The VELMOD-2 seismic velocity model of the Netherlands on- and offshore

VELMOD-2 is a layer cake model, with seismic velocities modeled per lithostratigraphic layer (Figure 1).

Main data sources for the model are lithostratigraphic depth data in DINO, the National Geo-data Centre of the Netherlands, and sonic logs of some 1300 boreholes (Figure 2).

All layers, except that of the Zechstein Group, are compacting layers. Their model velocities are assumed to increase linearly with depth:

\[ V(x,y) = V_0(x,y) + K \cdot z \]

The model parameters \( K \) were derived from linear least squares relations between interval velocity \( V_{int} \) and mid-depth \( z_{mid} \) per layer (Figure 3).

The position dependent parameter \( V_0 \) was determined at borehole locations and then kriged on a grid with cells of 1 km x 1 km. Determination of \( V_0 \) at borehole locations was effected by calibrating model traveltime through a layer to the traveltime according to the sonic data.

The velocity model for the non-compacting layer of the Zechstein Group consists of a grid of interval velocities, based on sonic data and seismic traveltime data.

Figure 5 shows the \( V_0 \)-distribution for the layer of the Upper and Lower Germanic Trias groups, whereas the kriging standard deviation of this distribution is shown in Figure 6.

K-values are regionally constant for the layers of Jurassic age (Figure 4), or constant for the entire Dutch on- and offshore.

Figure 1. Lithostratigraphic layers of VELMOD-2

Figure 2. Borehole locations with sonic data available to VELMOD-2

Figure 3. Linear least squares relations between \( V_{int} \) and \( z_{mid} \) for the main compacting layers of VELMOD-2

Figure 4. Regional subdivision of \( K \) for layers of Jurassic age

Figure 5. \( V_0 \)-distribution (VELMOD-2) for the layer of the Upper and Lower Germanic Trias groups

Figure 6. Kriging standard deviation of \( V_0 \) for the layer of the Upper and Lower Germanic Trias groups