Release Notes

InterWell 2023

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InterWell

Seismic inversion, seismic characterization and time-depth conversion solution

The major InterWell 2023 release brings a lot of new functionalities :

- In the database, the multi-survey is supported, as well as many improvements in the import/export of the data.
- The gather conditioning has been enriched with a new mute picking and new pre-processing (mutes, trim statics...and more) to output better stacks for the seismic inversion workflows.
- Historical modules, such as wavelet estimation, structure and QCs have been either enhanced or revamped to best suit your needs.
- Machine learning features, such as PCA and Clustering, have been developed to be applied directly on key attributes.
- Advanced workflows, such as 4D or azimuthal workflow, have been completed by new functionalities to better estimate the anomalies.

Feel free to contact us at support@beicip.com if you need any assistance while installing the new version.

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What's new in the database ?

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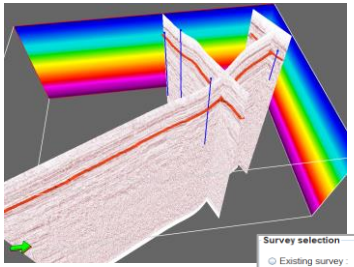
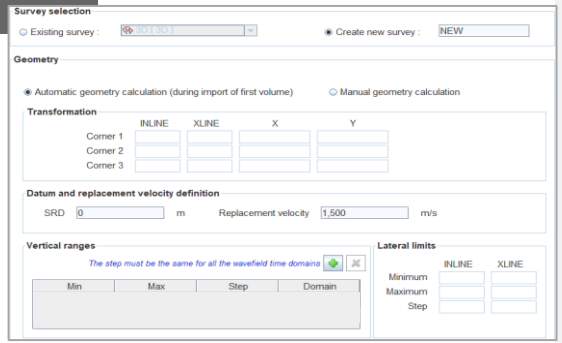
Multi-survey in InterWell : a study is now composed of different surveys



Multi-survey in the 3D

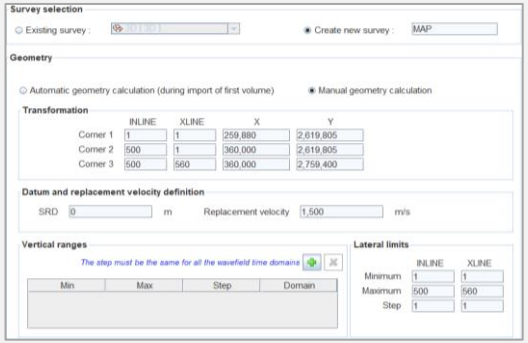
Undefined



- A name.
- An IL-XL to X-Y transformation.
- IL-XL ranges.
- Time ranges by wavefield domains.

To be defined by the first SEGY import, historical way to create the survey, only way to create 2D survey

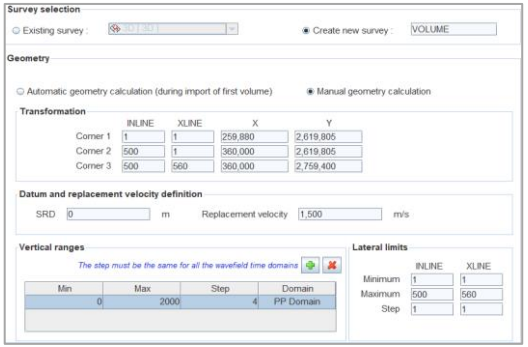
Map mode



- A name.
- An IL-XL to X-Y transformation.
- IL-XL ranges.
- Time ranges by wavefield domains.

Enable mapping functionalities of InterWell (gridding, smoothing, kriging...)

Fully defined



- A name.
- An IL-XL to X-Y transformation.
- IL-XL ranges.
- Time ranges by wavefield domains.

Enable all the functionalities in InterWell

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Data linked to surveys, data free of survey

Linked to surveys

- Seismic volumes and arbitrary lines
- Horizons/Maps
- Calibrated and extraction wells
- Runs (computation in InterWell)

Free of survey

- Input Wells
- Pointsets
- Polygons
- Tables

Key benefits :

- A **unique well database** covering different 2D/3D surveys.
- Possibility to **decimate**, **merge**, **krige** horizon/map data covering several surveys.
- A unique study gathering a 1ms grid and regular vertical grid for **stochastic inversion workflow**.
- A **unique velocity model** to convert several 2D lines.

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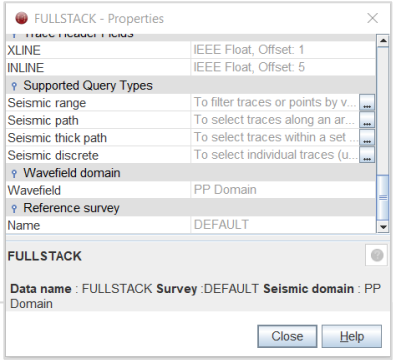
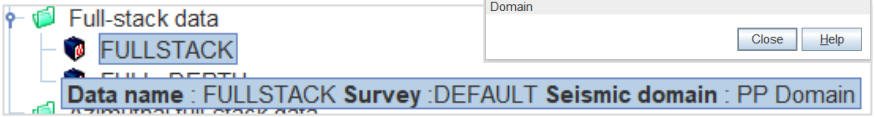
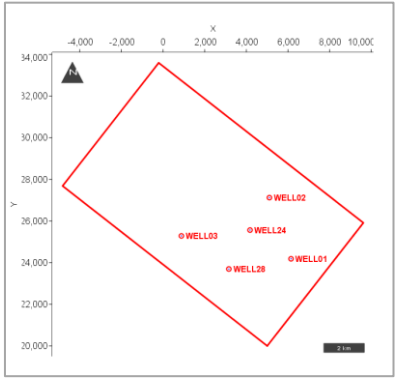
The survey in InterWell

*Each object is referenced in a survey, here **DEFAULT***

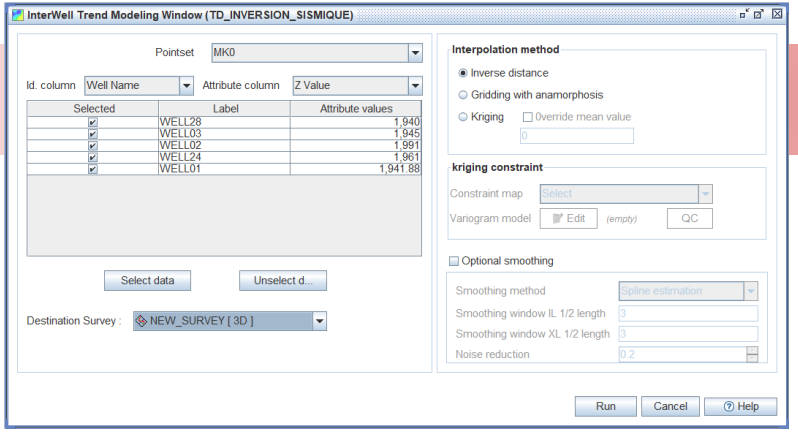




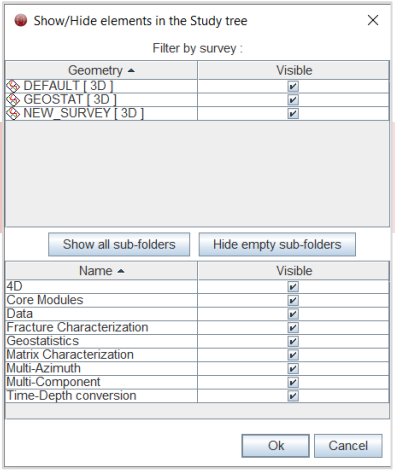
*The survey is defined as a **polygon**, as it can be **empty of data***



*In some modules, the **survey** must be **informed**, such as **Trend modeling***



*The survey tree can be filtered by **surveys***



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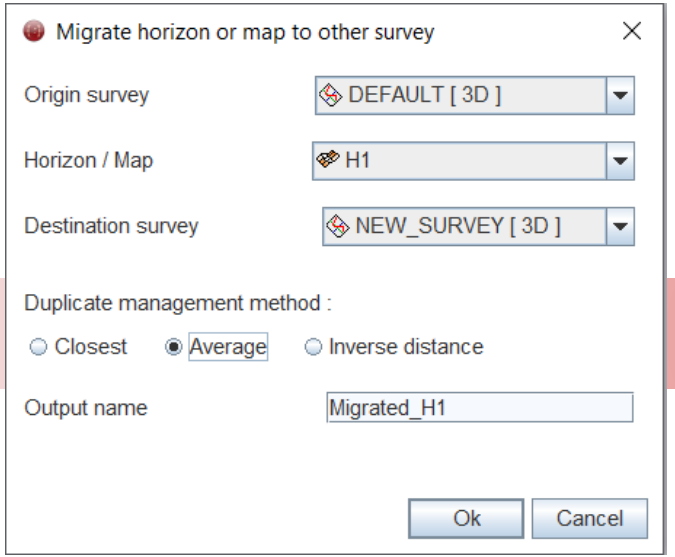
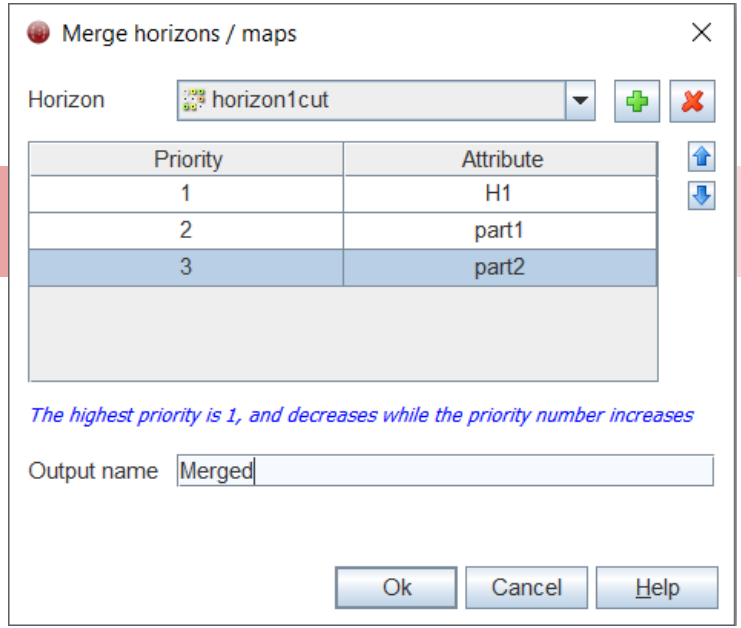
First applications : operations on horizons

Migrate a horizon from a survey to another



Merge several horizons/maps to create a new one, with priority in case of redundant locations



A new workflow to combine a map/horizon from different surveys

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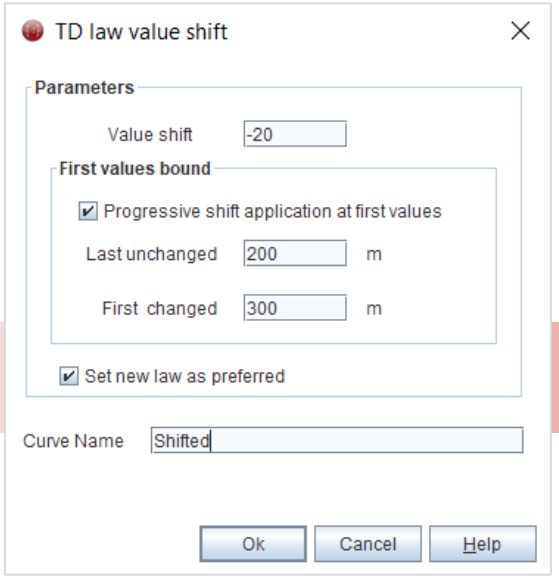
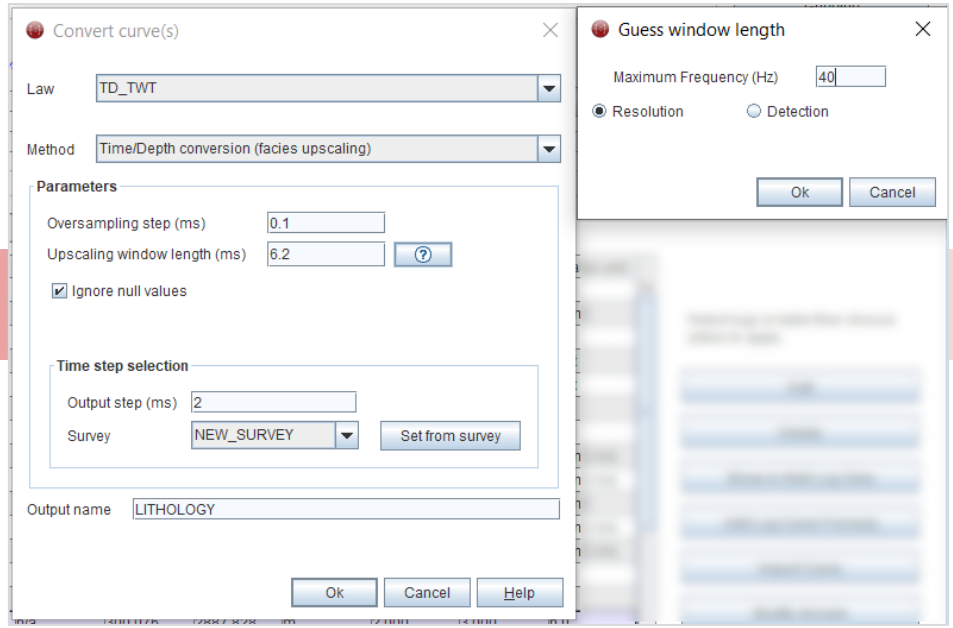
Operations at wells : Time-depth laws

Shift of the TD law with management of the first layer (for velocity workflow)



Avoid common velocity anomalies at the top of your velocity model

Facies time-depth conversion and "most of " upscaling



Handle your feasibility directly in InterWell with the cross-plot functionalities

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What's new in data conditioning ?

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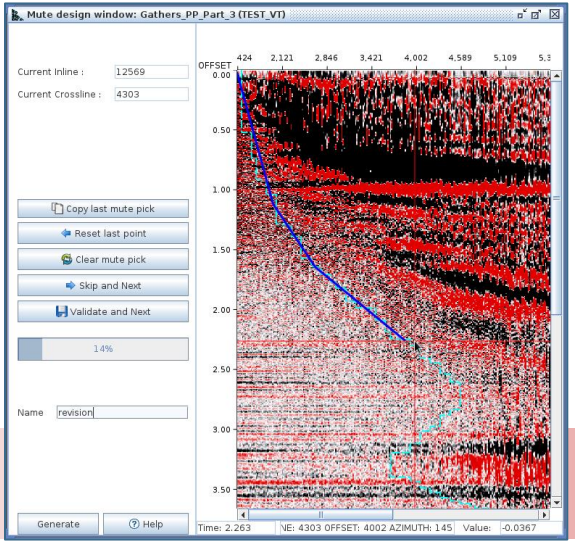
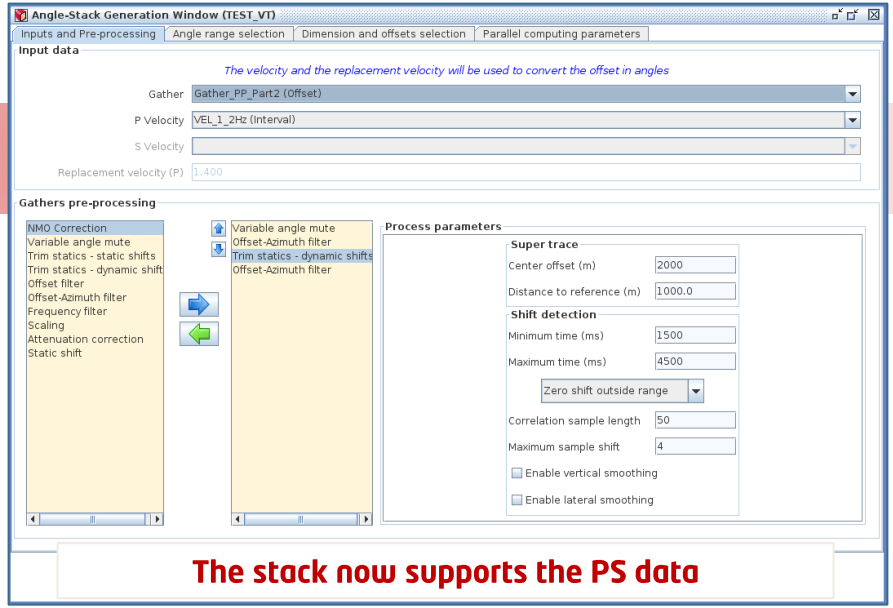
Gather conditioning : mute and new pre-processing



- Interactive picking of the mute in a regular grid of the gathers.
- Handy reset/skip/clear functionalities to edit current picking.
- Optional reference mute curve, for a picking review. If unused, the previous mute is plotted for more consistency.
- Save and 3D extrapolation of the mute for be used during gathers conditioning.

New processes for gather conditioning :

- Offset-Azimuth filter: Applies a filter (median or medium) to the data based on a distance from the offset and azimuth.
- Trim statics: alignment before stack by taking a "super-trace" (partial stack) as a reference.
- Mutes: hides the traces for the current and the next processes
  - Variable angle/offset—Define a curve using different points (whether converted to angles).
  - Free after picking.



The stack now supports the PS data

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What's new in seismic inversion workflow ?

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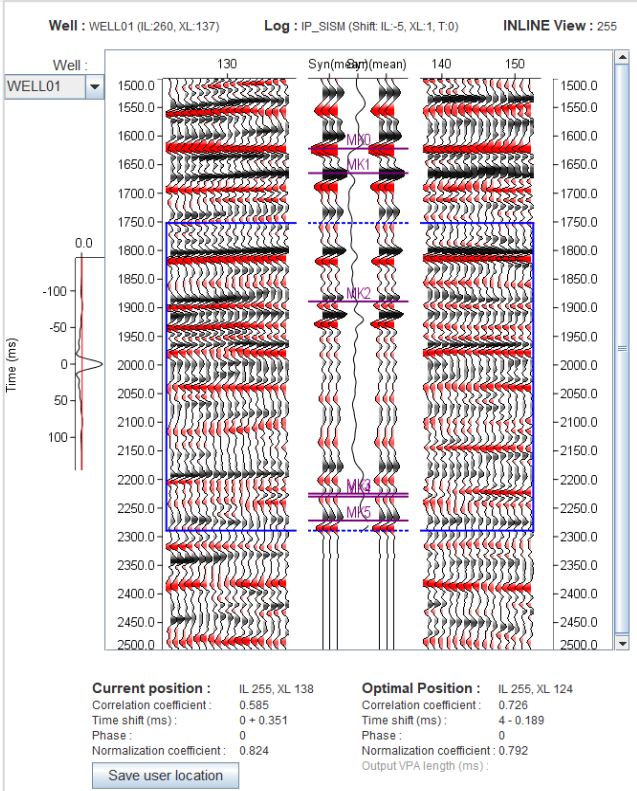
Update of the wavelet estimation step

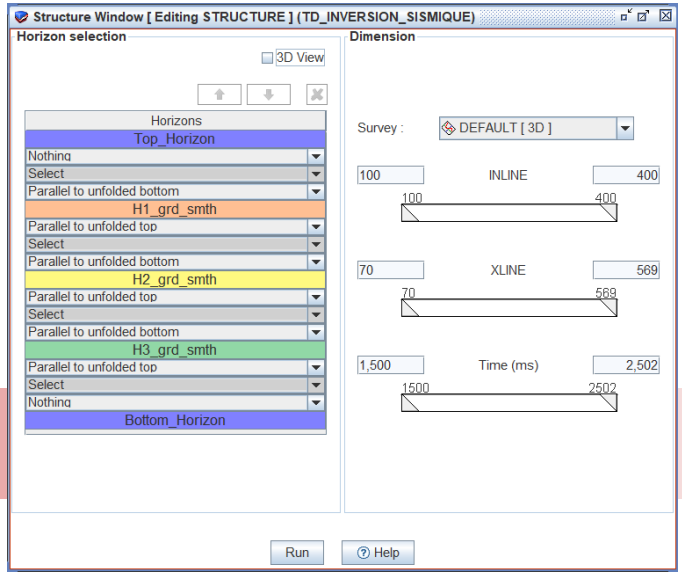
Porting of the calibration process in a more modern language, bringing along significant improvements

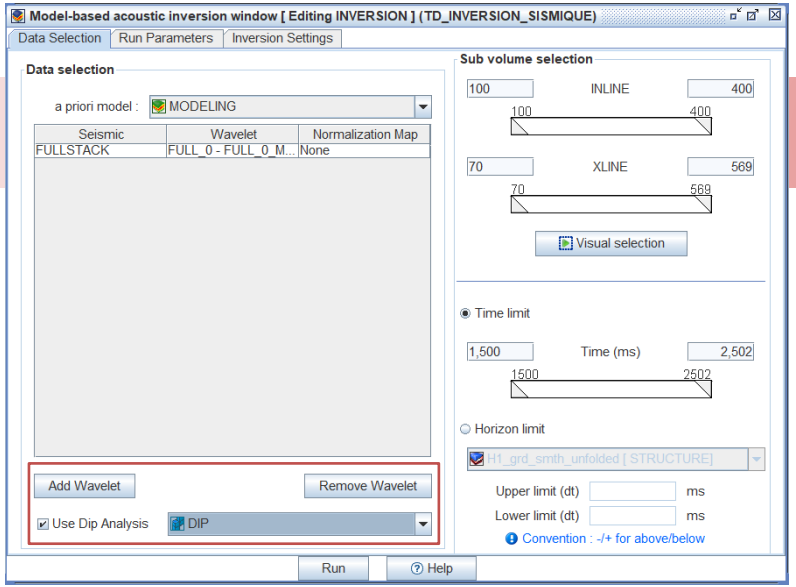
- Deviated wells are more precisely considered.
- Possibility to select shifts not centered in 0ms. Traces rejected only if dead traces or negative correlation.
- Application of the shift with oversampling to be more precise while detecting the phase. Angular mean instead of regular mean for phase estimation.
- The location must be saved once validated by the user, for a more fluent experience.
- Gradual colorbar in seismic window to better visualize areas with high/low energy.



Revamp of the structure module, Dip analysis more accessible

- The structure module has been revamped and simplify. The stratigraphic order and chronographic order is now the same.
- A fully defined survey must be informed. The horizons must be in a survey compatible (same transformation, same limits).





- DipX and DipY created from Dip Analysis directly accessible while selecting the parameters of the inversion.

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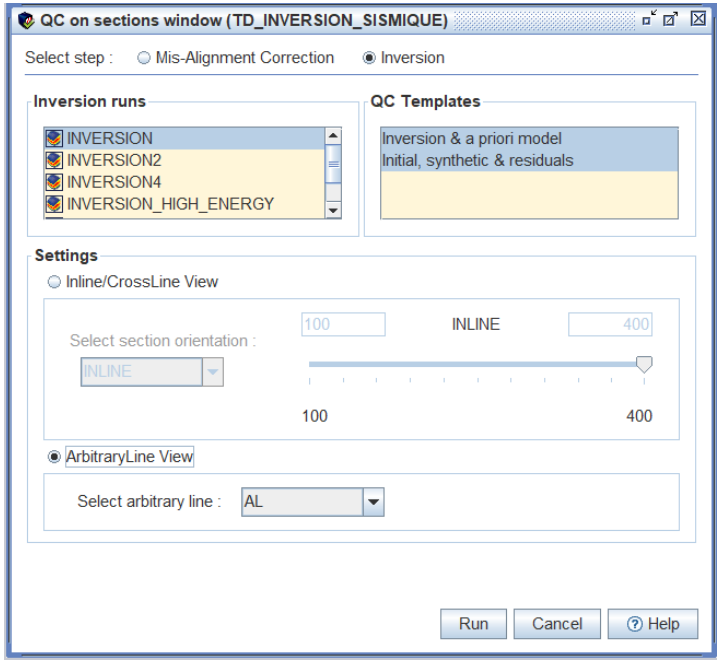
QC module : QC on sections

The QC module has been simplified to generate view to properly QC the key step of the inversion process Beicip-Franlab consulting standards.

Single run selection, multiple templates



- Create a view (IL,XL, Arbitrary line) according to templates.
  - For inversions, focus on the comparison between seismics (original and synthetics) and optimization of the elastic model (initial to optimal).
  - For RNMO, comparison between shifts and seismic vertical scale, comparison between seismic before and after correction.
- Automatically sets the colors and limits according to the data to visualize.
- This QC type only provides views without saving any run.

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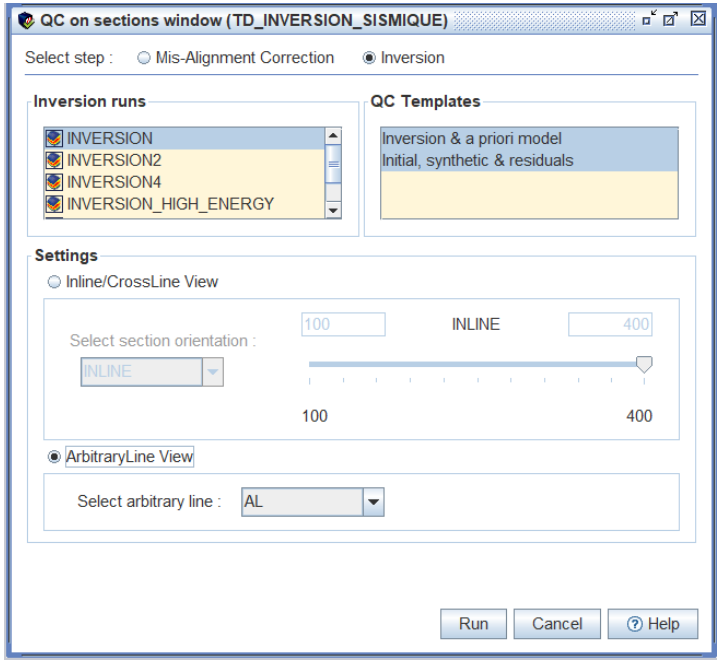
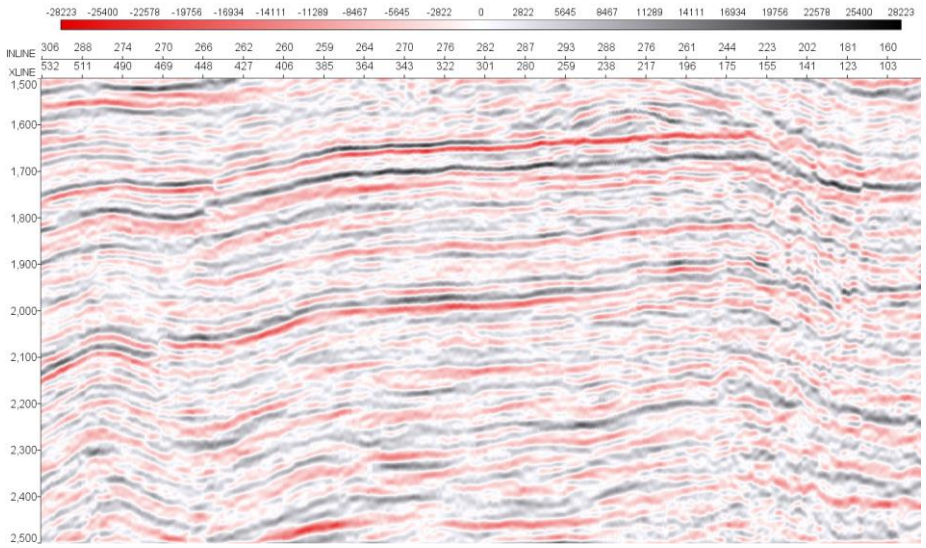


Synthetics



One window by template

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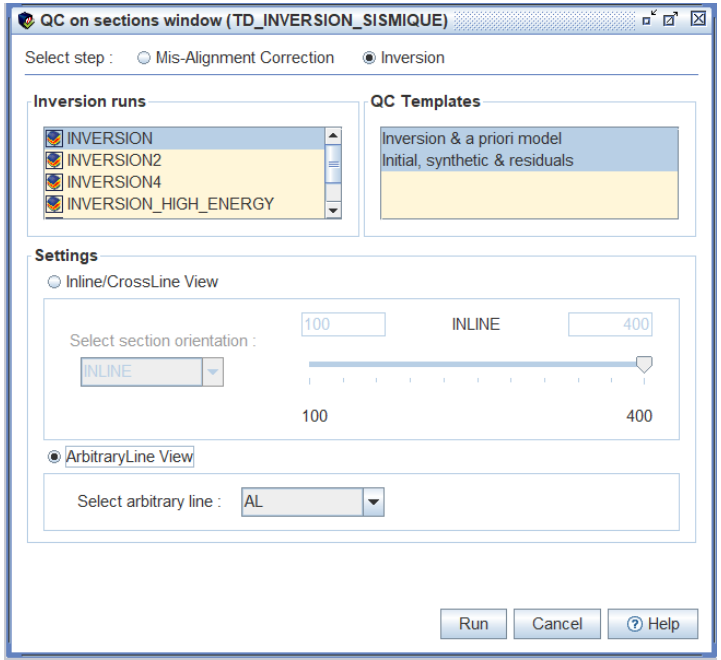
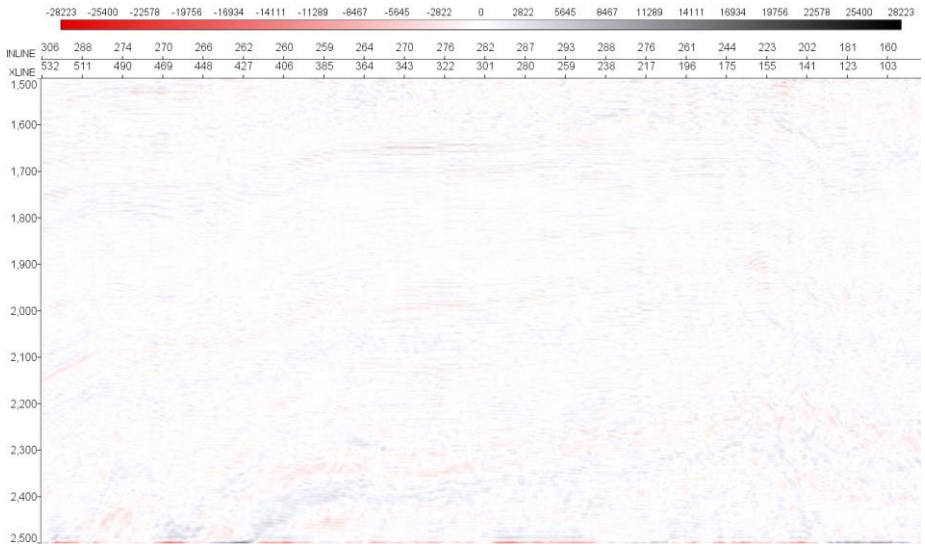


Residuals



One window by template

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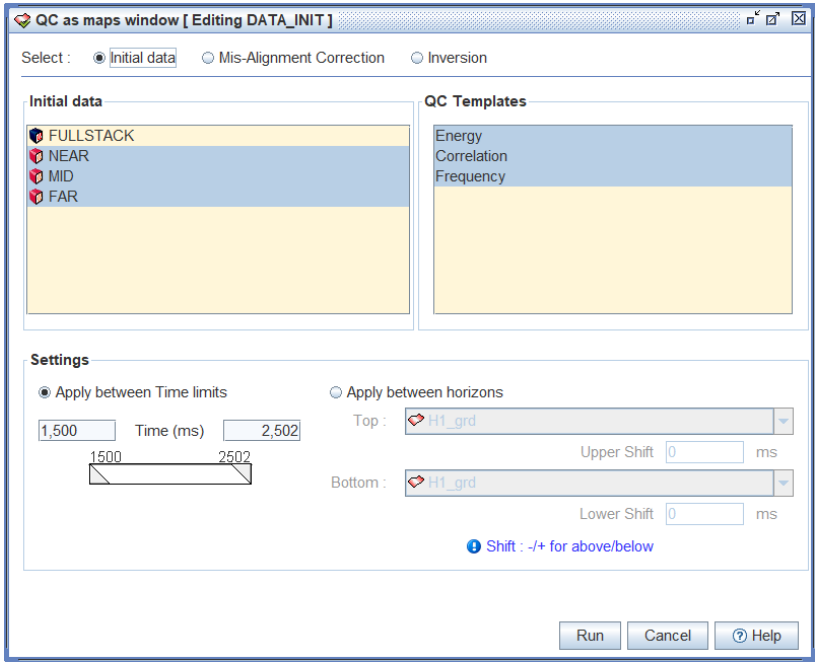
QC module : QC on maps

The QC module has been simplified to generate view to properly QC the key step of the inversion process Beicip-Franlab consulting standards.

Multiple data selection, multiple templates



- Extract at constant times or between horizons and creates a views to capture key informations on data or runs.
- This QC type creates a run which can be restored.
- Automatically sets the colors and limits according to the data to visualize.
- Adapted QCs depending on the run type.

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QC module : QC on maps

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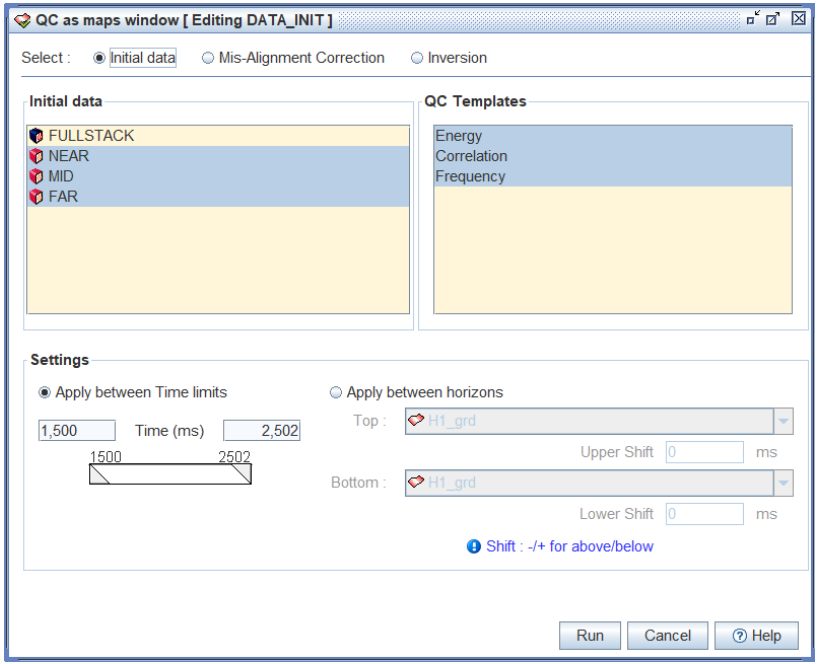
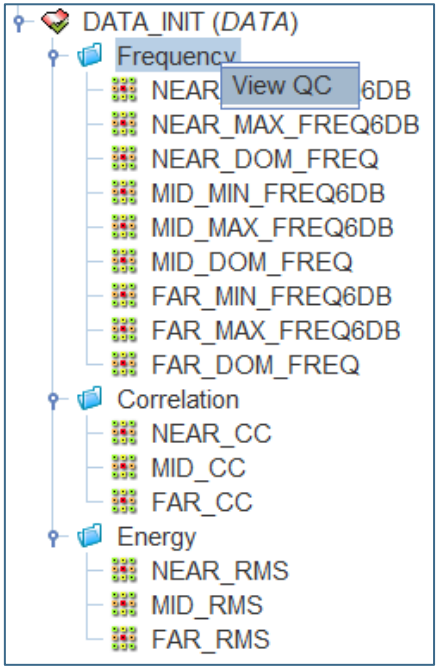
Multiple data selection, multiple templates



Maps extracted and stored in the survey tree



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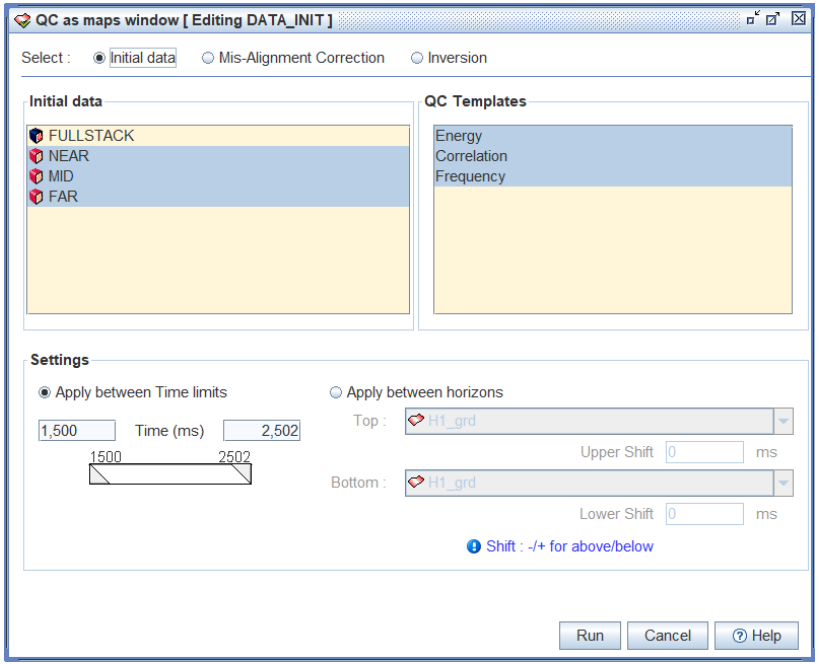
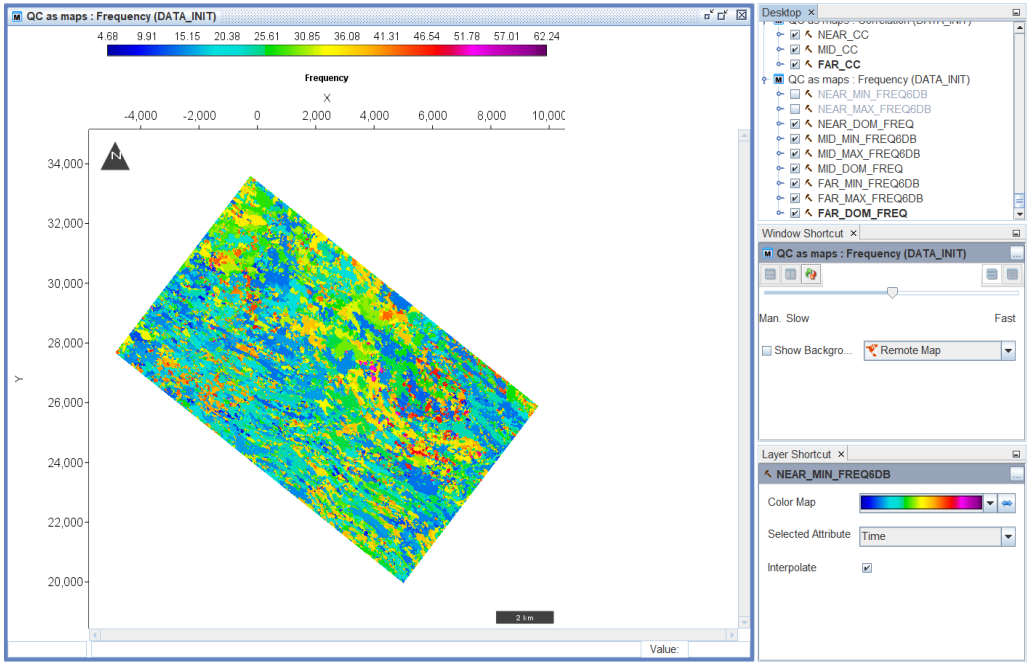


Map view with the same limits to compare the data



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QC module : QC on maps

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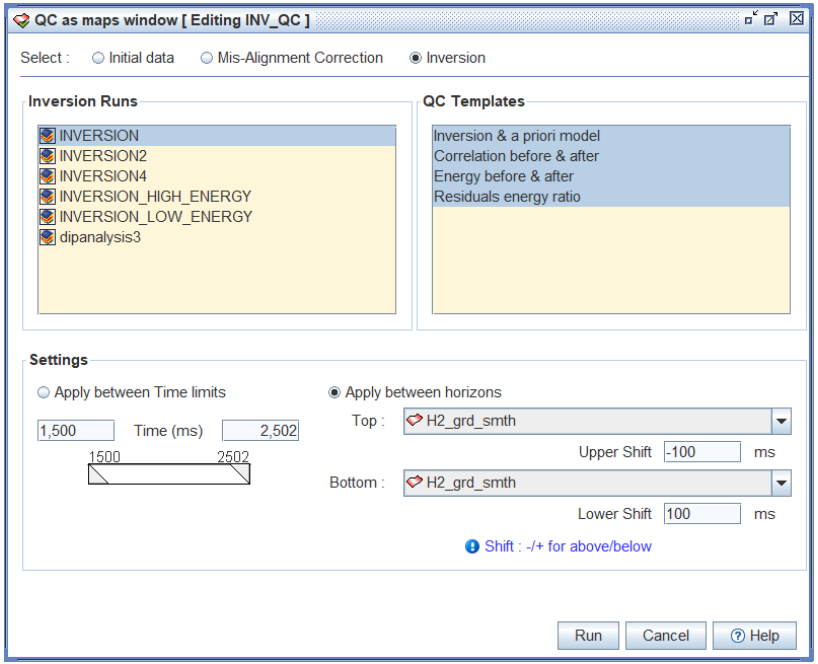
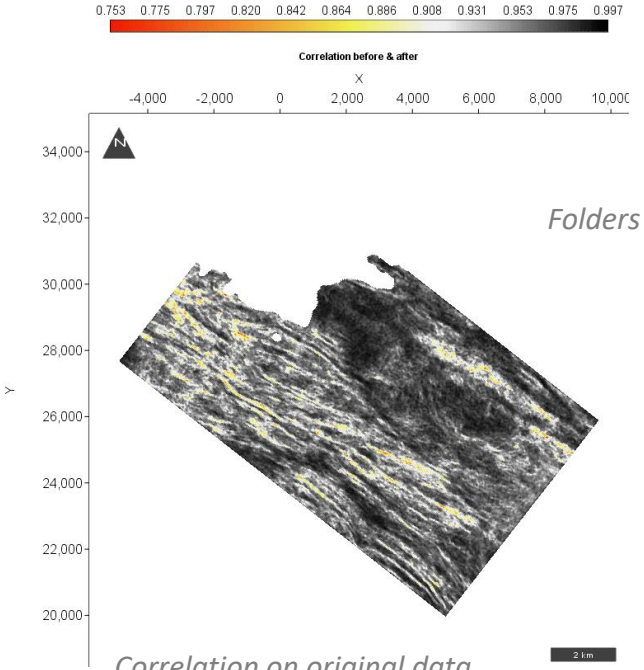
Single run selection, multiple templates

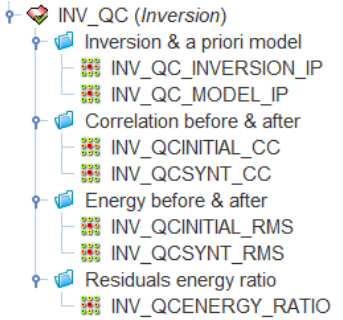


QC your inversion to check the data enhancement



Correlation on original data

Folders in the data tree, example with an acoustic inversion run



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QC module : QC on maps

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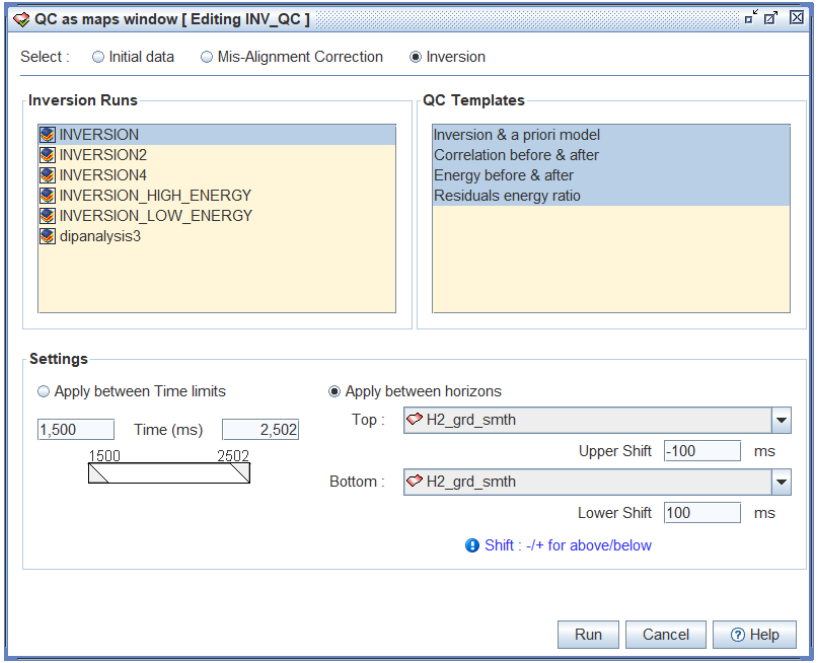
Single run selection, multiple templates



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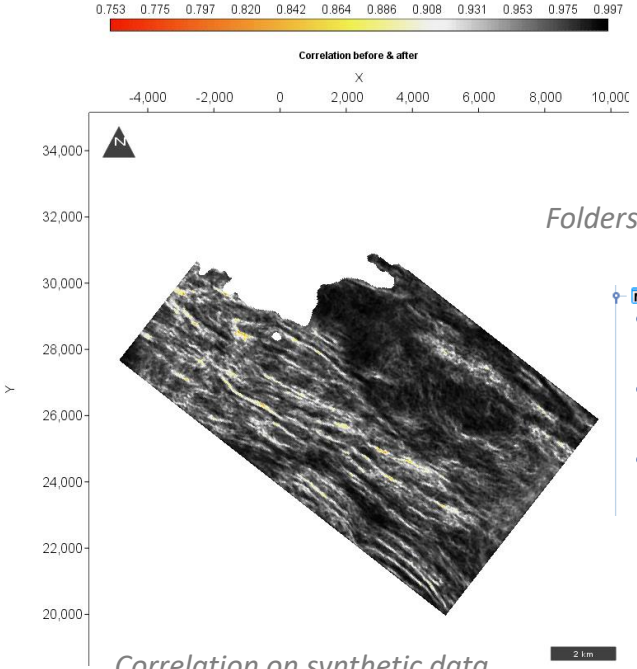
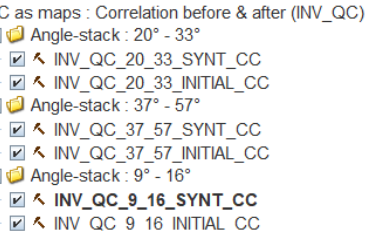


Correlation on synthetic data

Folders in the Desktop menu, example with an elastic inversion run



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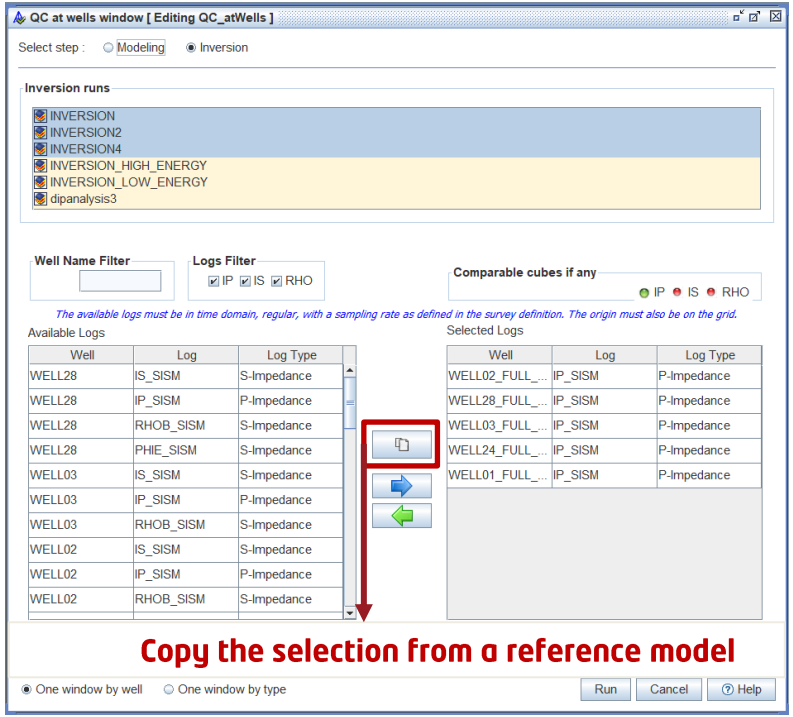
QC module : QC at wells

The QC module has been simplified to generate view to properly QC the key step of the inversion process Beicip-Franlab consulting standards.

Multiple run selection, supports calibrated and input wells



- Extract along the well trajectories and creates a view to compare the original logs with the 2D/3D volumes.
- This QC type creates a run which can be restored.
- The modes (By Well, By Type) can be changed from the study tree regardless the choice in the GUI.
- Automatically sets the colors and limits according to the data to visualize.
- Well designed to support blind wells.

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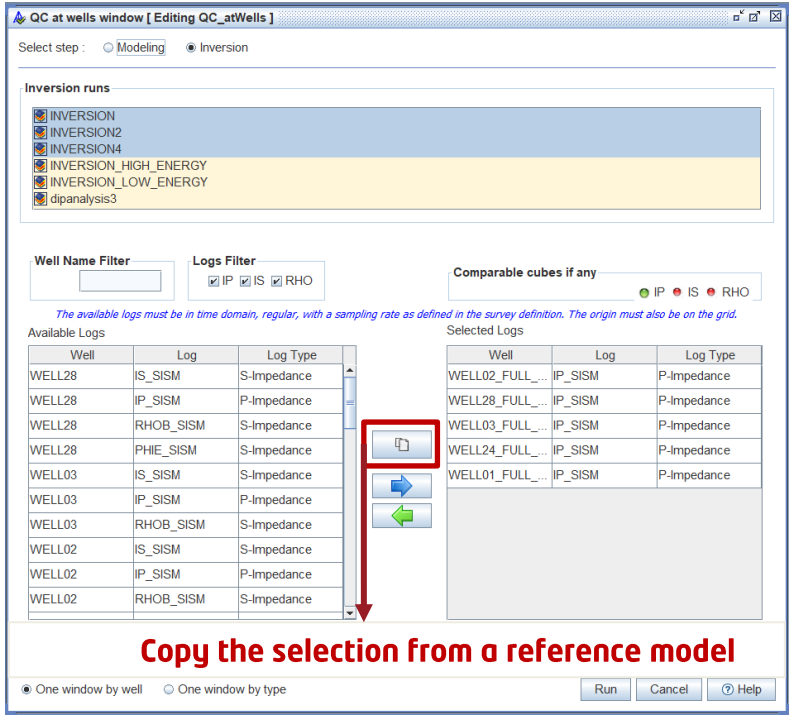
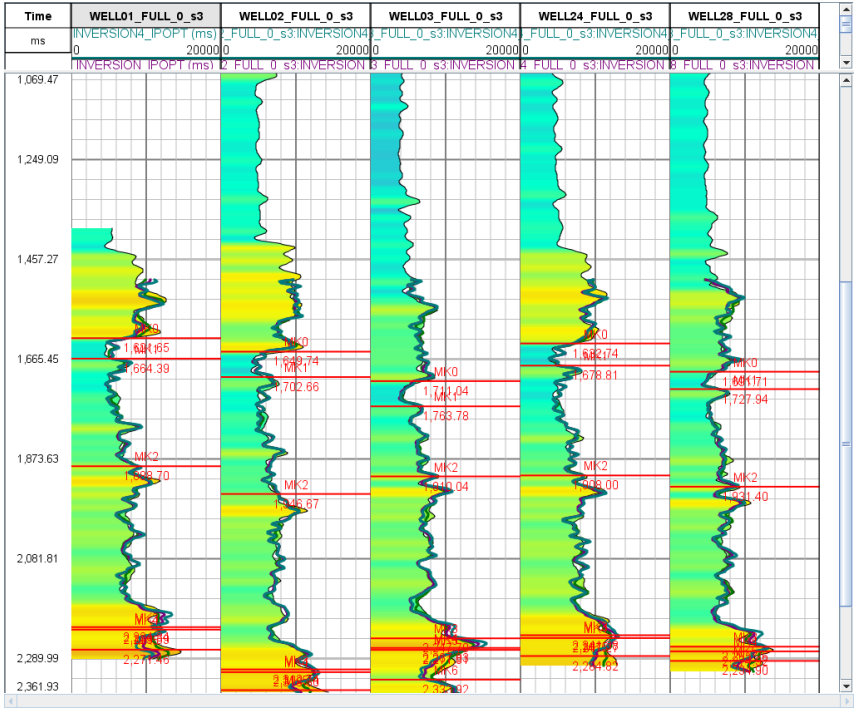
QC module : QC at wells

The QC module has been simplified to generate view to properly QC the key step of the inversion process Beicip-Franlab consulting standards.

Multiple run selection, supports calibrated and input wells



Compare the initial logs (color filled) with the runs (colored curves)



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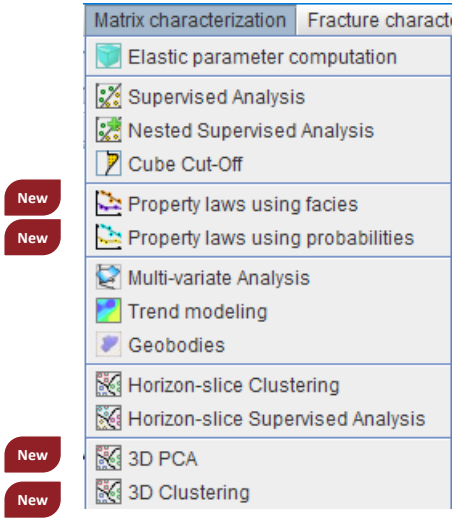
InterWell

Release 2023.1

What's new in seismic characterization ?



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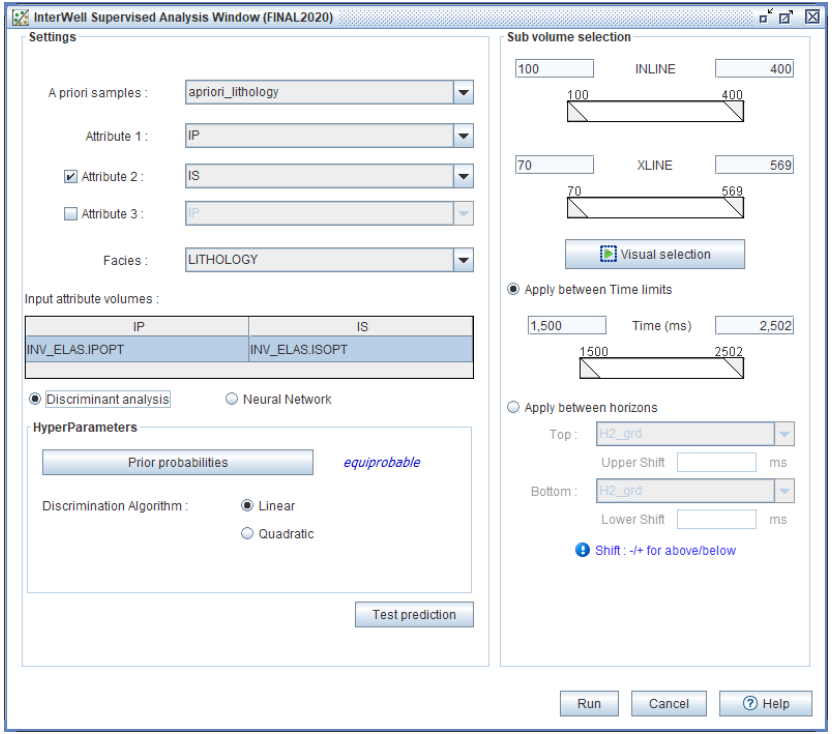
New classifier : neural network for supervised classification

Discriminant analysis, renamed as supervised analysis, now supports neural network in addition to the discriminant analysis.



- Supported in the standard and the nested mode.
- Supported for the test prediction.

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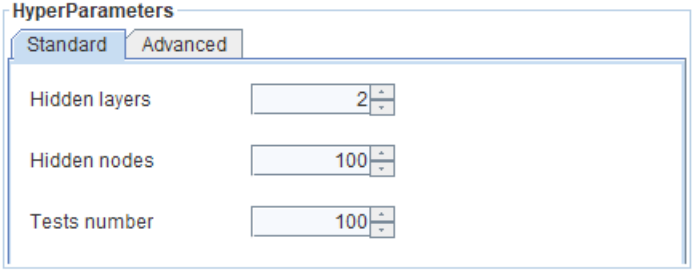
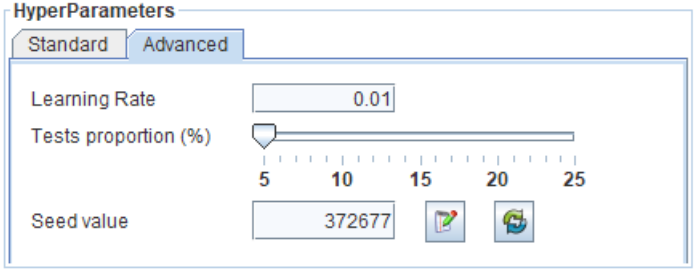
New classifier : neural network for supervised classification

Standard parameters, to be tested in every case



Advanced, to go deeper in the analysis



Structure of the neural network

- Hidden layers : the number of hidden layers to be considered in the model.
- Hidden nodes : the number of hidden nodes per hidden layer.

Validation and partitioning parameters

- Test number : the number of tests performed to find the most predictive model.
- Test proportion : the proportion (in %) of the training samples to be randomly left out for cross-validation of the model during training (blind tests).

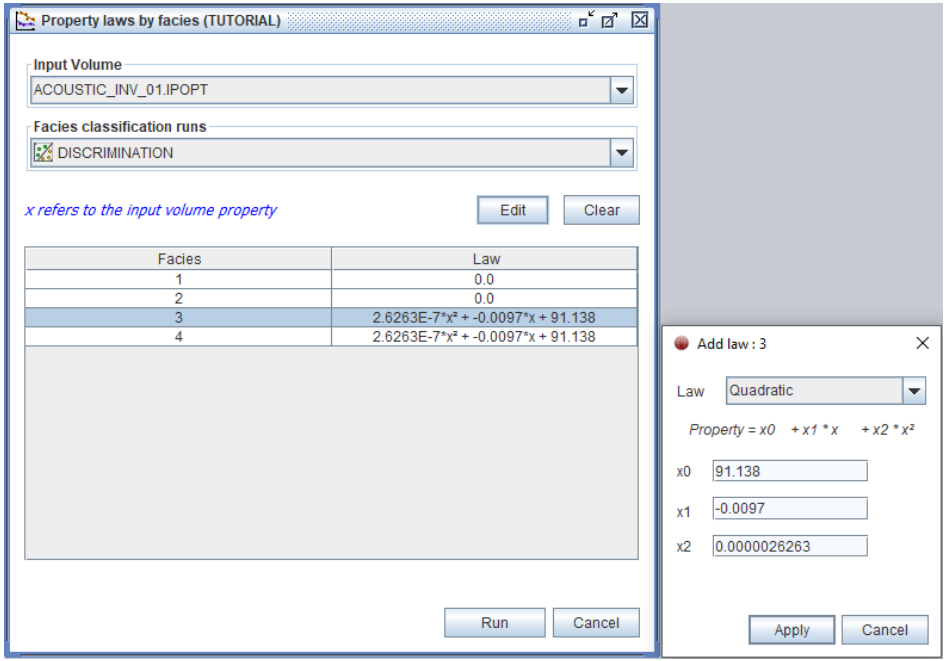
Initialization and internal parameters

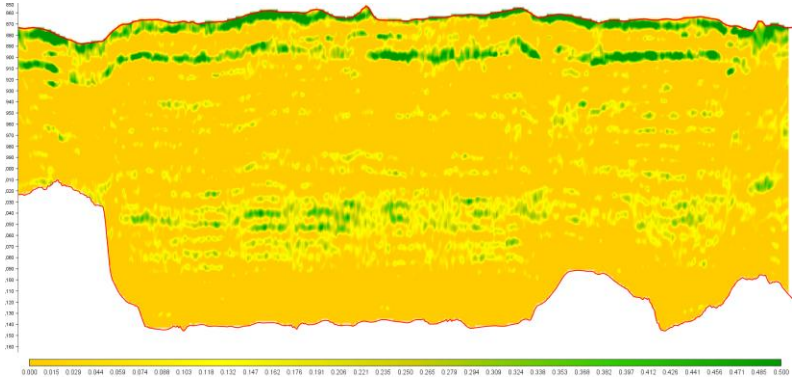
- Learning rate : the learning rate of the model.
- Seed value : the seed value to initialize the weights distribution before starting training the model.

@Bercip-Iranian

User friendly approaches for seismic characterization : law by facies

After a supervised analysis, this functionality allows to assign a law to each facies (constant, linear, quadratic).





Shale content (V/V)

Suitable for porosity, VSH, TOC estimation…

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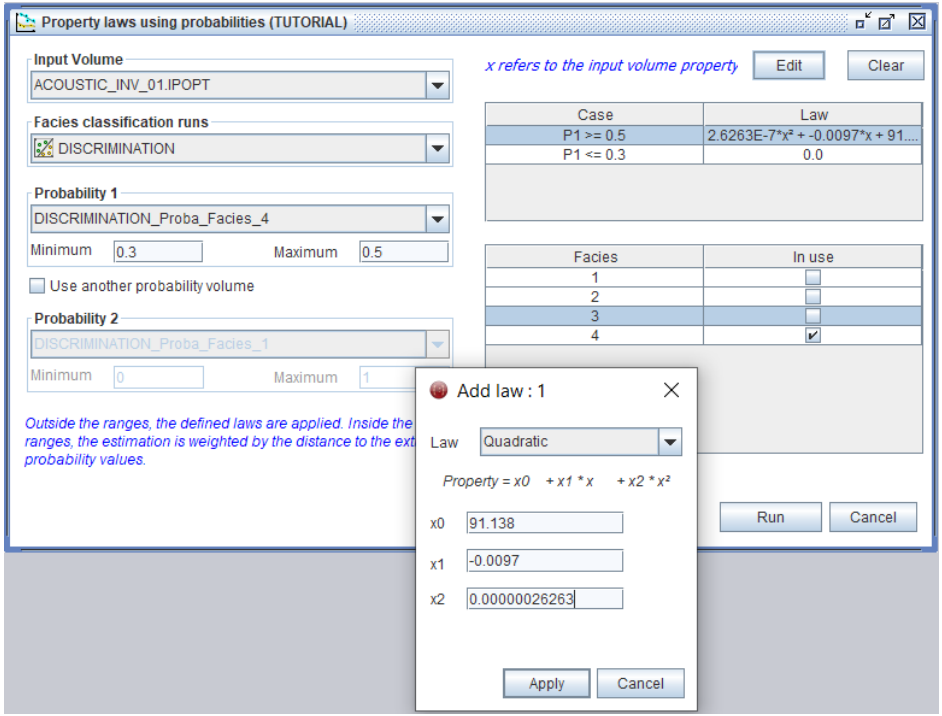
User friendly approaches for seismic characterization : law by probabilities

After a supervised analysis, this functionality allows to assign a law to each facies, defined as a probability value (constant, linear, quadratic).



Use 1 or 2 probability cut-offs to define a facies and assign a law. The final value will progressively vary from the first law to the second law according to the probability value(s).

Suitable for porosity, VSH, TOC estimation…

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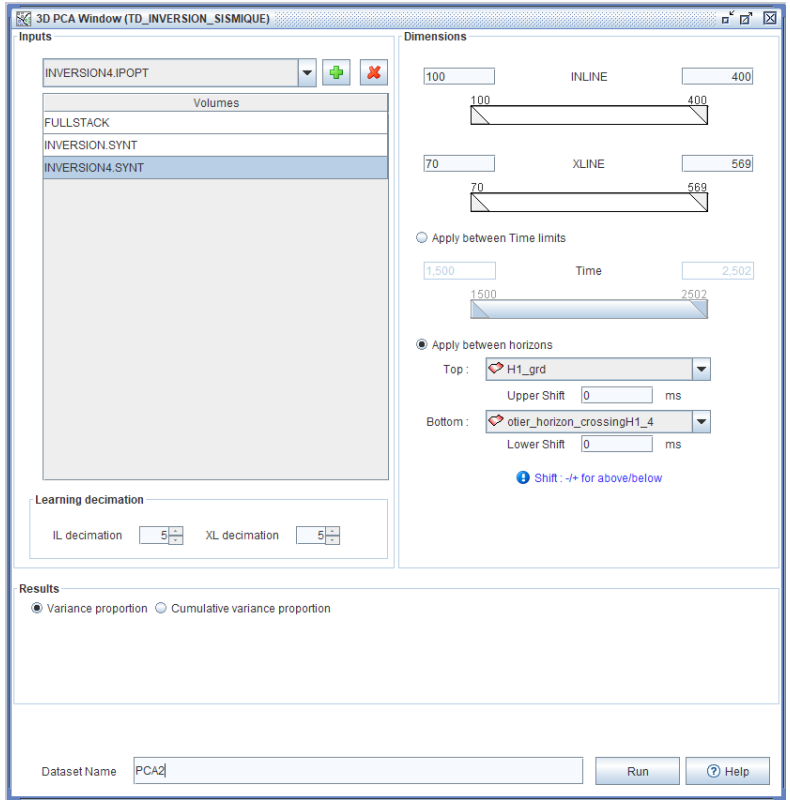
The Principal Component Analysis allows exploring the redundancy of the attributes



Applied in 3D, with no attribute limit.

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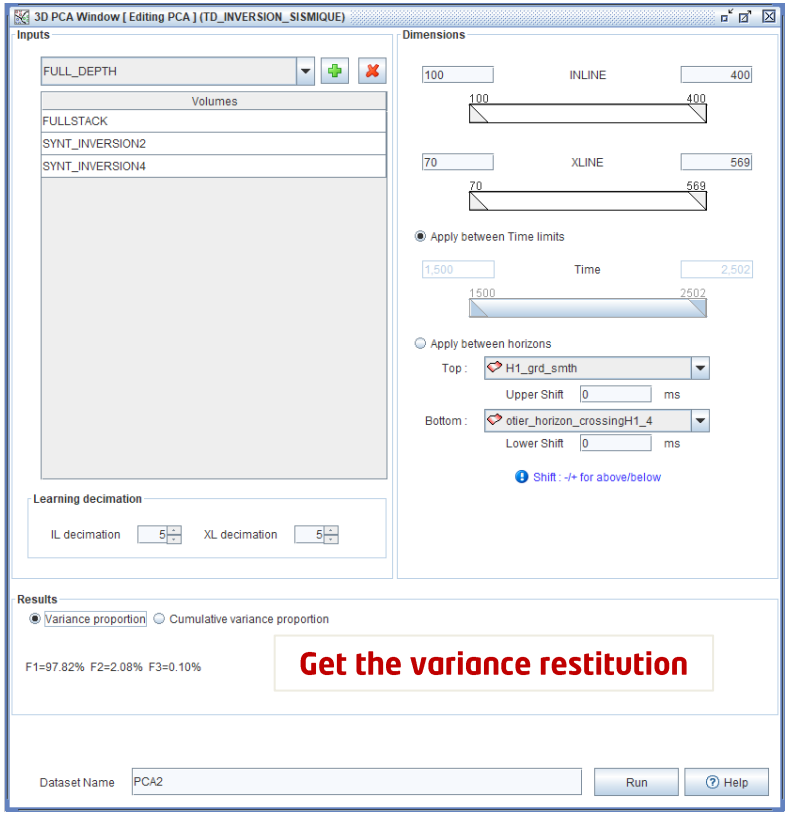
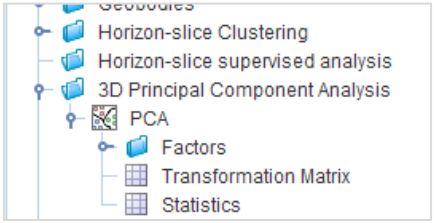
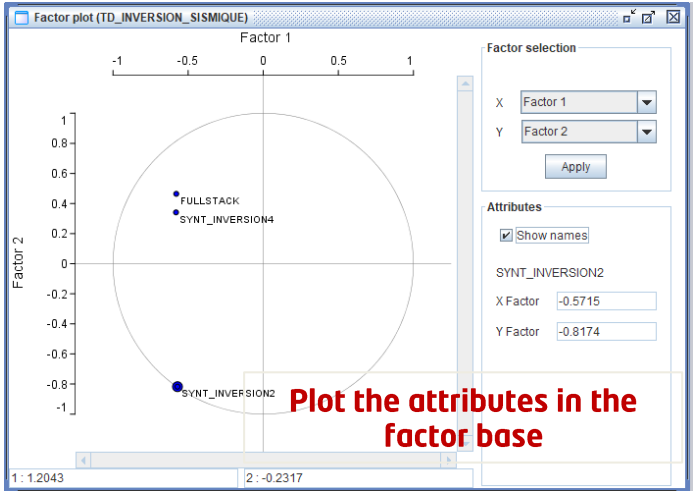
PCA : check the redundancy between attributes



Get the variance restitution

Get the transformation in the new base





Plot the attributes in the factor base

Generate the factors and filter the input volumes

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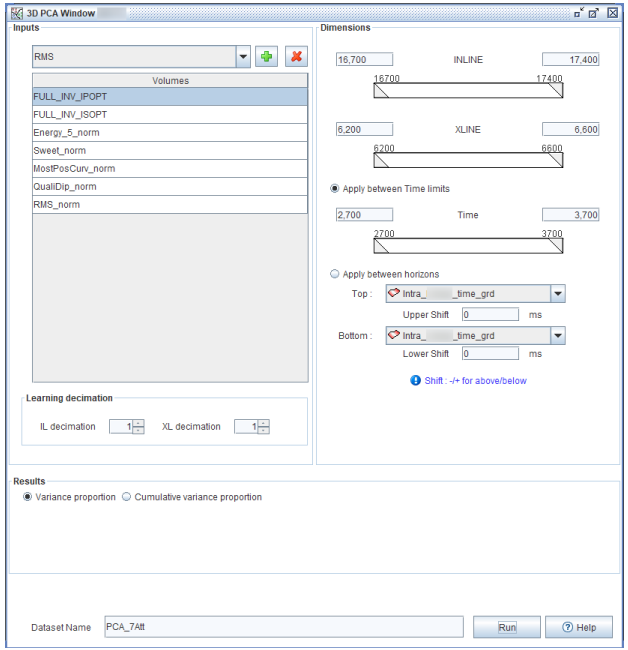
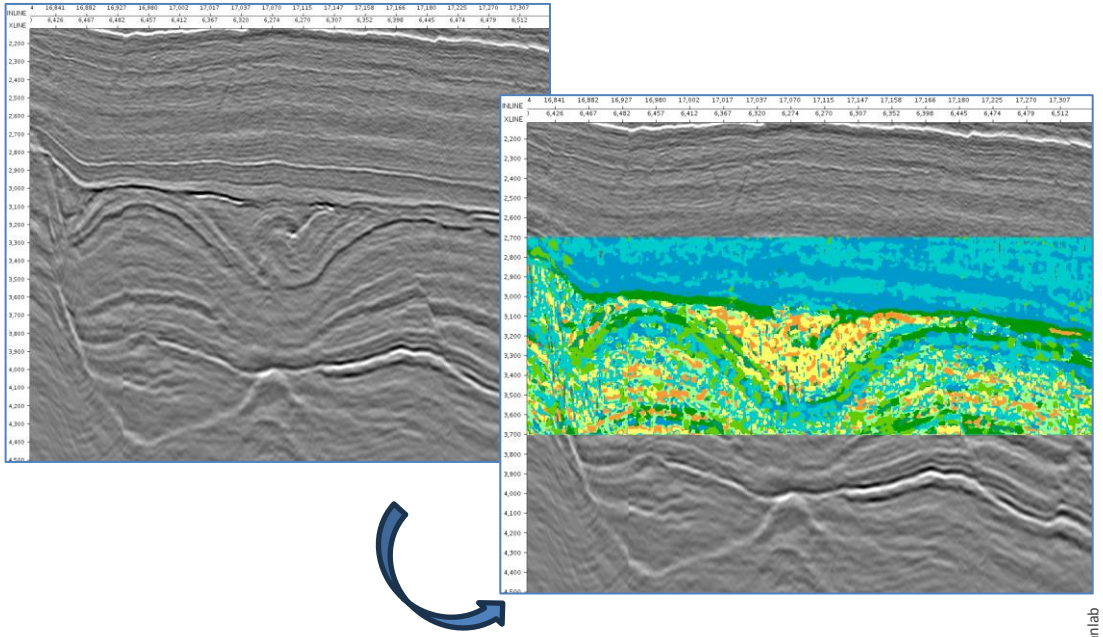
3D Clustering

Find typical patterns, in 3D, based on key attributes



Applied in 3D, with no attribute limit.



Unveil typical response from key attributes

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InterWell

Release 2023.1

What's new in the advanced workflows ?

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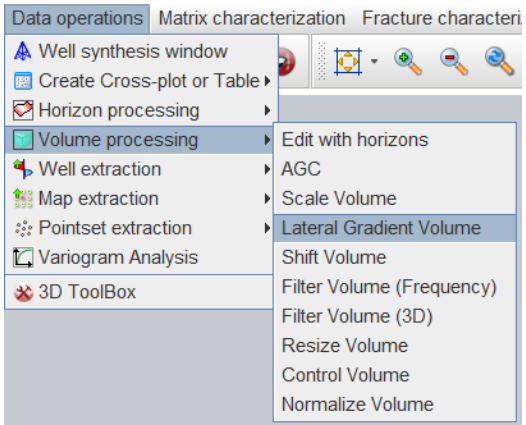
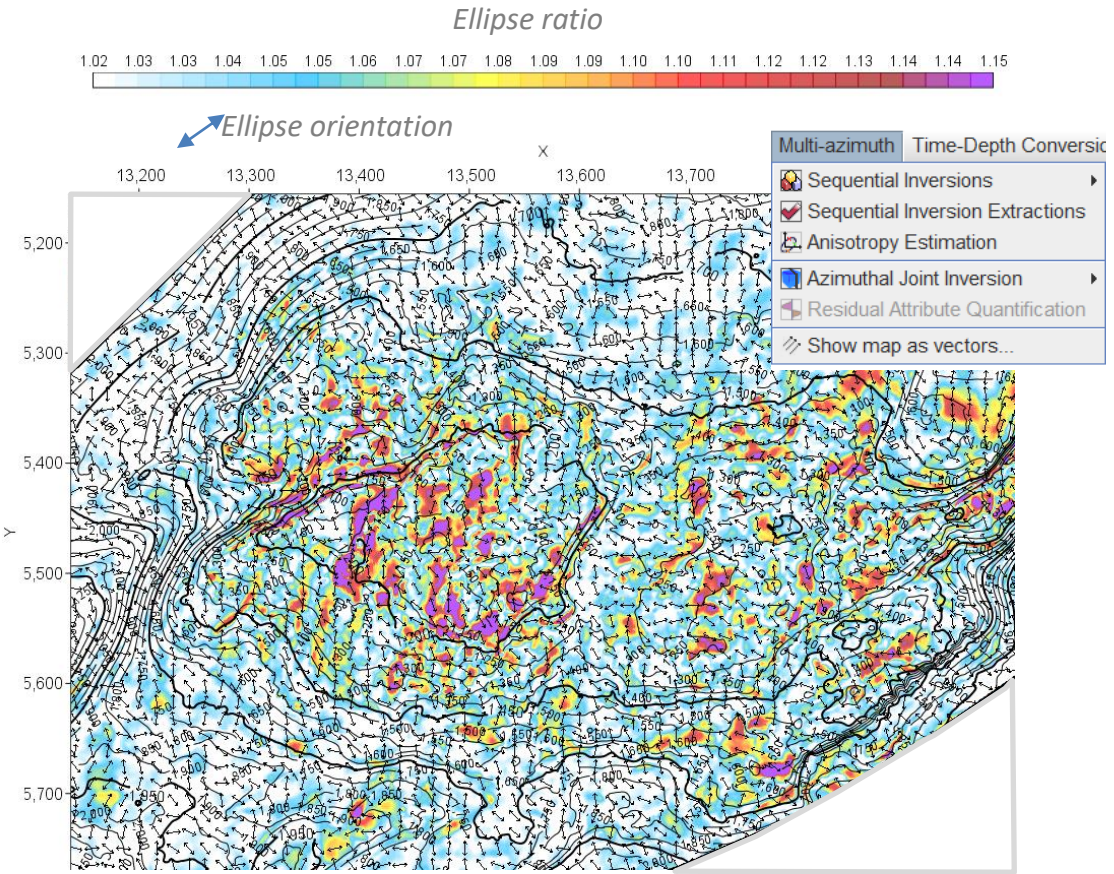
Azimuthal workflow : arrow display and gradient volume

- More accessible arrow display, even for volume ellipse fitting mode, by selecting the option in the Top menu.

- Lateral gradient attribute to support the anisotropy volume interpretation by deleting any other potential anisotropy source.





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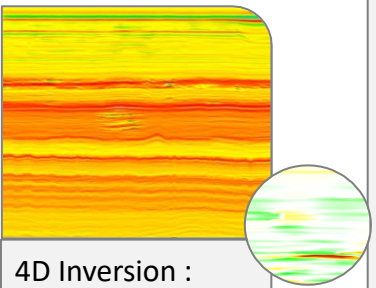
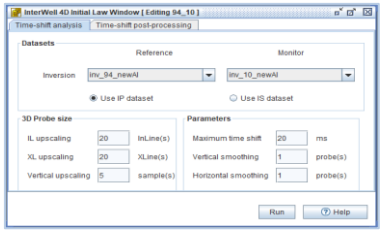
4D inversion workflow : enhancement for vintage pre-alignement



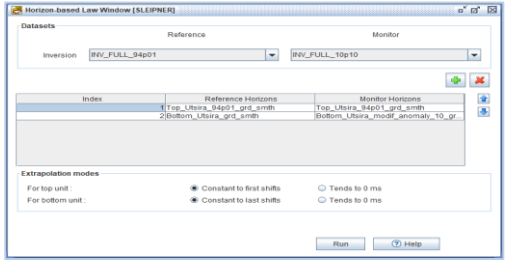
4D Inversion :
Registration laws

Initial law



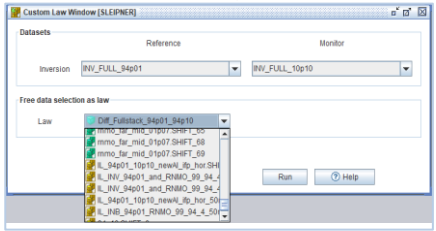
Optimizing shifts between impedance models

Horizon-based law **New**



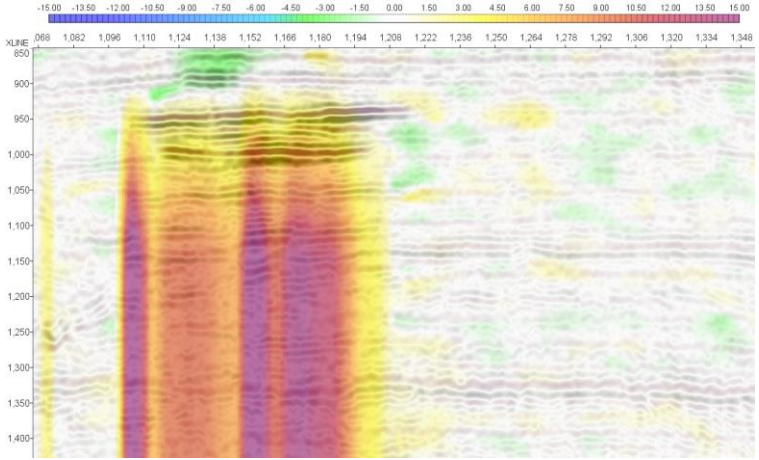
Modeling shifts according to horizon pairs

Custom law **New**



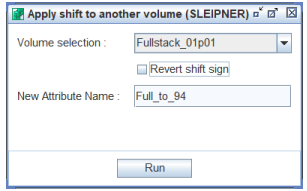
Free shift import or mixing methods

Shifts example (ms), combining RNMO and ***Horizon-based law****, after 3D filtering, loaded as* ***Custom law***



All connected to Warping and 4D joint inversion

Apply any ***shift run*** *to any* ***InterWell seismic***



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