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MAINTENANCE AND FURTHER PRODUCTS FOR THE ONLINE-DATABASE OF FINITE-SOURCE RUPTURE MODELS

P. Martin Mai
ETH Hoenggerberg, CH-8093, Zurich, Switzerland,
mai@sed.ethz.ch

Summary

Since the launching of the Internet-accessible database of finite-source rupture models (http://www.seismo.ethz.ch/srcmod) summer 2007, we have received an overall very positive feedback on the quality and accessibility of the source-model data. With "data quality" we refer to the representation of the available rupture-model information in form of MATLAB-based data structures and in form of comprehensive ascii-files. In terms of "accessibility", individual rupture-model data can be easily reviewed online (and downloaded), or the entire database can be retrieved as an easy-to-use MATLAB-structure (which seems to be the preferred choice for most users). However, despite this initial positive feedback, we received a number of constructive suggestions for improving and expanding the database. Some of these suggestions were implemented in the SCEC funding period March 2008 – March 2009, and are described briefly below.

XML-Representation of the database entries

We have modified the XML-representation of the database to an event-specific XML representation (where "event" refers to a specific rupture model for a given earthquake; in this context, an earthquake for which multiple rupture models have been made available to the SRCMOD-database has several "event" entries in the database). This step allows us to implement a JAVA-based search engine which facilitates the access to rupture models for specific earthquakes. Moreover, event-specific XML-files can be incorporated into corresponding software on any user-computer if so desired, and is more easily expandable to allow for representing additional source-model information or associated meta-data (like linking it to the Quake-ML format). As such, we now have a database-system in which the event-specific home pages are dynamically generated from the underlying MATLAB-database (Figure 1)

JAVA-based search engine

Using JSP-scripts (Java Server Pages) were developed to read user input and dynamically assemble the data-table based on the user-specified entries. The search fields are limited to the most important earthquake data (location, magnitude, date, source dimension, name of the event), but could be easily extended if necessary.

The search engine has been implemented and tested in a beta-version, requiring a TOMCAT server to be running on the host server. Due to technical limitations of the server configuration at the Swiss Seismological Service (which host the webpage from which the SRCMOD-database is accessible), we were not yet able to export the search engine and make it publically available. This problem is currently being addressed as the IT-hardware of the Swiss Seismological Service has recently been significantly been modified and improved.

Addition of new source model & Checking of data integrity

We are continuously searching for additional rupture models that can be integrated into the rupture-model database. This happens essentially through personal contacts / emails of the P.I. to researchers who have published source-inversion results in peer-reviewed journals. Occasionally, we receive rupture-model data "voluntarily" from scientists, but in most cases we have to convince the source-model "inverters" to re-format their results and send them to us. Most of the time, we in fact have to format the electronically transmitted files into the proper data format. Clearly, this "policy" needs to change in the future, and hopefully we will be able to establish an automatic procedure for submission and checking of source-inversion results.

Verifying the data integrity is another continuous task within the source-model database. Often, published models are later refined, and then send to us, such that final rupture-model in the database (and its associated meta-data) may not exactly correspond to the published version (from which we may extracted meta-data). User-feedback sometimes reports data inconsistencies which we then have to track down, verify, and correct in the respective source-model entries.

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Scientific and educational applications

To further expand the potential circle of users of the rupture model database and to facilitate its use in scientific application, we are in the process of generating animations for those source models with explicit time-dependent solutions (i.e. where a multi-time-window solution is available or rupture time, rise time and slip function are specified). Snap-shots of the propagating slip-velocity "pulse" over the fault plane will be made available (Figure 2) as well as the explicit time-dependent solution by furnishing the slip-rate function at each point on the fault (potentially interpolated in space and time to an appropriate smaller step size).

Figures

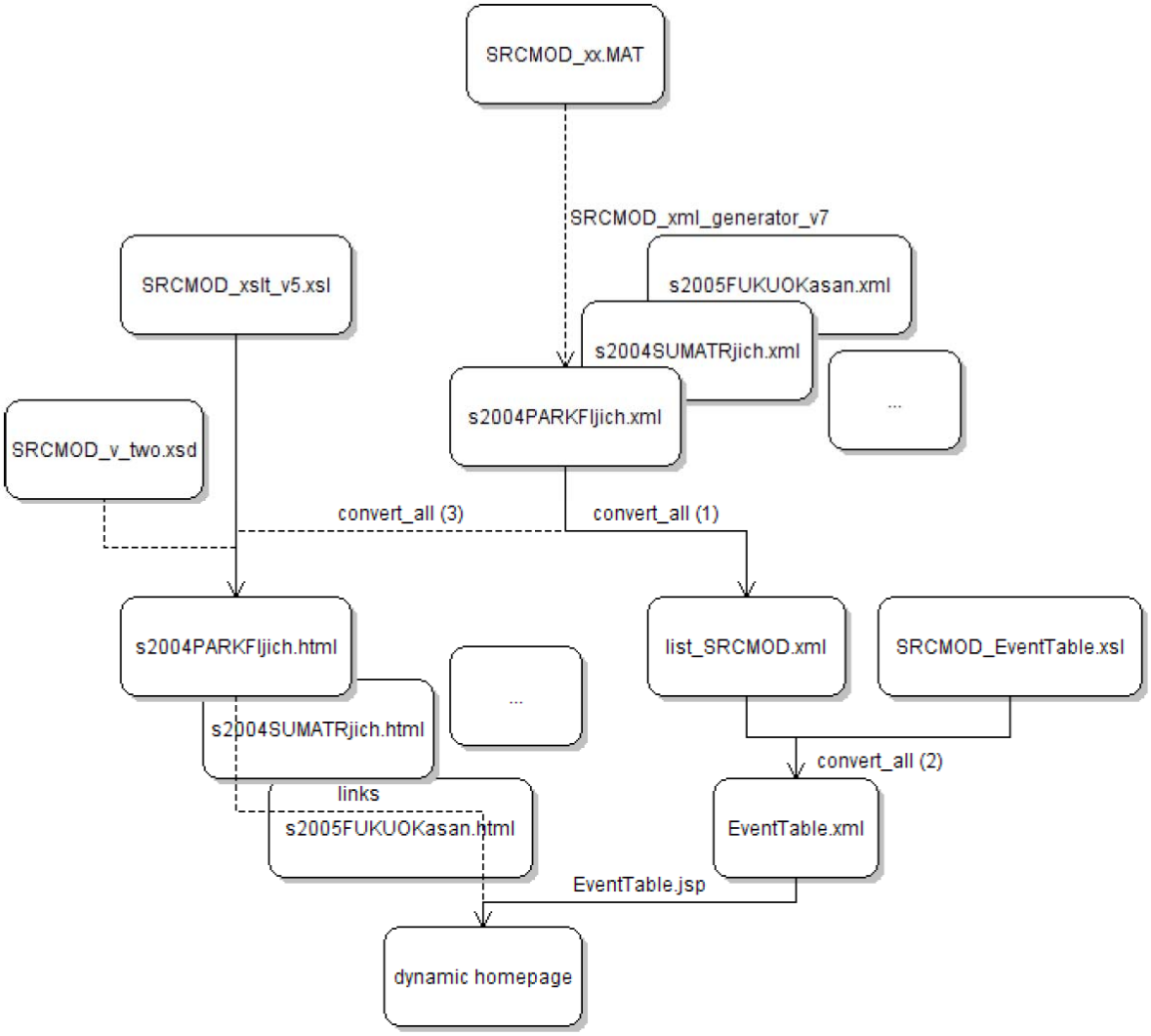

Figure 1: Flowchart to illustrate the work flow from the MATLAB database (*mat) to the dynamically generated event-page.

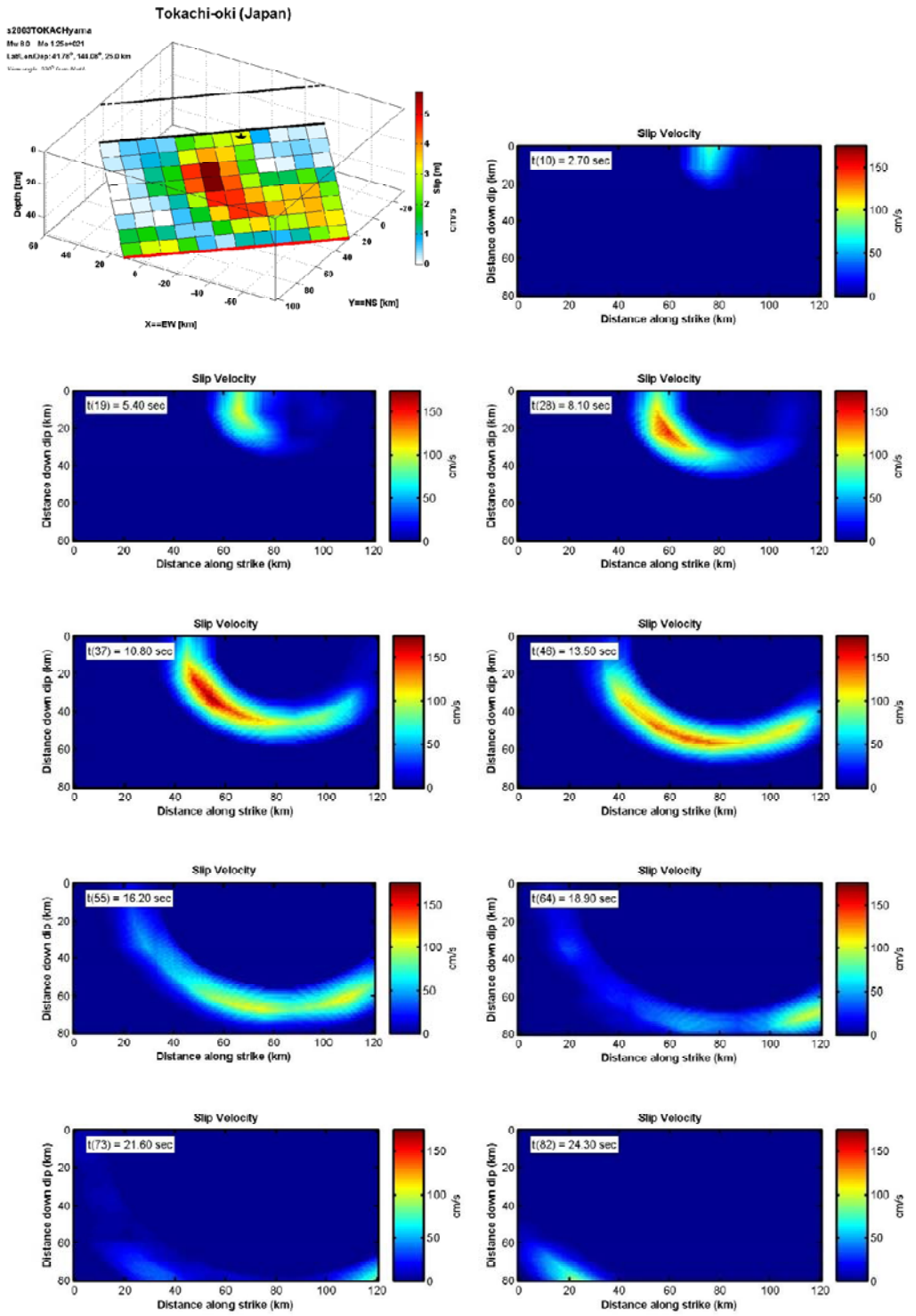

Figure 2: Example snap-shots (at every 2.7 sec) of the time-dependent slip-rate for the 2003 Tokachi-Oki earthquake (as inverted by Yamanaka & Kikuchi, 2003). The original model is shown in the top-left corner, the snap-shots are computed from a space-time interpolated representation of the coarse source-inversion result.