Broadband Platform 19.4 Overview

- Open-Source scientific software that can generate broadband (0-100Hz) ground motions
- Calculate ground motions at user specified sites for historical and scenario earthquakes
- Collaborative software development project involving:
  - SCEC Geoscientists
  - Civil Engineers
- Graduate Students - SCEC Community Modeling Environment (CME)
- Integrates complex scientific modules including:
  - Rupture Generation - Site Effects Calculation
  - Seismogram Synthesis - Visualization
- Provides ground motion models from seven different research groups
- Distributed as open-source package for Linux/GNU compilers and as a Virtual Box Image
- Features simplified command-line interface for interactive use and scripting interface

Integrated RSQsim-generated rupture slip-time histories into BBP workflow
- Used in study of building response to strong ground motions
- Used to simulate ground motions produced by large magnitude (M7.5+) ruptures

Correction of observations to rock site levels is no longer used in validation simulations
- Added Vs30-based site response module to simulation methods
- Added Parkfield, San Simeon, Iwate, and Chuetsu-Oki as new validation events

Implemented multi-segment rupture capabilities into several BBP simulation methods
- Features simplified command-line interface for interactive use and scripting interface
- Distributed as open-source package for Linux/GNU compilers and as a Virtual Box Image
- Integrates complex scientific modules including:
  - Collaborative software development project involving:
    - Calculate ground motions at user specified sites for historical and scenario earthquakes
    - Open-Source scientific software that can generate broadband (0-100Hz) ground motions
    - Ticketing system to document and resolve issues, documentation available on wiki
    - Unit tests verifies that modules are working properly
    - Automated software testing process
    - Modular architecture
- 1D Green’s Functions available
  - LA Basin, Mojave, Central California, Northern California
  - Eastern and Central United States and Canada
  - Western and Central Japan
- Export PGA and PGV data into OpenSHA
  - Use stations distributed uniformly in a grid
  - Create ground motion intensity maps

Recent Broadband Platform Developments for 2017-2019

- Integrated new Irikura Recipe Method 2 simulation method into the Broadband Platform
- Implemented multi-segment rupture capabilities into several BBP simulation methods
  - GP, SDSU, SONG, Irikura Recipe Method 1, Irikura Recipe Method 2
- Added Vs30-based site response module to simulation methods
- Correction of observations to rock site levels is no longer used in validation simulations
- Used to simulate ground motions produced by large magnitude (M7.5+) ruptures
- Used in study of building response to strong ground motions
- Integrated RSQsim-generated rupture slip-time histories into BBP workflow
- Used to calculate large collection of ground motion parameters for M6 to M8 ruptures

Funding for the SCEC Broadband Platform software development was provided by NSF awards “SSE-SSI: Community Software for Extreme-Scale Computing in Earthquake System Science” (ACI-1490451) and “SSE-SSI: A Sustainable Community Software Framework for Petascale Earthquake Modeling” (OCI-1148493) with additional support provided by Pacific Gas and Electric.

BBP 19.4 available for download at https://github.com/SCECcode/bbp