# The potential of a counseled multi-dimensional data regularization (5D) in Common Offset Volumes seismic processing (case study)

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ABSTRACT

When it comes to seismic imaging, multi-dimensional regularization is a crucial step. The importance resides in the urge of having regular sampled input to Common Offset Volumes processing flows (single offset, single azimuth, single fold). Thus, a careful regularization workflow should be inserted and controlled. The same thing applies to the Fourier reconstructions parameters of this flow.

In our case , we show the different steps of the 5D regularization workflow from the creation of the data sub-volumes to their regularization and merging, to the various control tools used (stacks, gathers, maps, statistics) in order to counsel the whole process.

The collection of all Offset Vector Tiles having identical offsets and azimuths from all shot lines and all receiver lines is called: Common Offset Vector Cube or Volume (COV cube).

Shortly, the workflow is as follow:

1) Offset Vector Binning 2) Homogenizing our COV cubes 3) Bin interpolation 4) Bin centering

5) Quality Control

Right after binning, we begin with arranging our data into consistent Vector Tiles in terms of number of traces. Non-homogenous COV cubes lead to the creation of unwanted artifacts and huge levels of noise. The algorithm simultaneously performs the bin interpolation and the bin centering.

Bin interpolation is highly needed because most of the land acquisition prospects feature large gaps in different directions, as they are lead over cities, pipes, camps, agriculture and military fields. In the sub surface, this means empty bins and low fold. The interpolation can be different along directions (X, Y which are basically inline and crossline directions) responding to the gaps shapes. At the same time, in blocks, each filled bin gets regularized to bin center based on the processing grid.

In order to provide a trustworthy multi-dimensional 5D regularization, every step needs to go through diverse Quality Controls. Mapping is the best tool to control the trace interpolation phase. Filled gaps does not always mean a successful interpolation, because over-interpolated traces signify unreliable geological information.