**REFLECTION SEISMIC STUDY OF THE DOBELE IMPACT CRATER, LATVIA.** A. Jõeleht[1], M. Mustasaar[1], K. Rooni[1], A. Kalvāns[1,2] and K. Popovs[2], [1]University of Tartu, Ravila 14A, 50411 Tartu, Estonia, [2]University of Latvia, Alberta 10, LV-1010, Riga, Latvia.

**Introduction:** The international impact researcher community has to rely on rather limited amount of data concerning the Dobele crater, Latvia. There are no papers concerning specifically this structure and usually overview papers [1-4] provide information only about its location, size and age. Although being described in just a single paragraph, so far the most comprehensive description of the Dobele impact crater is given by V. Masaitis [5] in an overview paper that describes the impact structures in the territories of the former USSR.

The Dobele crater is a valuable object in respect of impact research because (i) it is one of a few complex craters on Earth that is entirely in the sedimentary rocks, (ii) the target was sub-horizontally layered, (iii) it is eroded, but not deeply eroded crater, and (iv) it is well-preserved as the area has not been only tectonically disturbed at post-impact times.

We made reflection seismics at the Dobele crater aiming at detailisation of its size and location, its inner structure including central uplift and the shape of crater floor and rim.

**Geological Background:** The Dobele crater is buried and not visible in landscape. The target consisted of Palaeozoic sedimentary rocks, including sandstones, sulphate-carbonate rocks and carbonate rocks. The entire thickness of sedimentary sequence is ~1500 m according to drilling data. The crater has been buried under the Late Palaeozoic and Mesozoic sediments and then eroded again. Still, the present erosional level has preserved Carbon to Triassic sediments in large part of the annular moat. The crater is covered by 20 – 60 m of Quaternary glacial sediments. The impact origin of the Dobele crater is proven by existence of shatter cones and particularly by planar deformation features [5].

**Reflection Seismic Field Campaigns:** In 2013-2014 altogether about 19 km of high-resolution reflection seismic profiles were acquired, mainly along Dobele – Tervete highway and local gravel roads. Data were recorded by 72-channel system; geophone and source spacings were 10 m. Seismic waves were generated with an earth-tamper, which allowed stacking typically 300 – 500 shots that was usually sufficient to overcome highway traffic noise. Higher urban noise levels in Dobele town and geological peculiarities complicated seismic sections in the northern part of the structure. Outside of the crater, the deepest reflections came from the top of the crystalline basement (~1.1 s TWT, ~1.5 km depth).

**Crater Structure:** Seismic sections suggest that the centre of the Dobele crater is located at 23°17.4' E, 56°34.2N 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.

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 risal of Silurian carbonate rocks under the central uplift, but overlaying 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 to speculate that the central uplift has collapsed

The rim of Dobele crater is not visible on the seismic sections. Apparently the crater floor reflections rise towards the rim area where subhorisontal layered strata continues. 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.

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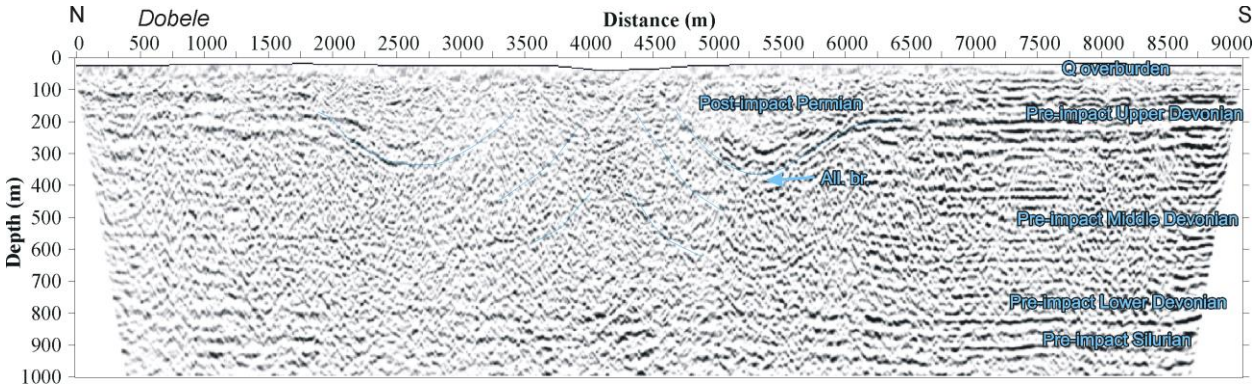


**Figure 1**. Pre-stack depth-migrated seismic section with preliminary interpretations. All. br. stands for allochthonous breccia.