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QuakeML 2.0: Recent developments

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QuakeML is a community-backed data model for seismic event parameter description. Its current version 1.2, released in 2013, has become the gold standard for parametric data dissemination at seismological data centers, and has been adopted as an FDSN standard. It is supported by several popular software products and data services, such as FDSN event web services, QuakePy, and SeisComP3.

Work on the successor version 2.0 is under way since 2015. The scope of QuakeML has been expanded beyond event parameter description. Thanks to a modular architecture, many thematic packages have been added, which cover peak ground motion, site and station characterization, hydraulic parameters of borehole injection processes, and macroseismics. The first three packages can be considered near final and implementations of program codes and SQL databases are in productive use at various institutions. A public community review process has been initiated in order to turn them into community-approved standards.

The most recent addition is a package for single station quake location, which allows a detailed probabilistic description of event parameters recorded at a single station. This package adds some information elements such as angle of incidence, frequency-dependent phase picks, and dispersion relations. The package containing common data types has been extended with a generic type for probability density functions. While on Earth, single station methods are niche applications, they are of prominent interest in planetary seismology, e.g., the NASA InSight mission to Mars.

So far, QuakeML is lacking a description of seismic instrumentation (inventory). There are two existing standards of younger age (FDSN StationXML and SeisComP3 Inventory XML). We discuss their respective strengths, differences, and how they could be combined into an inventory package for QuakeML, thus allowing full interoperability with other QuakeML data types.

QuakeML is accompanied by QuakePy, a Python package which is a close representation of the data model. QuakePy has been updated to reflect the most recent thematic additions to QuakeML 2.0. Furthermore, an object-relational mapping layer has been added, which allows convenient serialization of QuakePy objects to a relational database.

The current status of QuakeML development can be followed at http://quakeml.org/QuakeML2.0 .