Isatis Multi-Acquisition Automatic Factorial Kriging

Isatis, with its **Multi-Acquisition Factorial Kriging (MAAFK)**, offers a quick and easy way to extract the common features or the difference between two measurements of the same quantity using geostatistical filtering. The application implements the exclusive-to-Isatis automatic variogram fitting algorithm and automatic factorial cokriging. **MAAFK** is of particular interest for time-lapse seismic processing or dataset merging.

Isatis Multi-Acquisition Automatic Factorial Kriging embeds, in a **single application**, a complete process for extracting the common features or the differences between two variables measuring one quantity measured at two moments. The application applies multivariate geostatistical filtering technique through factorial cokriging.

Taking local heterogeneities into account

Starting from two gridded sets of data, **MAAFK** achieves a factorial cokriging and automatically computes the common part and the two residuals describing the noise and artifacts affecting the acquisitions.

The process calculates experimental variogram maps (cross- and simple variogram maps), then fits them automatically using **Isatis exclusive automatic variogram fitting algorithm**. To **speed up computations**, variography and factorial cokriging use the Fast Fourier Transform on gridded data.
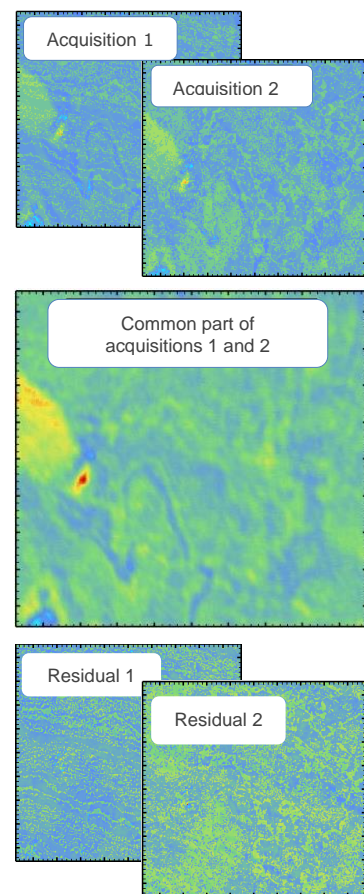
Variogram can be adapted at best locally using **local variogram parameters** to account for non-stationary components such as vertically-varying noise.

Numerous applications

MAAFK has many applications mostly related to seismic data processing. Input data can be any attribute as soon as it is gridded (i.e. velocity, amplitude, frequency, azimuth). **MAAFK** may apply for:

- Time-lapse seismic processing to estimate the common velocity cube, to assess measurement repeatability or to enhance the 4D signature.
- Data reduction processes (stacks, AVO, EI) to enhance results.
- Data merging (i.e. OBC and streamer data combination).
- Fracture characterization through decomposition of wide-azimuth data (extracting the anisotropy component).

Depending on the task requirement, the information to process is contained in the common part as for common velocity cube estimation or in the residual part as for 4D signature enhancement.

Features

- **All-in-one** easy-to-use application, fully integrated in Isatis.
- **Automatic** variography, variogram modeling and factorial cokriging.
- **Local parameters** for local fitting of models.
- **Fast process** thanks to the grid architecture and the use of the Fast Fourier Transform in the algorithms.

Acquisition 1 / Acquisition 2

Common part of acquisitions 1 and 2

Residual 1 / Residual 2

What's geostatistical filtering?

Geostatistical filtering consists in removing noise and artifacts on datasets by decomposing the input dataset into spatially independent structures (signal + artifact/noise) and filtering out the undesirable ones. Multivariate methods go further and allow the identification of common spatial behavior of different datasets.