Broadband Platform 16.5.0
Release Overview

SCEC CME Group

25 May 2016
What is the Broadband Platform (BBP)?

- Collaborative software system
  - SCEC research groups
  - CME software development
- Computes seismograms from 0-100 Hz
  - Depending on the method and parameters used
- Valuable in calculating ground motions timeseries at selected locations for scenario earthquakes
- Can be run by scientists or engineers without detailed knowledge of the code details
- Generates repeatable results
BBP Diagram
What’s New in Broadband Platform 16.5.0?

- Features a new method: Song RMG
- Incorporates updates to several methods
  - SDSU: BBToolbox 1.6.1 with NGA-W2 parameterization
  - GP: Genslip 5.0.1 – randomized rupture velocity (GP 2016)
  - GP: Site Response – NGA-W2
- Includes GFs with increased range:
  - LABasin, NoCal, and Mojave (140/140/250km → 500km)
- Contains new metrics (GMSV contributions)
  - Anderson GoF, RZZ2015, AS2016, RotD100/RotD50 ratio
- Requires newer Python / NumPy / SciPy / Matplotlib
- Includes new easy installation script
Mac OS X Requirements

- Mac OS X Mavericks, Yosemite, El Capitan
- Xcode (App Store) with command-line tools
- Gfortran compiler
- Anaconda 2.4
  - Python (2.7.10)
  - NumPy (1.10)
  - SciPy (0.16.0)
  - Matplotlib (1.4.3)
  - Pyproj (1.9.5.1)
Streamlined Command-Line Interface

- User provides minimum set of inputs
  - Validation
    - event
    - method
  - Scenario
    - velocity model
    - method
    - source file
    - station list
- Full set of capabilities still available
  - Expert mode allows simulation customizations
$ run_bbp.py
Welcome to the SCEC Broadband Platform version 16.5.0.

Please select the Broadband Platform mode of operation:
  * Validation - Simulates a historical event
  * Scenario   - Runs a user-defined hypothetical event

Do you want to perform a validation simulation (y/n)? y

Please select a validation event from the list below:

(1) Alum Rock
(2) Chino Hills

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The Broadband Platform includes several scientific methods that can be used to calculate synthetic seismograms.

Choose a Method to use in this Broadband validation simulation:

(1) GP (Graves & Pitarka)
(2) UCSB
(3) SDSU
(4) EXSIM
(5) CSM (Composite Source Model) - Beta Version
(6) Song

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SRC file: /home/sarah/bbp/bbp_val/ChinoHills/common/ch_v14_2_2.src

STL file: /home/sarah/bbp/bbp_val/ChinoHills/common/ch_v14_2_2.stl
Expert Mode

- Expert mode allows for extra functionality
  - Start simulation from SRF file
    - Run rupture generator outside platform (SG, JB)
  - Choose custom SRC file and/or station list
    - Reduced number of stations
    - Modified validation SRC file
  - Use site response
  - Elect plots to generate
  - Opt for the SDSU Goodness-of-Fit module instead of GP
  - Select GMPE group to use
  - Calculate additional metrics (GMSV group)
New Method: Song RMG

• Lead: Seok Goo Song
• Implements new Rupture Generator (RMG module)
• Uses GP low and high-frequency codes
• Version 1.0 (Oct 2015)
  – Uses grid specified in DLEN/DWID for calculations
• Version 2.0 (Jan 2016)
  – Employs interpolation to speed-up process
  – DLEN/DWID divided by 4
• Added flag to switch between the two modes
• Platform currently using version 2.0
Song RMG Combined Bias Plots

Combined GOF Plot for NR
50 Realizations
SONG Method

Combined GOF Plot for LOMAP
50 Realizations
SONG Method

Combined GOF Plot for NORTHEPS
50 Realizations
SONG Method

Combined GOF Plot for Landers
50 Realizations
SONG Method
Anderson GoF

• Lead: Andreas Skarlatoudis

• Inputs
  – Timeseries (sim, obs)
  – PSA (sim, obs)
  – Corrections

• Outputs
  – Metrics (station/event)
  – Score (station/event)
  – Combined plots
RZZ 2015 (Rezaeian-Zhong-Zareian)

• Lead: Sanaz Rezaeian

• Inputs
  – Timeseries (sim, obs)

• Outputs
  – Per station plots
  – Tabulated results
RotD100/RotD50 Ratio

- **Lead:** Christine Goulet
- **Inputs**
  - Timeseries (sim, obs)
- **Modified RotD50 code**
  - Also calculate RotD100
  - Compute ratio
  - Per realization, combined
# Broadband Platform 16.5.0 Tests

- **Unit Tests**
  - 35 tests (+4 from 15.3.0)
  - Individual components of the Platform
  - Covers 52% of code (up from 48% in 15.3.0)

- **Acceptance tests**
  - 14 tests (+2 from 15.3.0)
  - Validation and scenario simulations
  - All methods
-bash-4.1$ coverage run /UnitTests.py

test_runprog (test_bband_utils.Test_bband_utils) ... ok

test_runprog2 (test_bband_utils.Test_bband_utils) ... ok

test_runprog3 (test_bband_utils.Test_bband_utils) ... ok

test_execute_platform_bbp (test_python_code.Test_PythonCode) ... ok

test_python_code_comps (test_python_code.Test_PythonCode) ... ok

test_python_code_tests (test_python_code.Test_PythonCode) ... ok

test_arias_duration (test_arias.Test_Arias) ... ok

test_bbp2peer (test_bb_format.Test_BBP_Format) ... ok

test_exsim2bbp (test_bb_format.Test_BBP_Format) ... ok

test_peer2bbp (test_bb_format.Test_BBP_Format) ... ok

test_vm2ucsb (test_vm2vm.Test_vm2vm) ... ok

test_vm2ucsb_nga (test_vm2vm.Test_vm2vm) ... ok

test_vm2vm (test_vm2vm.Test_vm2vm) ... ok

test_vm2vm_nga (test_vm2vm.Test_vm2vm) ... ok

test_xy2ll (test_cc.Test_cc) ... ok

test_gensrf (test_genslip.TestGenslip) ... ok

test_jbsim (test_jbsim.TestJbSim) ... ok

test_hfsims (test_hfsims.Test_Hfsims) ... ok

test_wcc_siteamp (test_wcc_siteamp.Test_Wcc_siteamp) ... ok

test_match (test_match.Test_Match) ... ok

test_uc_fault_utils (test_uc_fault_utils.Test_UC_Fault_Utils) ... ok

test_ucgen (test_ucrmg.Test_UCrmg) ... ok

test_syn1d (test_syn1d.Test_Syn1D) ... ok

test_site_amp (test_uc_site.Test_UC_Site) ... ok

test_bbtoolbox (test_bbtoolbox.Test_BBToolbox) ... ok

test_amp_fac (test_amp_fac.Test_Amp_Fac) ... ok

test_exsim (test_exsim.TestExsim) ... ok

test_rmg (test_rmg.TestRMG) ... ok

test_respect (test_respect.Test_Respect) ... ok

test_rot50 (test_rot50.Test_RotD50) ... ok

test_gof (test_gof.Test_GP_Gof) ... ok

test_mogof_10stat (test_sdsu_mogof.Test_SDSU_MOGoF) ... ok

test_anderson_gof (test_anderson_gof.TestAndersonGof) ... ok

test_rzz2015 (test_rzz2015.TestRZZ2015) ... ok

test_as16 (test_as16.TestAS16) ... ok

Ran 35 tests in 1846.431s
Broadband Platform 16.5.0 Results

• Complete Part-A and Part-B validations
  – All events, all methods
  – 15k SUs

• Compare against previous results
  – BBP 16.5.0 versus BBP 15.3.0
  – Code changes
    • GP
    • SDSU
Broadband Platform 16.5.0 Release

• Minimum Distribution (~6GB)
  – Source distribution
  – LABasin velocity model (needed for unit, acceptance tests)
  – Northridge validation (needed for acceptance tests)

• Optional Downloads (~24GB)
  – Mojave, NoCAL, Central Japan, Western Japan, CEUS 1000, Canada 1000 velocity model packages
  – Chino Hills, Alum Rock, Loma Prieta, Landers, North Palm Springs, Saguenay, Riviere-du-Loup, Mineral, Tottori, Niigata validation events

• Virtual Box including all of the above (TBD)
  – 2 versions (basic and complete) using latest Ubuntu OS
Broadband Platform 16.5.0 Documentation

• Wiki
  – BBP 16.5.0 page (also on protected Wiki)
  – BBP 16.5.0 User Guide
  – BBP on OS X Guide
  – BBP 16.5.0 Release Notes

• BBP distribution
  – README
  – INSTALL_GUIDE
  – USER_GUIDE_16.5.0.pdf (from WIKI)
  – RELEASE_NOTES
Broadband Platform 16.5.0

Comments or Questions?

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