



Interactive visualization tool for station coordinates time series of DORIS and other space geodetic techniques at co-located sites

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Overview

Since its origin in the 2000's, IDS (International DORIS Service) Analysis Centers, and more recently IDS Combination Center, have routinely made available and given free access to time series of DORIS stations for scientific purposes such as measuring the deformation of the Earth's surface. These time series are also useful for DORIS network integrity purposes. To promote this IDS product and use it easier, CNES has developed a set of web tools (<http://ids-doris.org/plot-tools.htm>) that provides time series browsing in an interactive and intuitive way.

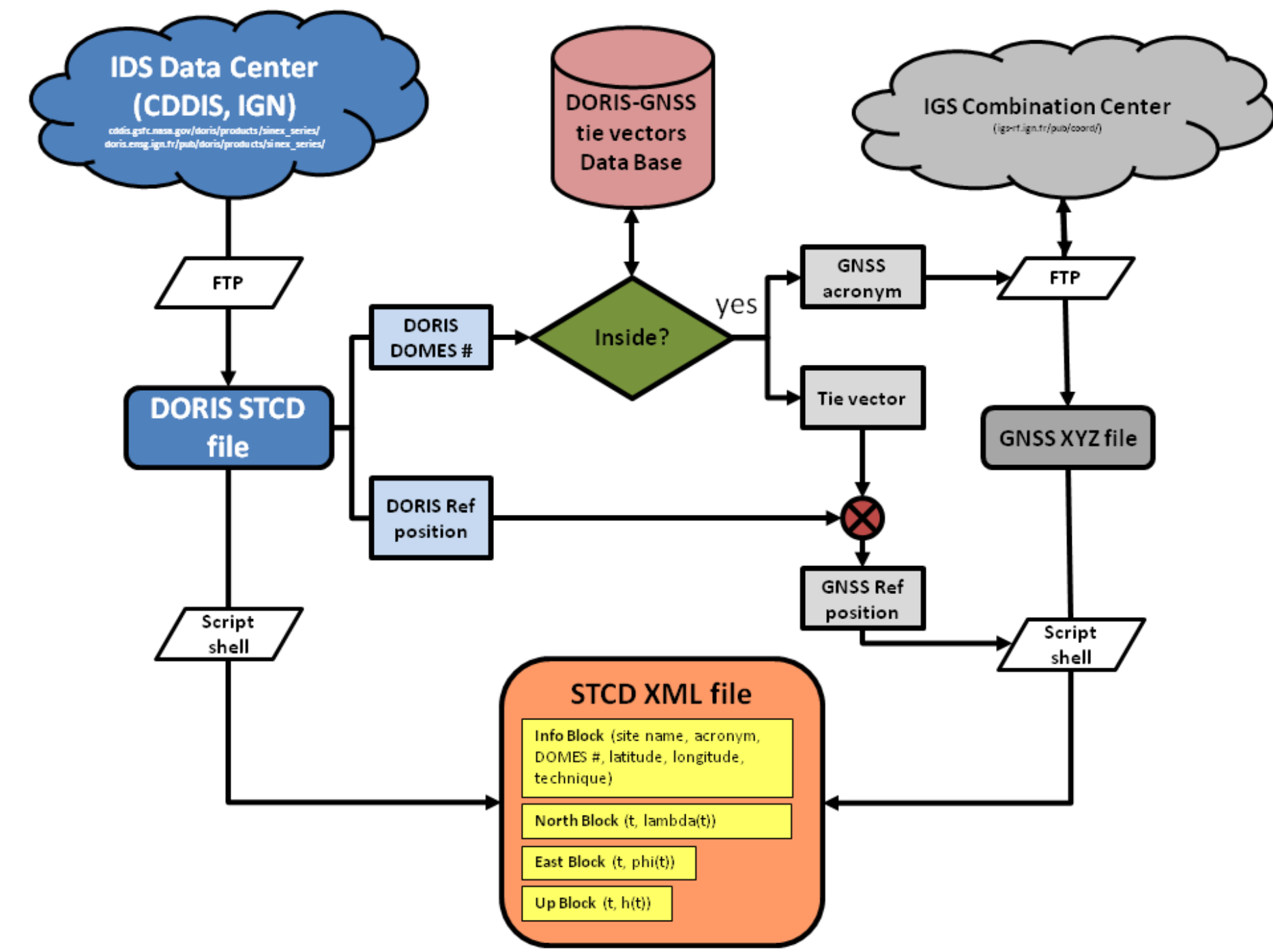
This IDS web tools enable: sites selection, time series display, editing data, data download, as well as plots export in several standard formats. In addition, various station and satellite events detected by the DORIS space and ground system monitoring, can be also highlighted in the coordinate time series plots. Statistic tools can provide mean, slope and weighted rms of any time series.

A new version of the IDS web tools was released in December 2013. Apart from new web design, this new version implements two major features. First, it allows any user to compare time evolution of coordinates for DORIS and co-located GNSS stations by plotting both in the same graph. Second, the new release offers a user-friendly web interface to easily identify and select DORIS sites as well as co-located GNSS stations where IDS and IGS (and eventually later on ILRS and IVS) coordinates times series are available for display.

Dataflow

Next diagram describes dataflow as well as pseudo algorithm to transform both DORIS and GNSS coordinates time series into STCD (time series format of IDS) files in XML format which can be directly superimposed by IDS plot tools.

A pre-processing is necessary to transform the GNSS Cartesian absolute coordinates times series into relative geodetic ones, as common standards of DORIS STCD files.



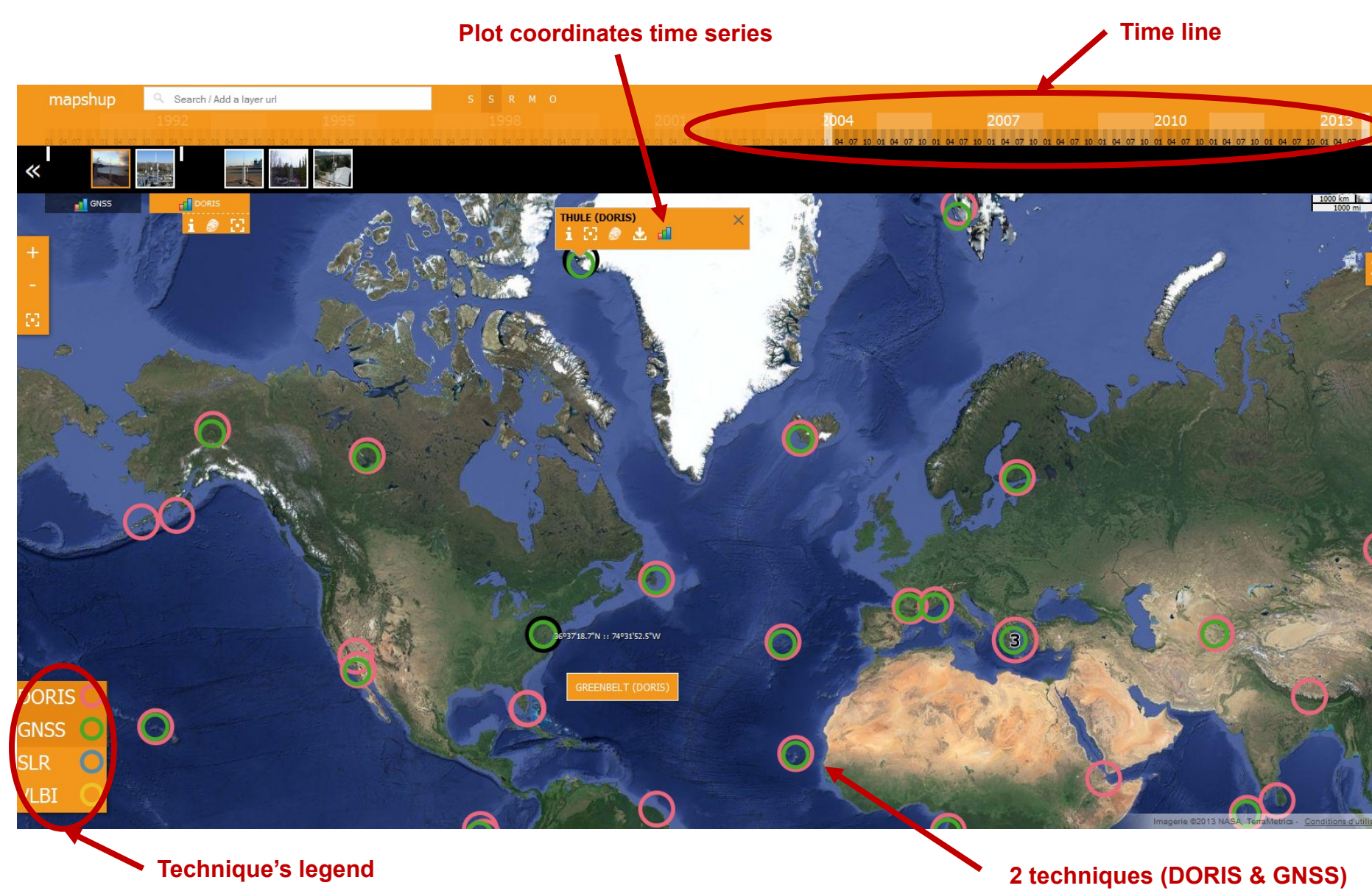
Technical Details

- Library: Highcharts / Highstock
- Langages: javascript, php, shell
- Input data in XML format
- Supported Web browsers: Firefox, Google Chrome, Safari, Internet Explorer

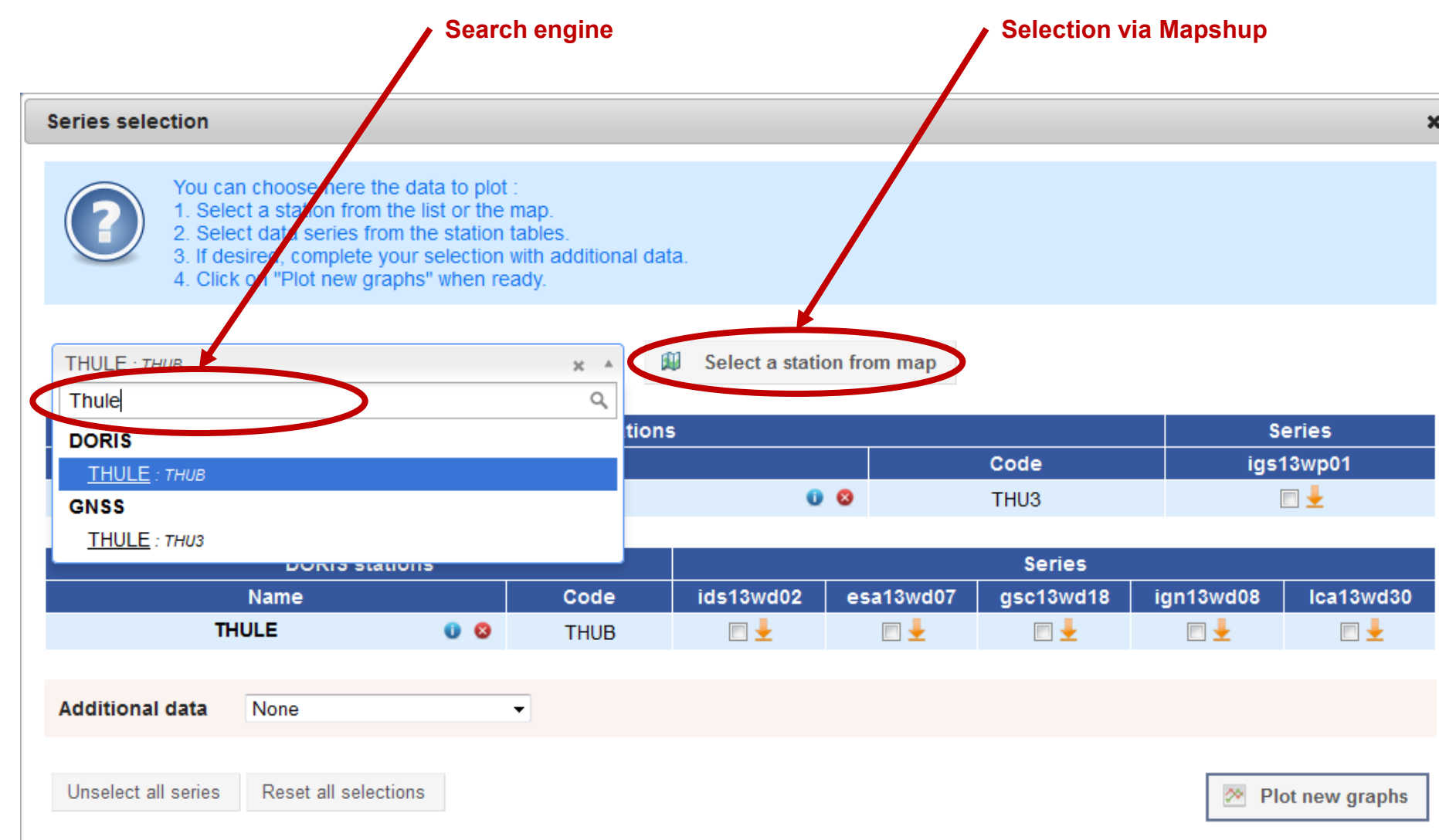
Sites Selection – Data Loading

Sites selection or data loading can be achieved in two ways:

- From an interactive global map application (Mapshup - <http://mapshup.info>). The user can easily visualize and select DORIS sites collocated with other techniques (only GNSS for the moment) and plot the available combined coordinates time series (given by IGS od IDS). Note that by moving the time line located on top of the map, the user can also visualize time evolution of each network.



- From a list of available sites per technique. Note that a search engine by either site name or acronym is also available. This second way also allows us to plot the 5 IDS Analysis Centers' series: ESA, GSC (Goddard – NASA), IGN (France), INA (Inasan – Russia) and LCA (CNES/CLS – France), as well as the DORIS and GNSS combined solutions.



Additional Relevant Informations

Below is given a short list of complementary data (useful to interpret discontinuities, for example) about station events that can also be displayed.

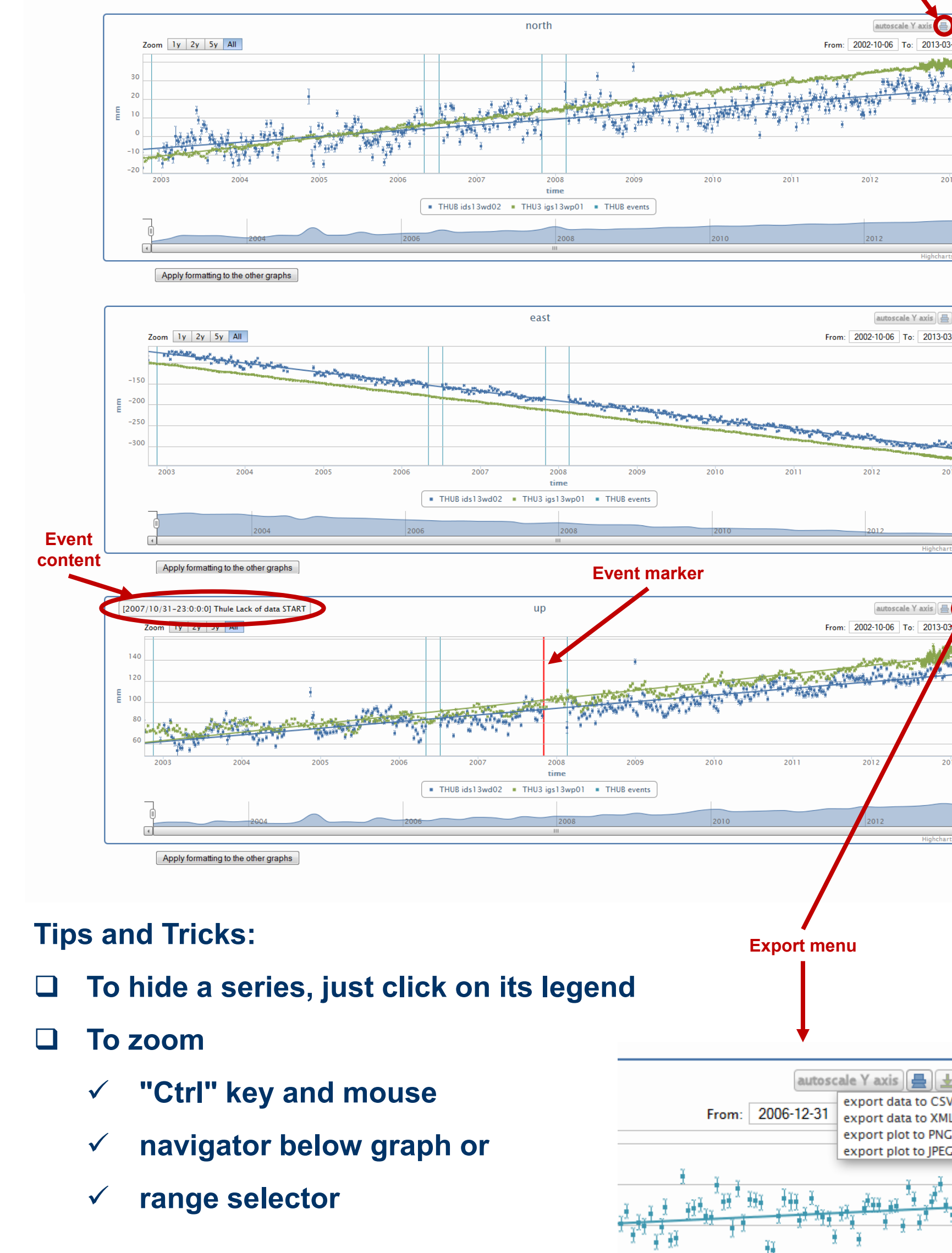
- Antenna changes
- Beacon evolutions (beacon, USO, maser/cesium)
- Degraded data
- Possible impacting earthquakes (from USGS survey service)
- DPOD (2008 version 1.12) and/or ITRF (2008) velocities

GNSS stations		
Name	Code	Series
THULE	THU3	igs13wp01

DORIS stations		
Name	Code	Series
THULE	THUB	ids13wd02
		esa13wd07
		gsc13wd18
		ign13wd08
		lca13wd30

Coordinates Time Series Display

Basic output from IDS web service comprises 3 graphs (one per component – North, East, Up) displaying all selected series plus optionally complementary data. In addition to time series display, IDS web service includes facilities to export plots in PNG or JPEG formats. Original or modified data (coordinates time series) can also be uploaded in CSV or XML formats for offline analysis.

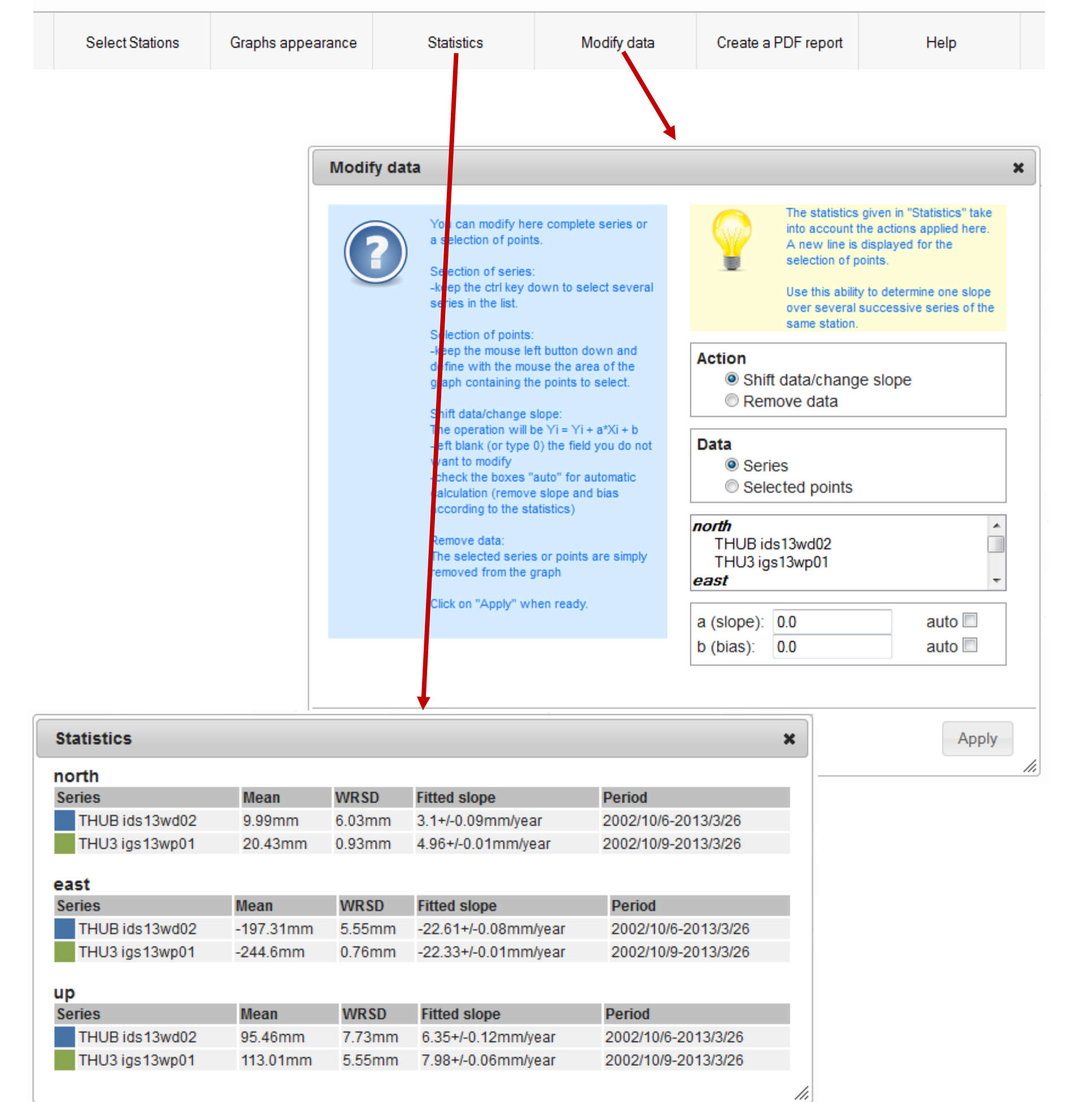


Tips and Tricks:

- To hide a series, just click on its legend
- To zoom
 - "Ctrl" key and mouse
 - navigator below graph or
 - range selector

Interactive Analysis Toolbox

Furthermore, IDS time series visualization tools give access to applications to modify data as well as to compute statistics such as mean value, weighted rms and slope. The application includes online help and utility to export in PDF format report including the North, East and Up plots as well as the statistics table. Last but not least, graphs appearance can be easily modified.



What's next ?

- Drag and drop facilities to allow any user to superimpose its own time series with DORIS ones.
- Store all the DORIS coordinates time series in an Oracle database to improve robustness and efficiency of IDS web service as well as to promote data exchange with other services (IGS, ILRS, IVS, GGOS...).
- To feed our local DORIS-GNSS tie vectors database from the forthcoming IERS local ties database.
- Make available historical coordinates time series of SLR and VLBI co-located sites as output of ITRF2013 processing.

All comments/suggestions/feedbacks on IDS web services are welcome

Contact: ids.central.bureau@ids-doris.org

