

## Reflection seismics of the Dobele impact crater, Latvia

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The Dobele crater is a valuable object for impact crater researchers as the complex crater is entirely in sedimentary rocks, the target is horizontally layered and it is relatively well preserved. Unfortunately, this structure is not well known as there is only a limited number of publications describing it (e.g. Masaitis, 1999). We conducted reflection seismics at Dobele aiming at detailisation of its size, location and inner structure.

Altogether about 19 km of high-resolution reflection seismic profiles were acquired along Dobele – Tervete highway and local gravel roads. Seismic waves were generated using earth tamper (vertical stack typically 300-500 hits) and recorded by 72 geophones that were spaced every 10 m. The deepest reflections came from the top of crystalline basement at about 1.5 km depth.

Seismic sections suggest that the centre of the Dobele crater is located at 23°17.4' E, 56°34.2'N that is a couple km eastward of commonly reported location. Position of the centre of crater can be estimated from the shape of central uplift and annular moat. The rim of crater is not visible on the seismic sections. Reflections from the crater floor rise towards the rim area where subhorizontal layered strata continue. Some profiles suggest that the rim has already been eroded prior formation of Late Paleozoic sediments, but it certainly has been also eroded by Scandinavian Ice Sheets.

According to drilling and seismic data, the allochthonous breccias occur at about 300 – 350 m depth in the annular moat that surrounds central uplift. Seismic sections also suggest no significant rise of Silurian carbonate rocks under the central uplift, but overlying Lower Devonian siliciclastic rocks have gained thickness, probably due to increased porosity and fracturing. The reflection from the base of clayey dolomite of the Middle Devonian Narva Stage rises toward the centre from about 600 m depth in surroundings to couple hundred meter depth and these rocks have been found to outcrop in shallow drillings (50 to 100 m depth).

The central uplift is relatively large in diameter. It appears to be more than two km across at the foothill level. Pattern of reflections allow speculating that the central uplift has collapsed.

### References:

Masaitis, V.L. 1999. Impact structures of northeastern Eurasia: the territories of Russia and adjacent countries. *Meteoritics & Planetary Science*, 34, 691-711.