

Sequence Stratigraphy in the North-eastern Part of the Styrian Basin

Marcellus G. SCHREILECHNER & Reinhard F. SACHSENHOFER

Three high resolution seismic lines were acquired in the NE part of the Styrian Basin to describe the hydrogeological situation and to locate new wells for the regional water supply. Two lines are situated in the N–S trending upper Lafnitz (Fig. 1) and Stögersbach valleys (Fig. 2a, b). The third line is a W–E trending connecting line (Fig. 2c, d). The seismic lines were used together with logs from three wells to establish a sequence stratigraphic framework for the Neogene deposits. Sequences with an order higher than three will be named in the following with rising indices. The Neogene basement can be identified as a discontinuous reflector with partly high amplitudes. An internal reflector within the Lower Miocene section is tentatively taken as the Ottnangian/Karpatian boundary, although the presence of Ottnangian rocks remains unclear. The top of the Lower Miocene – Styrian Unconformity – forms a reflector with high amplitudes and partially with top laps representing the upper part of a Karpatian Highstand Systems Tract (HST; Fig. 2a, b).

The Styrian Unconformity is overlain by three prograding units (HSTs), which partly are separated by erosive surfaces. The HSTs can be related to three 3rd order sequences of Badenian age (BAD-1 to BAD-3), which are local representatives of the global cycles TB 2.3, TB 2.4 and TB 2.5 (HAQ et al. 1988; HARDENBOL et al. 1998).

The Sarmatian succession is subdivided into three 5th order sequences (SAR-1.1.1 to SAR-1.1.3) and one 4th order sequence (SAR-1.2) composed mainly of Transgressive Systems Tracts (TST) and HSTs. Only the lowermost Sarmatian rocks were deposited during a time with falling sea level (forced regression package, Falling Stage Systems Tract (FFST)) forming the Lowstand Systems Tract (LST) of SAR-1.1.1. LSTs of the overlying sequences are not observed. This is either because they are located in a distal position not covered by the seismic lines, or because they are beyond their resolution. Reflection geometries suggest the presence of carbonate build-ups within sequences SAR-1.1.1 and SAR-1.1.2 (Fig. 1). These build-ups may form equivalents of carbonate rocks exposed in the Hartberg area. The following sequence (SAR-1.1.3) completes the deposition of the Lower Sarmatian which is a 4th order sequence named SAR-1.1 (= LS-1 of HARZHAUSER & PILLER 2004) and part of the 3rd order sequence SAR-1 (= TB 2.6 of HAQ et al. 1988 and HARDENBOL et al. 1998). Note that progradational patterns in SAR-1.1.3 are not well visible (Fig. 1-2), because most of the sediments were deposited perpendicular to the direction of the seismic lines.

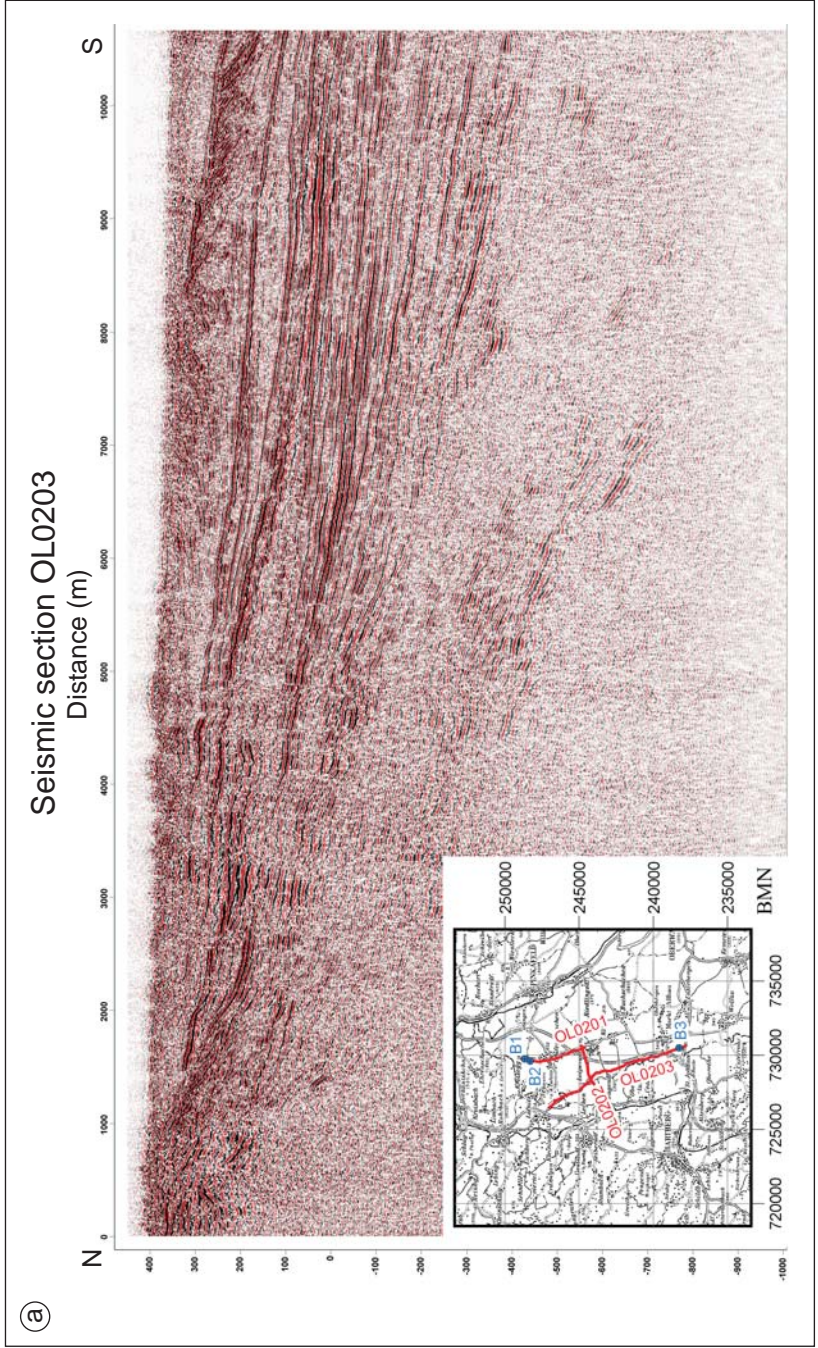


Fig. 1: a) N-S trending seismic section in the upper Lafnitz valley (Joanneum Research).

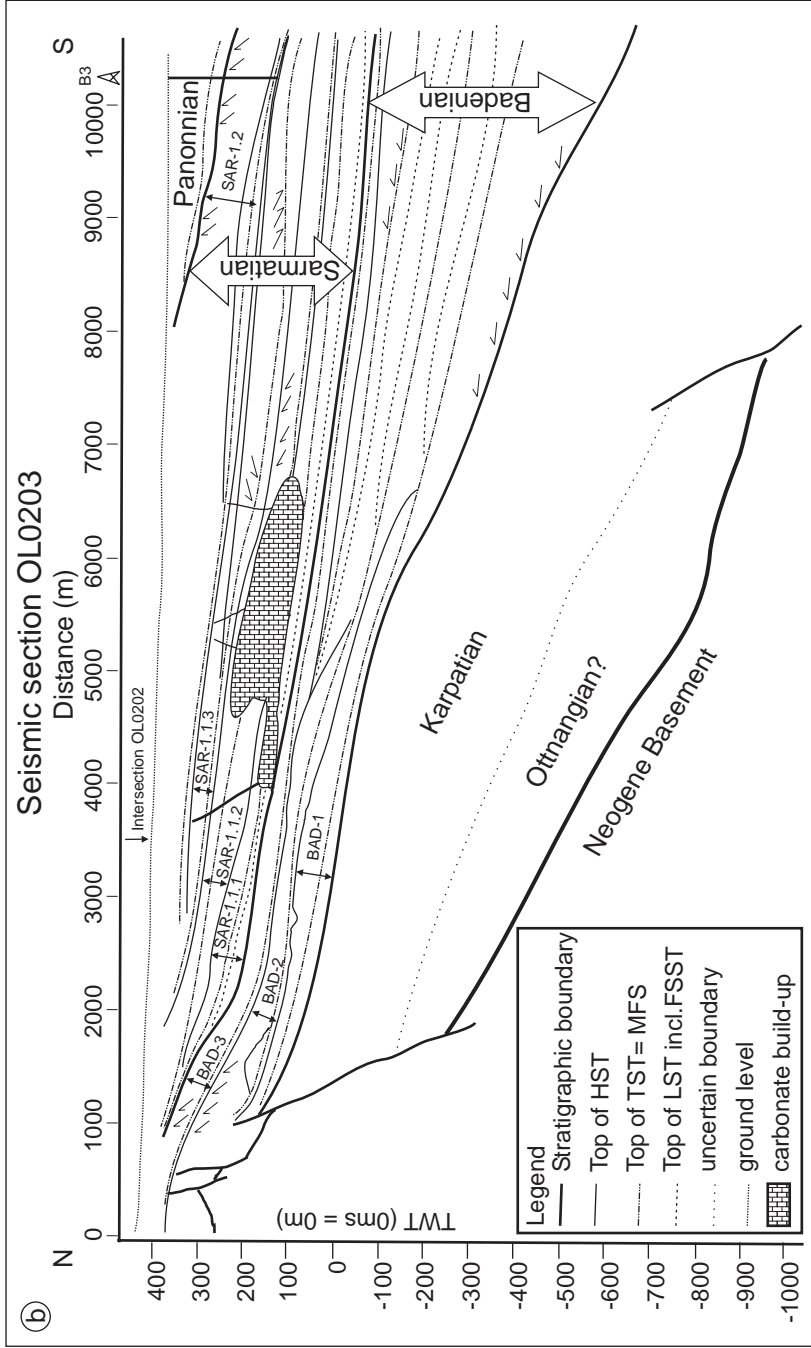


Fig. 1: b) Corresponding interpretation (cf. Fig. 1a).

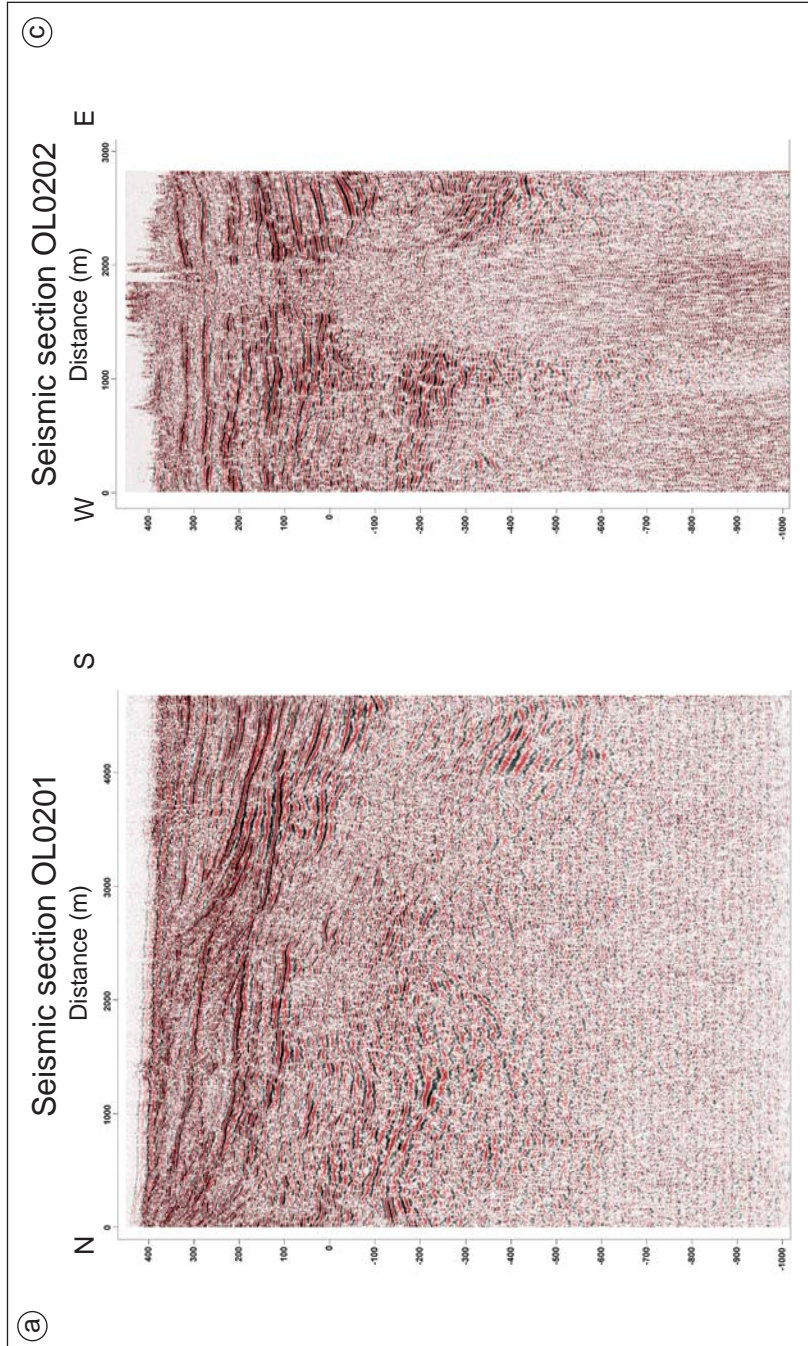


Fig. 2: a) N-S trending seismic section in the Stögersbach valley. c) E-W trending connection seismic line (both Joanneum Research).

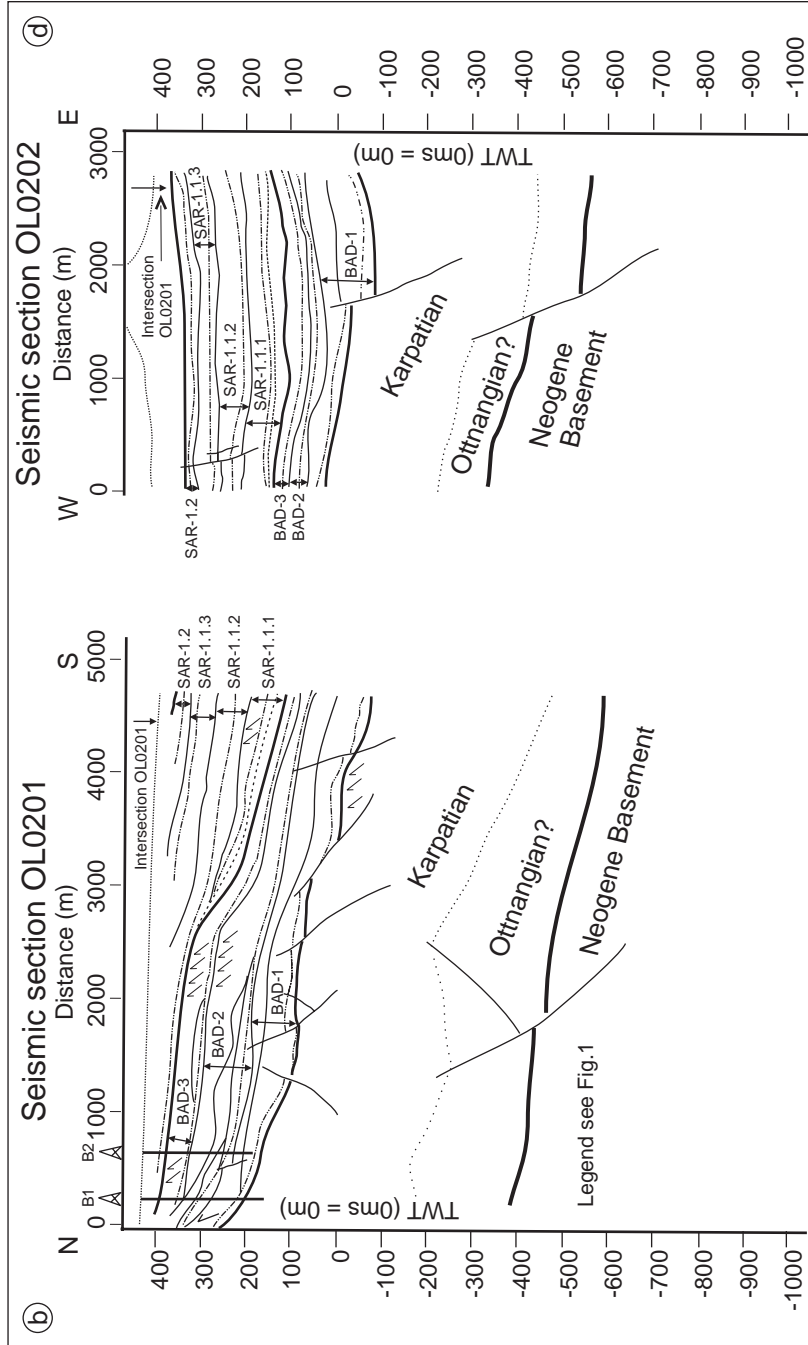


Fig. 2: b) Corresponding interpretation (cf. Fig. 2a). d) Corresponding interpretation (cf. Fig. 2c).

Thick southward prograding delta sediments occur in the southernmost part of line OLO203 near Markt Allhau (Fig. 1). They represent Upper Sarmatian sediments and can be related to the 4th order sequence with the denotation SAR-1.2 (US-2 after HARZHAUSER & PILLER 2004). An erosive surface on top of the delta sediments marks the Sarmatian/Pannonian boundary (KOSI et al. 2003).

References

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Authors address:

Marcellus G. Schreilechner
Joanneum Research
Institute of WaterResourcesManagement,
Hydrogeology and Geophysics
Roseggerstrasse 17
A-8700 Leoben
marcellus.schreilechner@joanneum.at

Reinhard F. Sachsenhofer
University Leoben
Department Applied Geosciences and Geophysics
Chair of Geology
Peter Tunnerstrasse 5
A-8700 Leoben