How to create a Zone-of-Interest Tuning Cube in OpendTect.

This is a workflow to create a zone-of-interest tuning cube (a cube which represents local amplitude spectrum calculated using spectral decomposition along seismic horizon) as described by Greg Partyka in 1999.

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Step 1: Compute attribute grids on a horizon of interest.
Step 2: Create a zone-of-interest tuning cube from horizon attribute grids.

References
Step 1: Compute attribute grids on a horizon of interest.

1. Define *Spectral Decomposition* attribute:

![Attribute Set 3D window](image1)

2. Go to Processing > Create Horizon Output > Attributes > 3D.

![Calculate Horizon Data from 3D window](image2)
3. Repeat these two steps to compute Spectral Decomposition grids on the horizon: for example, from 10 to 80 Hz with a step of 5.

4. To QC all components:
   - Add the horizon to the 3D scene
   - Right-click on it > Add > HorizonData
   - Choose all components
   - Use PageUp/PageDown to scroll through the grids
Step 2: Create a zone-of-interest tuning cube from horizon attribute grids.

1. For each horizon grid define *Horizon* attribute as such:

   ![Attribute Set 3D interface]

   The attribute propagates attribute grid value along the whole trace. The seismic cube is provided for the geometry reference.

   In this example attributes *SD10*, *SD15*, ..., *SD80* are defined based on the horizon data of *Demo 6 --> FS8* horizon (Note that the attributes are named the same way as the horizon data: don’t be confused, those are not the same objects).
2. Define *Reference* attribute which at each sample is equal to *Z index* (sample number): 1,2,3,...

![Attribute Set 3D](image1)

3. Define a chain of *Mathematics* attributes (each *Mathematics* attribute can have the max of 8 variables) as shown below:
   - **Cube01** = *SD10* at sample 1, *SD15* at sample 2, ... *SD35* at sample 6, then **Cube02**

![Attribute Set 3D](image2)
- **Cube02** = SD40 at sample 7, SD45 at sample 8, ... SD65 at sample 12, then **Cube03**

- **Cube03** = SD70 at sample 13, SD75 at sample 14, SD80 at sample 15.

This attribute consists of multiple nested **Statement ? Outcome If True : outcome If False** (OpendTect Mathematics attribute syntax for IF ... THEN ... ELSE ...).
4. QC the defined attribute **Cube01** by computing it on-the-fly along an *Inline*:
   - Add Inline to 3D scene: *Inline > Add and Select Data*
   - Choose **Cube01** from the Attribute list
   - Optionally, right-click on *Inline > Display > Properties* and in the *Texture* tab switch to *Classification* to see individual samples.

5. Create a seismic volume (physically stored on disk) via *Processing > Create Seismic Output > Attributes > Single Attribute > 3D* (optionally, limit Z range of the output cube via *Volume Subselection* for example, in this case it is limited to 0 - 100 ms as only samples 1-15 have actual data).
References