of several sub-process modeling steps. Within each sub-process, numerous models have been developed, each with unique formulations, assumptions, strengths, and uncertainties. SEMIP will facilitate model evaluations and intercomparisons of individual model sub-processes, as well as different modeling pathways. The linkage and execution of all possible modeling pathways is made possible by the modularity and extensibility of the BlueSky smoke modeling framework.

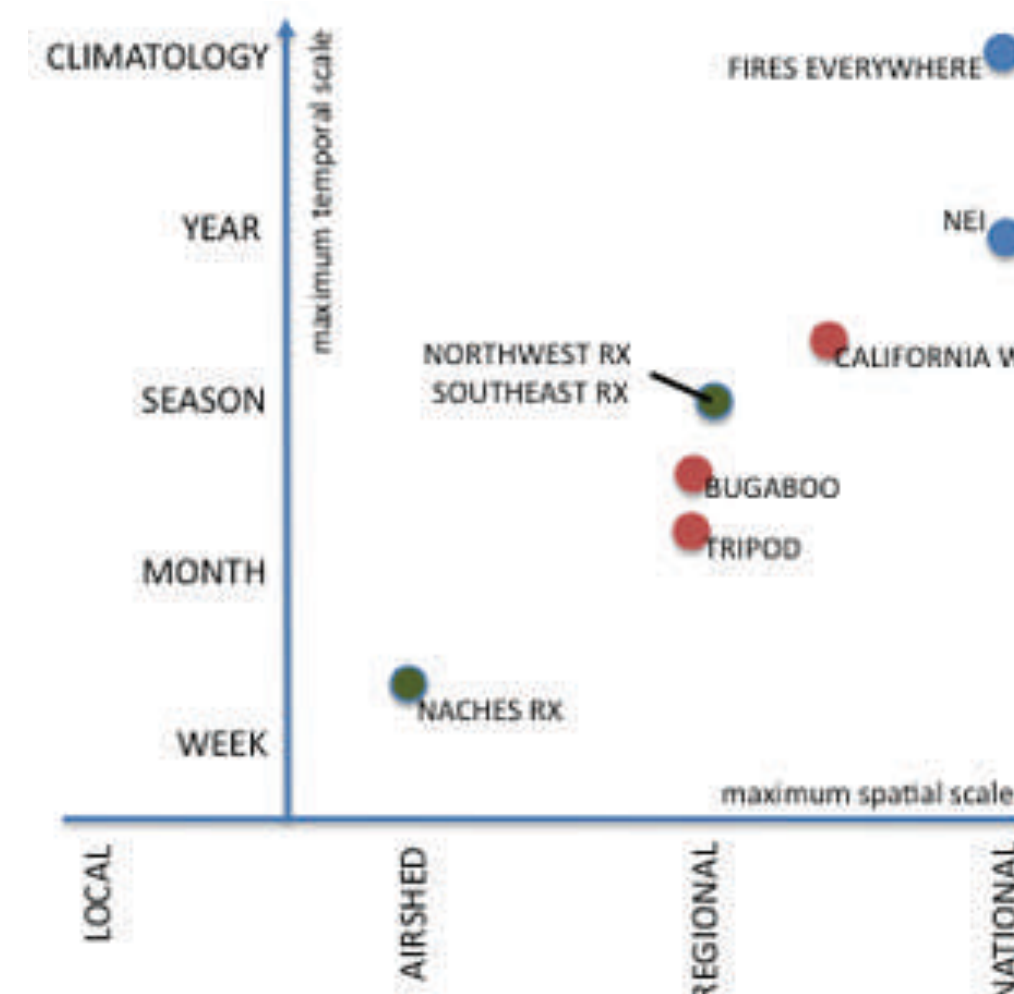


Test Cases

Test cases are the specific fire events to be modeled in SEMIP. Each test case consists of a set of fires, an analysis procedure, and observational data sets to drive the models and evaluate results. The initial test cases are designed to test the models under a variety of fire types, fuels, geographic regions, and meteorological conditions.



Location of initial SEMIP test cases.



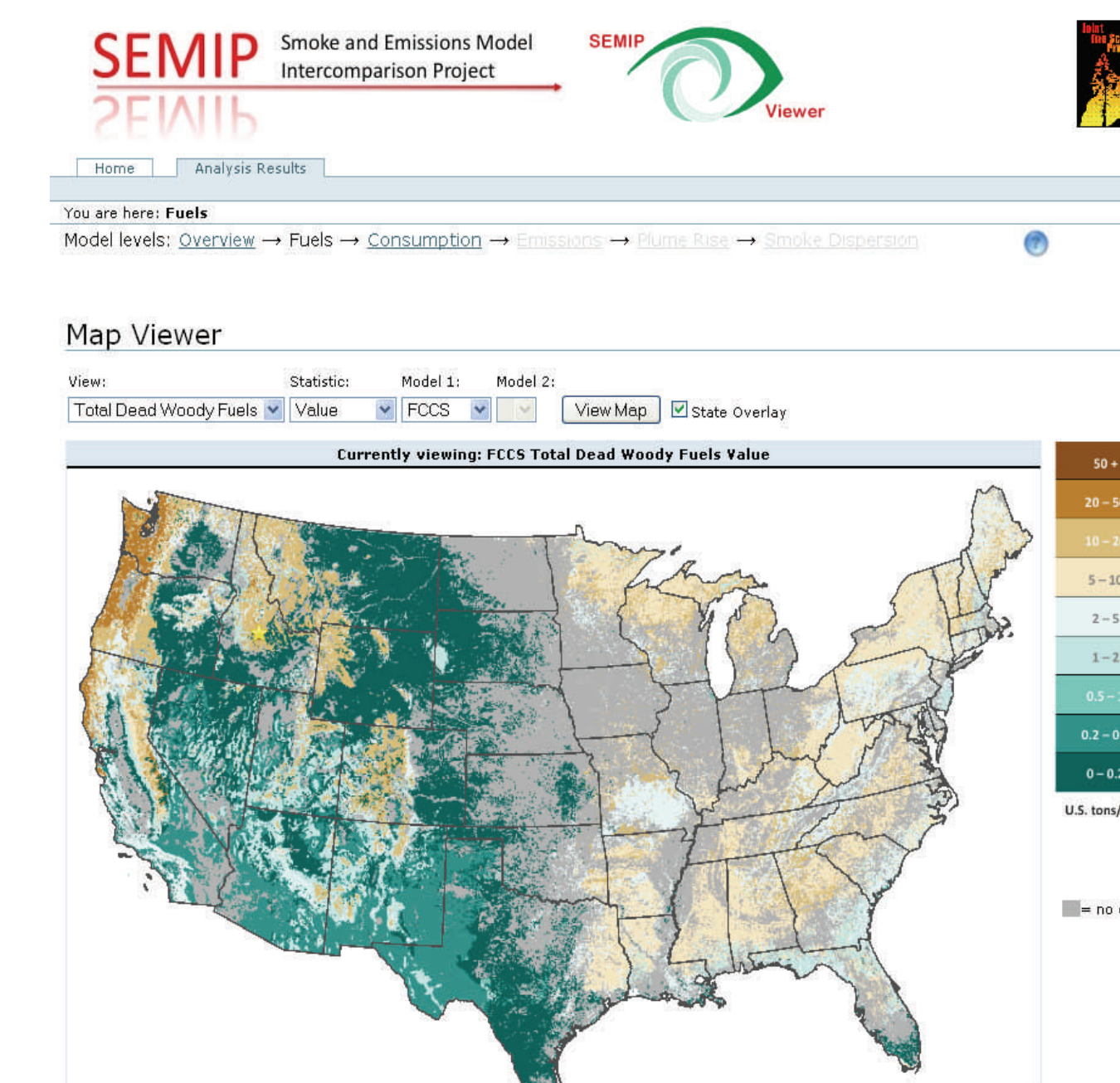
Maximum spatial and temporal scale encompassed by the initial SEMIP test cases.

Model Comparison, Evaluation, and Analysis

SEMIP establishes a framework of model comparison, analysis, and evaluation at each output level of the smoke and emissions modeling chain.

Analysis protocols are developed for each output level, as each modeling step has a unique set of variables, evaluation issues, and observational data constraints.

The "R" statistical package is used to perform statistical comparisons and generate graphics for the SEMIP Viewer.



FUTURE PLANS

- Continued SEMIP development and Phase 1 simulations and analyses.
- Observational data for all test cases will be obtained, formatted, and made available to SEMIP users.
- Further development of the SEMIP Viewer to facilitate analysis and display of data from all modeling steps.
- Test cases, standards, and protocols will be submitted to the Science Advisory Board and the user community for feedback.

DOCUMENTATION AND INFORMATION

SEMIP Documentation and information: <http://www.semip.org>

- Full SEMIP documentation
- Test case descriptions and selection methodology
- Design features
- Standards and protocols

BlueSky Framework information: <http://www.blueskyframework.org>

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For more information, contact Neil Wheeler via email at neil@sonomatech.com