**Local Geostatistical Filtering**

**Using Seismic Attributes**

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**Introduction**

Geostatistical filtering is powerful mean to clean post-stack amplitude seismic. The challenge is not to filter too much signal. Local geostatistics (LGS) can help to account for non-stationarity that is often encountered within seismic datasets and to filter the right amount of noise at each location. There are several approaches to compute the optimised parameters. Amongst them, mathematical morphology techniques provide a set of tools to analyse the image. Seismic attributes analysis helps the geostatistical data analysis that is key to the parameters choice. Furthermore, mathematical morphology coupled with seismic attributes can help LGS parameters tuning.

> Mathematical morphology coupled with seismic attributes helps LGS characterisation

**Methodology**

1. Compute initial parameters
   - Attributes
   - Global variogram
   - Trend modeling
   - Allow to determine coherent noise structures

2. Define background parameters
   - Attributes
   - Local variograms
   - Allow deep analysis of signal vs noise

3. Optimise
   - Local variogram ranges
   - Local variogram sills
   - Local neighbourhood

4. Filter with LGS

**Results**

**Case 1: Teapot Dome Seismic Data Set (June 13, 2007)**

**Step 1: Global analysis**

- Original amplitudes
- Coherency
- Dip

**Step 2: Local analysis**

- Filtered amplitudes (LGS)
- Filtered artifacts (LGS)
- Azimuth

**Step 3: LGS filtering**

- Filtered artefacts
- Dip

**Step 4: LGs filtering**

- Original
- Global filtering
- LGS filtering (orientation)
- LGS filtering (orientation, sills)

**Conclusions**

- Mathematical morphology coupled with seismic attributes helps LGS characterisation.
- LGS characterisation helps to better define signal vs coherent noise structures.
- Finding local parameters is not trivial since background parameters need to represent the true signal and require an optimisation step.
- Local geostatistics results can be more precise but difficult to define and more demanding in terms of computation time.

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All results obtained using: the ISATIS software, developed by Geovariances (http://www.geovariances.com) & the EarthQuick software (http://www.earth-quick.com)