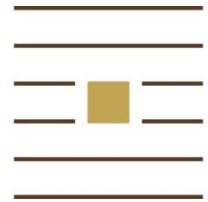


WEBINAR Q&A

How to save Months & Millions
using UDOMORE Depth
(an Ocean plug-in to Petrel)



Attention :

UDOMORE Community

22/02/2017



Seisquare Webinar Q&A

SEISQUARE'S WEBINAR Q&A FEBRUARY 22, 2017

HOW TO SAVE MONTHS AND MILLIONS USING UDOMORE DEPTH

(AN OCEAN PLUG-IN TO PETREL)

Seisquare delivered a 30 min Webinar to its UDOMORE Depth community on February 22, 2017: How to save Months & Millions? For a recap of the Q&A session, please see below.

1/How do you include seismic velocities into the model?

You can use two velocity functions:

- 1) $A * V_{seis}$ (A = constant rescaling factor, V_{seis} = seismic interval velocity map) to best calibrate your seismic velocities to the well velocities.
- 2) $A * V_{seis} + B$ (A = constant rescaling factor, B = constant shifting factor, V_{seis} = seismic interval velocity map), meaning that a calibration and shifting of your seismic velocity.

To input your seismic velocity to UDOMORE Depth, you need to

- 1) compute seismic layer velocity in Petrel ;
- 2) input seismic velocity , and A , B parameters to the section $A * V_{seis} + B$ in UDOMORE Depth .

As a result, UDOMORE Depth will optimize your velocity model.

2/Could you display a vertical section with the instantaneous velocity displayed ?

UDOMORE Depth does not create 3D velocity model for the moment.

However, you can do it easily by following some steps:

Path 1) output the resulting interval velocity (Estimated interval velocity) from UDOMORE Depth and input them in Petrel "make velocity model" , create a 3D velocity model using PETREL "make velocity model"

Path 2) output the UDOMORE optimized velocity law parameters and input them to Petrel "make velocity model" using the same layering and choice of velocity laws. Create a 3D velocity model using PETREL "make velocity model"

3/ How many iterative updates of V_0 and K should we do to reduce enough uncertainty at the well and optimize velocity ?

Iterate until it stabilizes around optimized values of V_0 and K . If necessary enlarge the a priori uncertainty range associated to updated V_0 and K , to allow the plugin to scan a wider range of possibilities.

Remember that Velocity function $V_0 + K * Z$ (V_0 = constant velocity factor (instantaneous velocity at the surface), K = constant compaction factor,) is non-linear function in the time to depth conversion formula.

In case of a priori K values very different from the starting default $k = 0.2$, it is advised to input a first k value consistent with existing calibrated sonic .

4/ Given I have time horizons and depth tops at wells, and I want to use a V_0K law for a given interval, can I fix K and let UDOMORE generate a V_0 map ? If yes can we visualize and save this V_0 map ?



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Yes. UDOMORE takes your input velocity parameters (values and uncertainty range as one sigma) as defining a prior velocity trend. UDOMORE then provides the best estimation of the posterior distribution (kriged values and kriging standard deviation) for these parameters, defining the post velocity trend (that minimizes the well depth mismatches).

In the case of $V_0 + K \cdot Z$ velocity functions, UDOMORE does not directly output the resulting (or a posteriori) V_0 maps.

1) Should you define a priori constant V_0 and K parameters with associated uncertainty ranges, UDOMORE will estimate the values of posterior V_0 and K , inside the a priori uncertainty range, using Bayesian kriging. The posterior V_0 and K values are the ones that minimize the depth mismatches for this layer (and also influence the other layers).

You can fix the value of a priori K by indicating a 0 associated sigma (no uncertainty).

UDOMORE Depth does not directly output the resulting V_0 map. We can provide you the formulae to retrocompute a V_0 map in Petrel if you need it.

2) If you are using the velocity function $A \cdot V_0_map + K \cdot Z$, UDOMORE will best estimate the A scaling factor and the K value inside the a priori uncertainty range, the output V_0 map will be equal to $A \cdot \text{input } V_0 \text{ map}$.

5/ Does UDOMORE communicate with the velocity model of Petrel, or do we have to build a velocity model by using the depth maps or velocity maps from UDOMORE outputs ?

UDOMORE outputs a multi 2D layer interval velocity model that is a direct input to PETREL "make velocity model" with optimized velocity model parameters. You can also use the V_0 and K values output by UDOMORE as an optimized input to make velocity model.

However, UDOMORE doesn't communicate directly with Petrel "make velocity model" as there is no Petrel/Ocean API for us to program it.

6/How UDOMORE generates the P90-P10 surfaces distribution?

UDMD provides as an output the best estimated depth/velocity/thickness and their uncertainties and also a given number of the simulated depth surfaces.

For a given structural target, UDOMORE Depth will compute the GRV from each simulated depth surfaces using Petrel "map base volumetric computations" within a Petrel workflow that we provide.

The GRV curve is obtained by sorting values of the simulated GRVs by increasing order, UDOMORE Depth associates the depth realization (map) to a given quantile on the GRV curve. The way to derive P10, P50 and P90 depth scenarios could be discussed in more details by request.

7/ What is the probabilistic model used ?

The probabilistic model used is Bayesian Cokriging Estimation/simulation.

References:

1) Sandjiv, L. & Shtuka, A. 2009, Depth conversion and associated uncertainties using consistent velocity model: A probabilistic unified model based on Bayesian approach,



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11th International Congress of SBGf, Salvador, 2009

Link: <http://www.earthdoc.org/publication/publicationdetails/?publication=45546>

2)P. Abrahamsen (1993) "Bayesian Kriging for Seismic Depth Conversion of Multi-layer Reservoir" in A. Soares (ed.) "Geostatistics Troia '92". Pp. 385-398

Link: <https://www.nr.no/sites/default/files/files/Bayesian-Multilayer-Abrahamsen-1993.pdf>

8/If I want to test Udomore for one month, what are the conditions ?

We offer one month (30 days) of the free evaluation period and will guide you during the installation process.

Condition: You need to have Petrel licence.