Importing, Post-Associating, Viewing and Exporting Seismogram Data in Trace for Standalone Applications

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Andries van Zyl
(Andries.vanZyl@IMSeismology.org)

Gareth Goldswain
(Gareth.Goldswain@IMSeismology.org)

Reviewed by Frans Cronje

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Contents

1 Introduction

This document describes how to use Trace to import raw data (seismograms recorded by IMS stations) into an existing IMS database, post-associate and view these data. Additionally, the process of exporting data into various formats is described.

2 Installing the required Trace Plugins / Add-Ons

2.1 New Trace Install

If you are installing Trace for the first time or re-installing, it is recommended that you install ***Trace-Standalone*** which is a version of Trace pre-bundled with the necessary plugins/add-ons. The 64-bit Windows and Linux versions are available for download at the following URL's:

- Trace-Standalone for Windows (64 bit)
- Trace-Standalone for Linux (64 bit)

2.2 Trace Add-Ons

Alternatively, you can install the ***Standalone System Configuration (Neuron)*** Add-On from the ***Tools > Add-Ons*** menu of Trace, and the IMS Trace Extras ASCII Exports Plugin from the ***Tools > Plugins*** menu.

2.3 Trace Plugins

Another method is to install all the individual Plugins via the ***Plugins*** window accessed via the ***Tools > Plugins*** menu of Trace:

- Enable the following update centres using the ***Add*** button in the ***Settings*** tab of the ***Plugins*** window (figure 1):
  - "IMS Standalone" (http://updates.imseismology.org/standalone/updates.xml)
  - "IMS Con Tools" (http://updates.imseismology.org/contools/updates.xml)
- Install Plugins from the **Available Plugins** tab of the **Plugins** window (use the Search bar to filter):

- "IMS Con Editor"
- "IMS Trace Standalone Core"
- "IMS Standalone Actions"
- "IMS Standalone Database GUI"
- "IMS Standalone Device Access"
- "IMS Standalone Legacy"
- "IMS Standalone Postassociator Core"
- "IMS Standalone Postassociator GUI"
- "IMS Device Access API"
- "IMS Trace Extras ASCII Exports"
- "IMS Trace Extras Standalone Data Import"
- “IMS Trace Extras Continuous”
- “IMS Trace Extras Seismogram Tree”

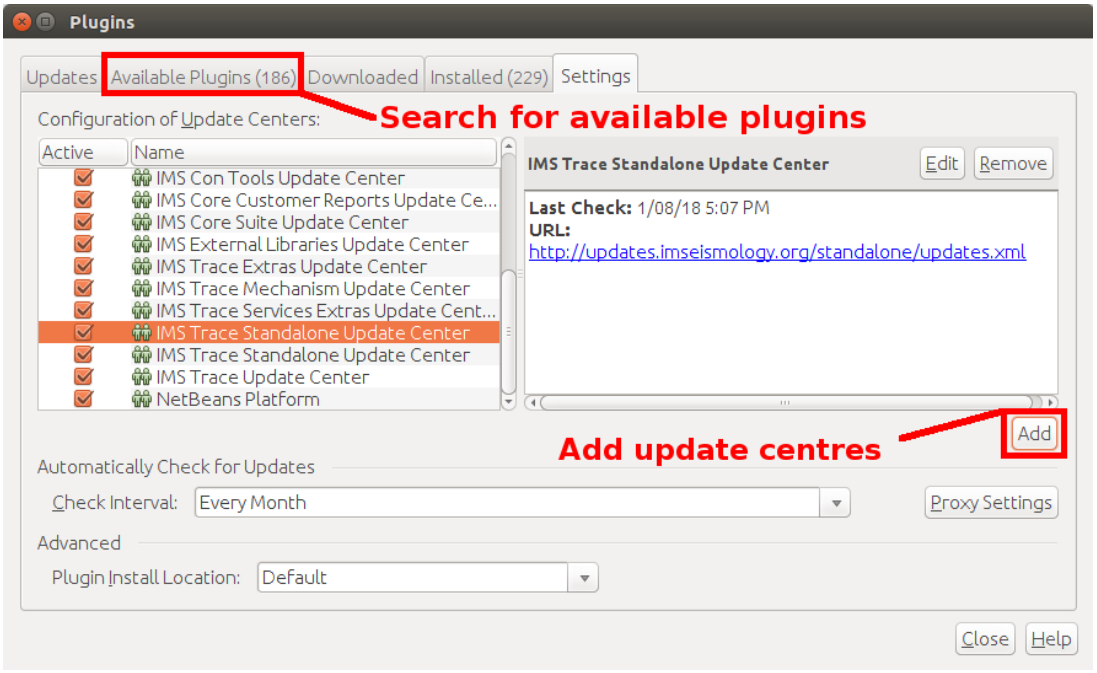

Figure 1: Plugins window can be used to configure update centres (Settings tab), search for and install plugins (Available Plugins tab).

3 Importing raw data into an IMS database

Importing data recorded to removable media by IMS stations can be done with the following steps:

1. Optionally (but recommended), copy all the raw data to a single working directory on the processing computer:
   (a) create a directory at a convenient location on the processing computer (i.e. the computer running Trace)
   (b) copy the ***data*** directory (raw data) from each IMS Station's recording media into the directory created in the previous step; select "Yes to all" if asked to merge files/directories with the same name[1]
2. If a destination IMS database does not exist, create one using the ***File > New > Create New Database*** menu item in Trace
3. Import the raw data into the destination IMS database:
   (a) right click on the database created in step 2 (or open another existing database using the ***File > Open > Database*** menu option) and select ***Import IMS Seismograms***
   (b) browse to, and select the directory containing all the raw data - this is the data directory created on an IMS station's external recording media (USB flash drive) or the consolidated directory recommended in step 1 above
   (c) if asked about which *target bucket(s)* to import data to, you can accept the defaults (empty)
   (d) click OK and a progress bar should appear on the bottom right status bar, depending on the amount of data, importing data can take quite some time; when completed a window will pop up summarising the amount of data (number of seismograms) imported

4 Post-associating the imported (triggered) data

Before post-associating data, ensure that all configuration files (sites, sensors, adc's) that were used to configure the sites/stations in the field are present on the local computer running Trace. If different computers are used, this means synchronising config files between the computers (e.g. using Trace's ***Tools > Downsync configs from*** *menu item, or copying the files between computers).*

[1] Files from different recording stations should contain a unique path but may have some top level directories in common, e.g. ***data/trig***.

Data imported from IMS stations will not be associated into events, thus if events are needed a post-association process will be required. If only continuous data is required, then post association is not required and you can skip this section. To post-associate triggered data:

1. Right click on the IMS database and select **Post-Associate from trig**.
2. Use the Wizard to edit the post-association parameters if necessary (see figure 2). Once completed, click ***Finish*** to start post-associating data.

    - This will cause the post-associator to consider all seismograms in the trig bucket (directory) of the database, including newly imported triggered seismograms as per section 3, for association into new (and optionally existing) events.
    - Depending on the amount of data, the post-association process can take some time. Once complete a summary information window will be displayed.
    - Any events updated/created by the post-association process should now be visible in the IMS database. You may need to refresh the database by right-clicking on the database and selecting ***Refresh***, or by closing and re-opening the database.

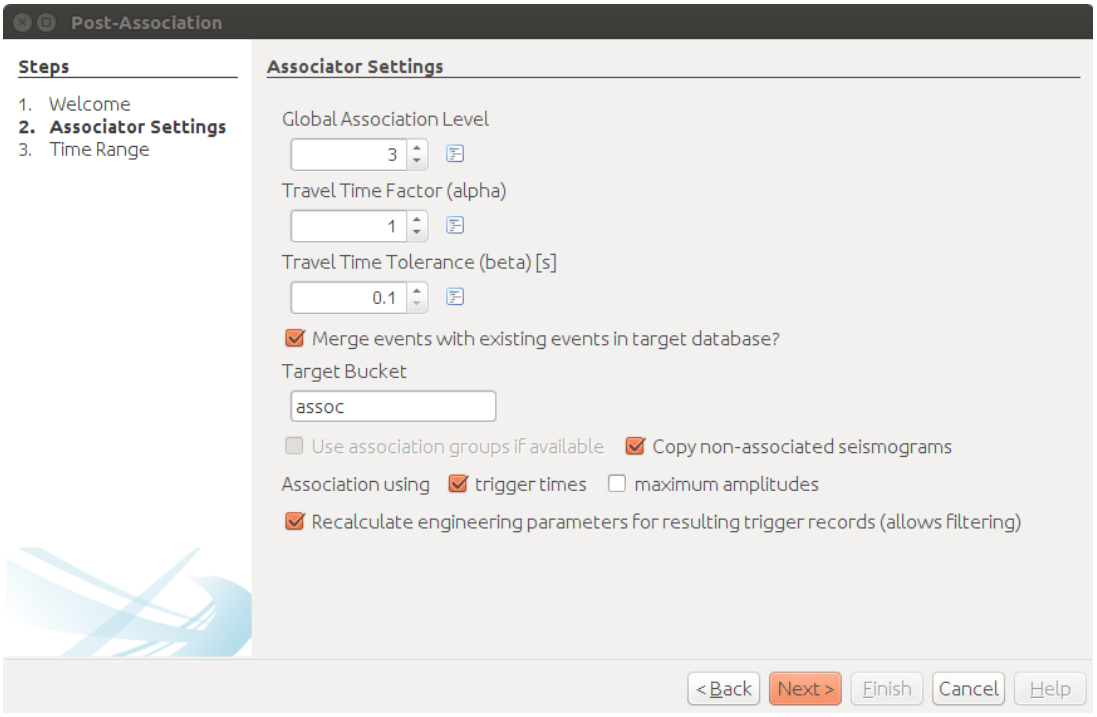

Figure 2: The post-association wizard prompts for various event association parameter settings.

5 Viewing Continuous Data

Before viewing data, ensure that all configuration files (sites, sensors, adc's) that were used to configure the sites/stations in the field are present on the local computer running Trace. If different computers are used, this means synchronising config files between the computers (e.g. using Trace's ***Tools > Downsync configs from*** *menu item, or copying the files between computers).*

1. To view seismograms in the database tree (the default is to only show events):
   - right click on the database and select the ***Properties*** menu item
   - in the ***Seismograms*** tab add `trig` (for triggered) and `untrig` (for continuous/untriggered data) to the Buckets parameter as a comma separated list, e.g. this should read `assoc,trig,untrig`
   - in the ***Advanced*** tab enable ***Show Seismograms***
   - in the ***Tools*** tab select ***PER_HOUR*** for the ***Day Display*** parameter
   - close the database properties window and refresh the database by right clicking on the database and choosing refresh (or close and reopen the database)
2. Expand the IMS database tree and browse to a date/time node of interest - see figure 3.
3. Right click on a data/time node and select ***Open Continuous View***. Use the controls bar and navigation keys/mouse actions to navigate and alter the view (e.g. pan, zoom, enable/disable sites/components, etc.) - see figure 4.

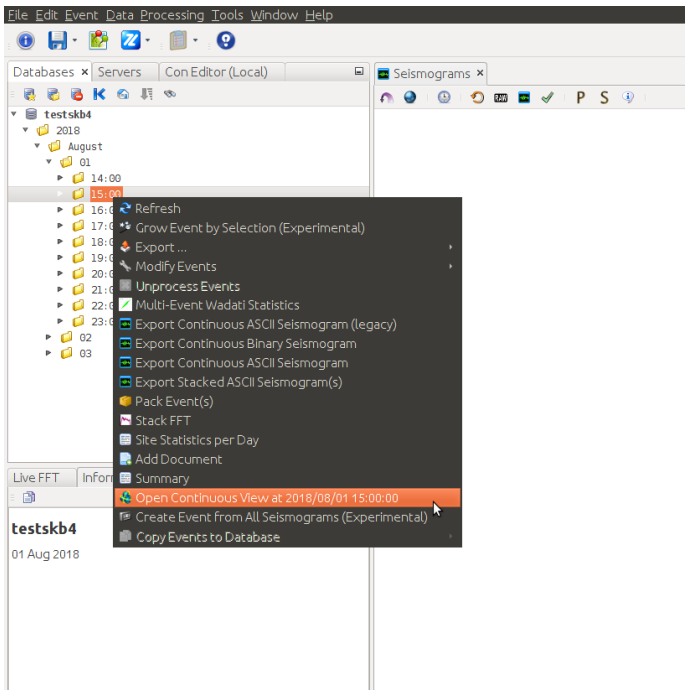

Figure 3: Opening the continuous view.

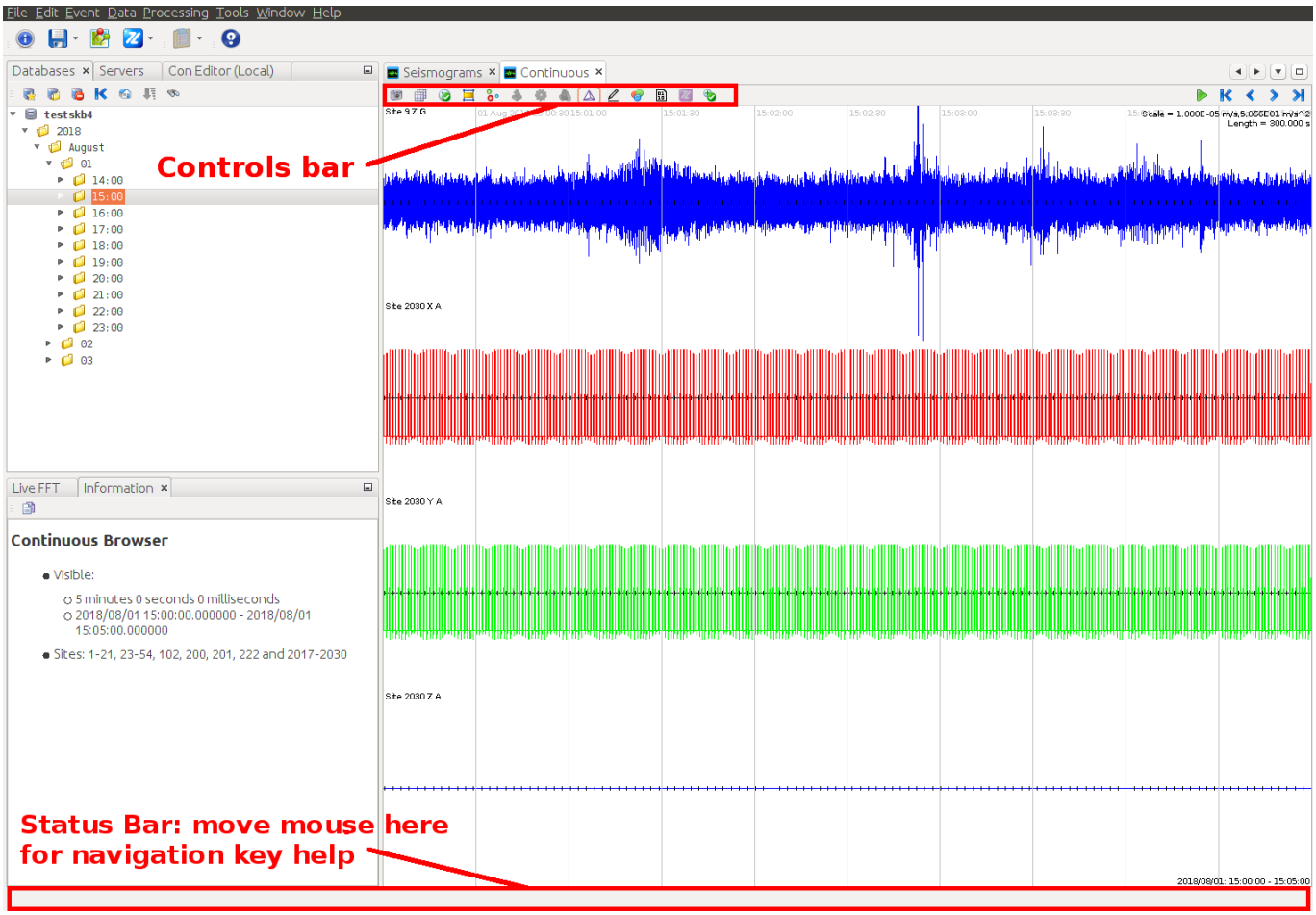

Figure 4: Continuous view showing controls and status bar.

6 Exporting Data

Should data be required for analysis outside of Trace, various export options are available.

Before exporting data, ensure that all configuration files (sites, sensors, adc's) that were used to configure the sites/stations in the field are present on the local computer running Trace. If different computers are used, this means synchronising config files between the computers (e.g. using Trace's ***Tools > Downsync configs from*** *menu item, or copying the files between computers).*

6.1 Event Data

Events can be exported in a few different ways[2] (e.g. catalogue data, events only, triggers only, events and triggers, etc.) into a number of different formats. To export an event in Trace, right click on the event (or time range) in the Database explorer pane and select one of the options below the ***Export*** menu item as per figure 5.

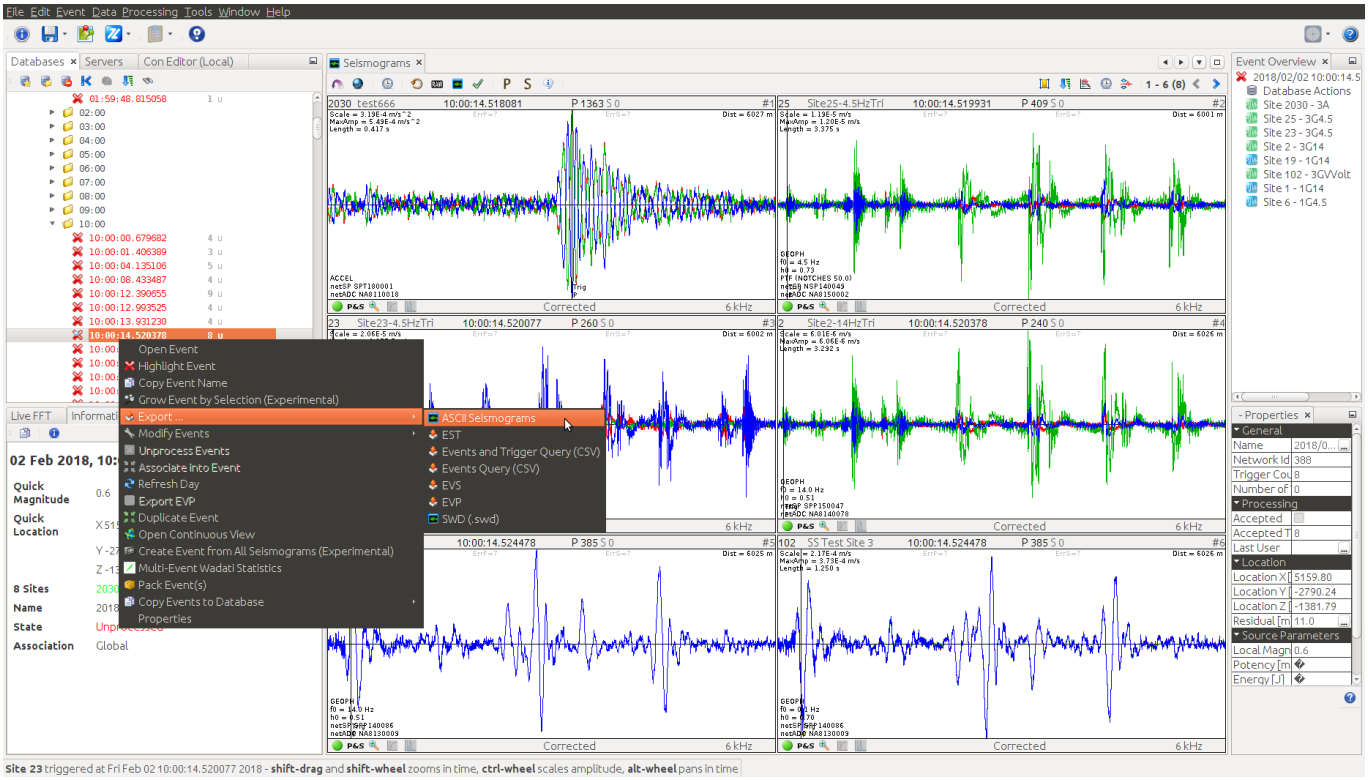

Figure 5: Exporting event data in Trace.

6.2 Continuous Data

Continuous data can be exported for time ranges of one hour or more.

- To export continuous data in Trace, right click on a time range of interest in the Database explorer pane and select the ***Export Continuous ASCII Seismogram*** menu item (as per figure 6), after which you will be prompted to:
  - choose a destination directory where the ASCII data will be exported to

[2] See IMS Event Templates documentation for creating custom event templates.

  - select the output seismogram duration
  - choose whether the exported data stream should be re-sampled[3] to be phase-aligned with ATU (GPS)
  - choose the sites you wish to export

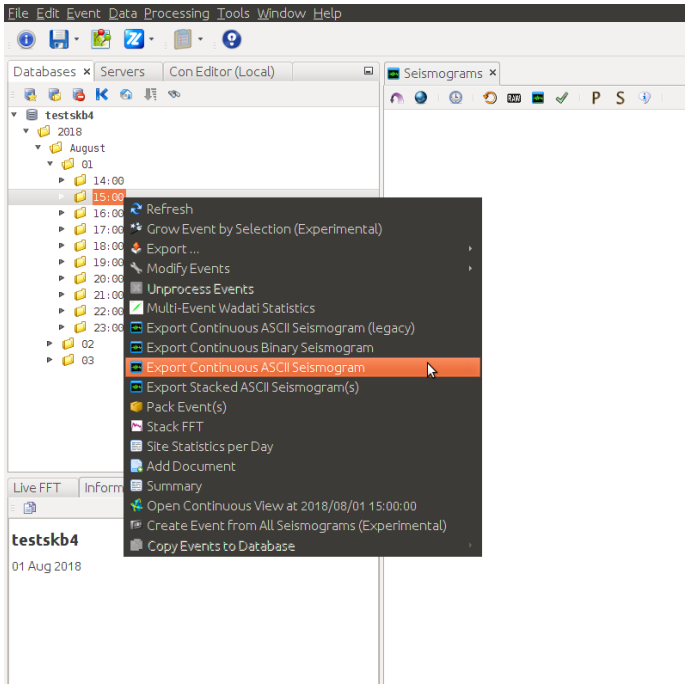

Figure 6: Exporting continuous data in Trace.

- To export a time range of less than one day (the database's default time resolution display), ensure the ***PER_HOUR*** display is enabled on the database:
  - right click on the database and select the ***Properties*** menu item
  - in the ***Tools*** tab select ***PER_HOUR*** for the ***Day Display*** parameter
- **Note:** if large amounts of data are exported (sampling rates > 6000 sps) you should allocate more system memory to Trace (4 GB recommended), or else the export may not complete. To increase Trace memory allocation:
  - open the ***Tools > Options*** menu
  - navigate to the ***Miscellaneous > Application*** tab

[3]Re-sampling is done using bandlimited interpolation, implemented using a windowed sinc method.

- edit the ***Maximum Heap Size [MB]*** setting and change to `4096`
- close Trace; Trace will automatically restart, make sure you close Trace again and that it does not auto-restart before launching Trace from in the usual way (“cold-starting” from the command line or double clicking the desktop icon)

Change Control Record			
Date	Author	Description	Revision
2013/03/07	AVZ	Original document	0
2018/05/22	AVZ	Minor changes and converted source to LyX	1
2018/08/03	GG	Rewrite to include updates for changes to Trace (including Trace-Standalone, new seismogram importer and post-associator, continuous phase-locked ASCII exporter)	2
2018/08/07	GG	Correct errors in text Some clarifications and additions including images/screenshots	3
2018/08/10	GG	Note about keeping configs synchronised on Trace computer	4

Table 1: Change record