QuakeML: an XML-based data exchange format for seismology

F. Euchner[1], D. Schorlemmer[2], J. Becker[3], A. Heinloo[3], P. Kästli[1], J. Saul[3], B. Weber[3], and the QuakeML working group

[1] ETH Zürich, Switzerland. [2] University of Southern California, Los Angeles, USA. [3] GFZ Potsdam, Germany.

Abstract

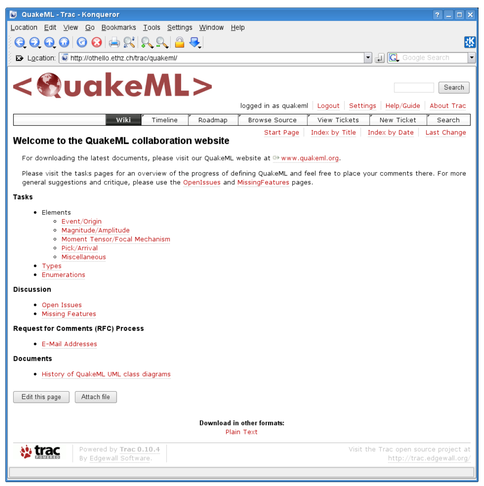
QuakeML is a new XML-based data exchange format for seismology. Adopting the XML standard family, it is designed for flexibility, extensibility and modularity.

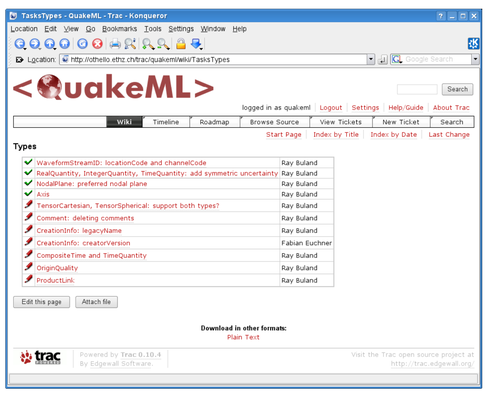
The first release of QuakeML will cover a basic description of seismic events including picks, arrivals, amplitudes, magnitudes, origins, focal mechanisms, and moment tensors. Further extensions are in progress or planned, e.g., for macroseismic information, location probability density functions, slip distributions, and ground motion information.

As an application of QuakeML, ETH Zurich currently develops a Python-based seismicity analysis toolkit as a contribution to CSEP (Collaboratory for the Study of Earthquake Predictability).

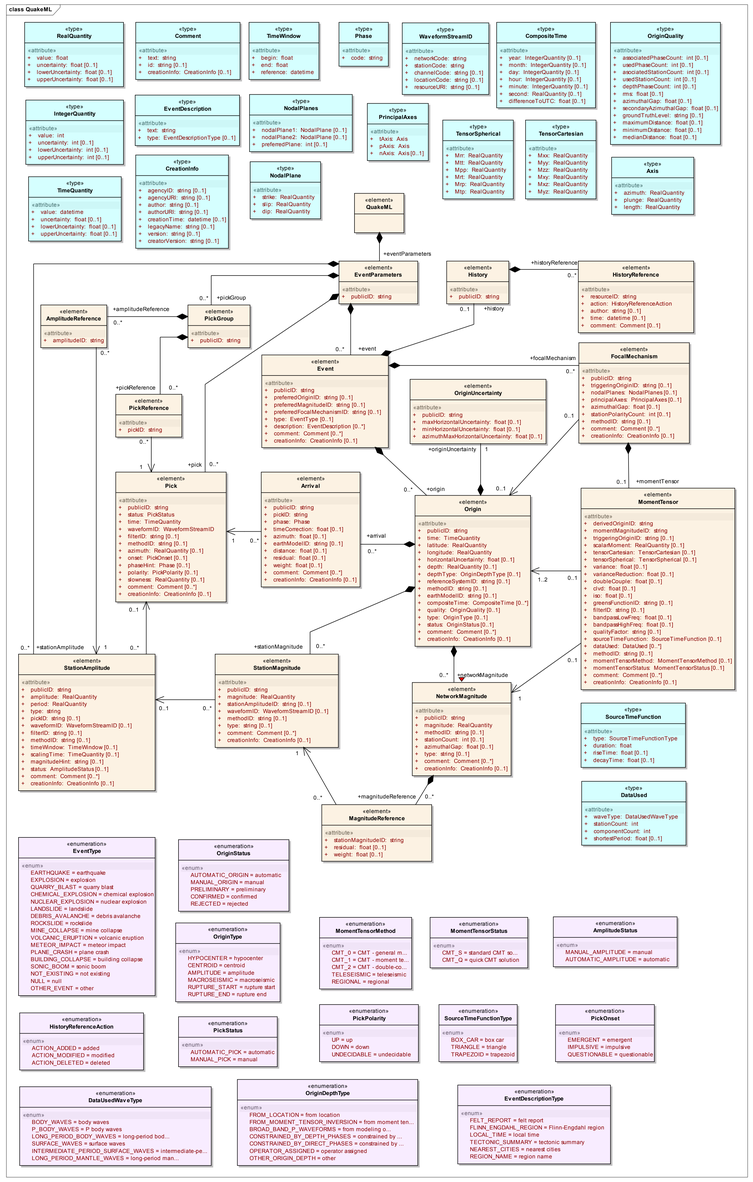
We follow a collaborative and transparent development approach along the lines of the procedures of the World Wide Web Consortium (W3C). QuakeML currently is in working draft status. The standard description will be subjected to a public Request for Comments (RFC) process and eventually reach the status of a recommendation. Current collaborators are from ETH, GFZ, USC, USGS, IRIS DMC, EMSC, ORFEUS, and ISTI.

QuakeML development website (trac)





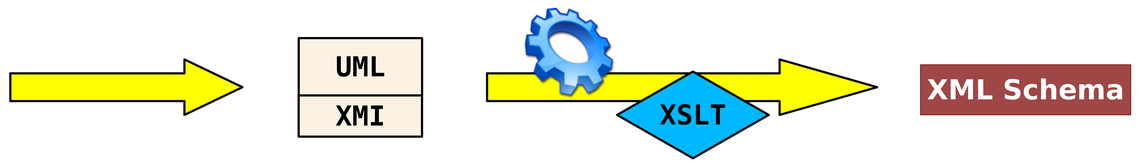
QuakeML class diagram, version 0.7.3



Acknowledgements

We thank Rémy Bossu, Ray Buland, John Clinton, Torild van Eck, Paul Friberg, Stéphanie Godey, Winfried Hanka, Linus Kamb, Silvio Maraini, Alessandro Spinuso, Stefan Wiemer, Jochen Wössner, and Adrian Wyss for their contributions to QuakeML.

http://www.quakeml.org



QuakeML instance

```
<?xml version="1.0"?>
<quakeml>
  <eventParameters publicID="smi:local/Catalogue/001">
    <event publicID="smi:local/Event/1">
      <origin publicID="smi:local/Origin/1">
        <time>
          <value>1981-04-19T09:02:10.33Z</value>
        </time>
        <longitude>
          <value>-117.7743</value>
        </longitude>
        <latitude>
          <value>35.833</value>
        </latitude>
        <networkMagnitude publicID="smi:local/NetworkMagnitude/1">
          <magnitude>
            <value>4.8</value>
          </magnitude>
        </networkMagnitude>
      </origin>
    </event>
    ...
  </eventParameters>
</quakeml>
```

QuakePy Python package

```
fab@desdemona:~/prog/pyprog/quakepy> python
>>> import quakepy as qp
>>> cat = qp.QPCatalog( 'socal.qml' )
>>> print len( cat.eventParameters.events )
14003
>>> cat.cut( minmag='4.0' )
>>> print len( cat.eventParameters.events )
470
>>> cat.writexml( 'socal.4.qml' )
```