

## PROJECT EXECUTIVE SUMMARY

**Title:** Statewide California Seismic Hazard Model Development

**PI and Co-PI(s):**

PI: Yehuda Ben-Zion – University of Southern California

Co-PI: Kim Bak Olsen - San Diego State University

Co-PI: Yifeng Cui - San Diego Supercomputer Center

Co-PI: Alice-Agnes Gabriel - University of California San Diego

**Applying Institution/Organization:** Statewide California Earthquake Center (SCEC)

**Resource Name(s) and Number of Node Hours Requested:**

OLCF Frontier - Node Hours Requested: 537,500

**Amount of Storage Requested:**

OLCF: 549 TB temporary file system storage, 274 TB archival storage

**Executive Summary:**

In this INCITE allocation request, a collaborative research group from the Statewide California Earthquake Center (SCEC) requests time on Department of Energy (DOE) computing resources to perform earthquake system science research. Our research aims to develop accurate high-resolution seismic hazard models for the state of California by leveraging the best available California geological models and advanced seismic hazard modeling methods. To achieve this goal, we will assemble, assess, and improve the components used in seismic hazard models. These components include (1) earth structural models, (2) earthquake dynamic rupture models, and (3) earthquake wave propagation models. Properly expressed, and integrated together, we will then use these improved components to improve probabilistic seismic hazard models in California. Our interdisciplinary research group has considerable experience working collaboratively and is exceptionally qualified to perform this seismic hazard research. With support from the National Science Foundation (NSF), the U.S. Geological Survey (USGS), and the DOE, our group has the scientific breadth required to conduct multi-disciplinary research that develops improved seismic hazard information using the best available science. In addition, our collaborations with energy industry partners and civil engineering groups ensures that our research addresses socially significant hazard and risk problems. In Sept 2023, our group began statewide operations and we initiated research activities across the full state of California, which significantly broadens our scientific region of study and increases the relevance of our research to a wider population. We anticipate several benefits from the research program proposed in this allocation request. Our basic research on seismic processes will develop more realistic and reliable physics-based models of earthquake rupture dynamics, rates and seismic ground motions. We will develop new seismic hazard assessments in California that reflect region-specific seismic velocity models, frequency-dependent ground motion attenuation, and site response effects. The research will contribute to the development of urban seismic hazard maps that show probable variations in hazards at a neighborhood scale. Our work will provide the technical basis for revised codes and standards for critical infrastructure and contribute to seismic design guidelines for major specialized structural systems (e.g., buildings, bridges, power plants, chemical and oil storage facilities). By producing seismic hazard information relevant to groups including the USGS, state agencies, and civil engineers, our work will lead to improved risk and loss assessments used for recovery planning and mitigation strategies at the federal, state and local levels.