For the purposes of the Collaboratory for the Study of Earthquake Predictability (CSEP), a testing region consists of two elements: a precisely defined geographic region in which earthquake models are tested and the test specifications. Delineating a natural laboratory requires precise characterization of available data, particularly regional earthquake catalogs. This includes information about data generation processes, measurement uncertainties, and derived properties such as catalog completeness. CSEP employs working groups for data, test, and model standards to develop guidelines for testing region developments. We present the details of the California testing region and describe the ongoing efforts to establish comparable testing regions in New Zealand, Italy, the Western Pacific region, and Japan. The unique challenges of global testing are also addressed.

Abstract

These examples indicate a few of the interesting challenges of defining a natural laboratory:

- Identifying the appropriate earthquake catalog(s)
- Working with regions containing multiple "authoritative sources" (e.g., California)
- Working with regions where no authoritative source has been identified (e.g., Basin and Range)
- Testing forecasts that transcend geographical boundaries (e.g., Italy)
- Working in regions with subduction zones (e.g., New Zealand, Japan)

All of these issues arise from the simplest form of observation: seismicity catalogs. As CSEP extends the experiment space to include other data such as GPS or fault models, careful consideration should be given to the process of defining the natural laboratories.