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Wide-angle observations of ALP 2002 shots on the TRANSALP profile: Linking the two DSS projects

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Abstract

Dynamite shots of the crustal-scale refraction seismic project ALP 2002 were recorded by an array of 40 seismological three-component stations on the TRANSALP profile. These observations provide a direct link between the two deep seismic projects. We report preliminary results obtained from these data. In a first approach, we verified the TRANSALP refraction seismic velocity model computing travel times for several shots and comparing them to the new observations. The results generally confirm this model. Significant first-break travel time differences in and near the Tauern Window are explained by anisotropy. Large-scale features of the model, particularly the Moho structure, seem to be continuous towards the east. Travel time residuals of wide-angle reflections indicate a slight eastward dip component of the Adriatic Moho.

Keywords: Crustal structure; Eastern Alps; Tauern Window; TRANSALP; ALP 2002; P-wave velocities; Refraction; Anisotropy; Moho

1. Introduction

For the purpose of connecting the two Deep Seismic Sounding (DSS) projects, we deployed 40 stations on the TRANSALP profile (TRANSALP Working Group, 2002) to observe the ALP 2002 refraction seismic shots. These stations constitute the line ALP 12 at the western border of the ALP 2002 investigation area, which is covered by a network of 13 passive lines several hundred kilometres in length (Fig. 1) (Brückl et al., 2003). TRANSALP results may therefore provide important boundary conditions for ALP 2002 models. Also, ALP 2002 may provide valuable constraints with respect to lateral variations east of TRANSALP.

Seismic images and models of the crustal structure along TRANSALP revealed large bi-vergent intracrustal shear zones related to collision, and a Moho geometry related to southward subduction of Penninic oceanic crust. These results resemble the structures found in the Central Alps in many aspects. For a discussion of these deep seismic studies see e.g. Pfiffner (1992), Schmid et al. (1996), TRANSALP Working Group (2002), Lippitsch et al. (2003), Kummerow et al. (2004), Bleibinhaus and Gebrande (2005—this issue) and references therein.

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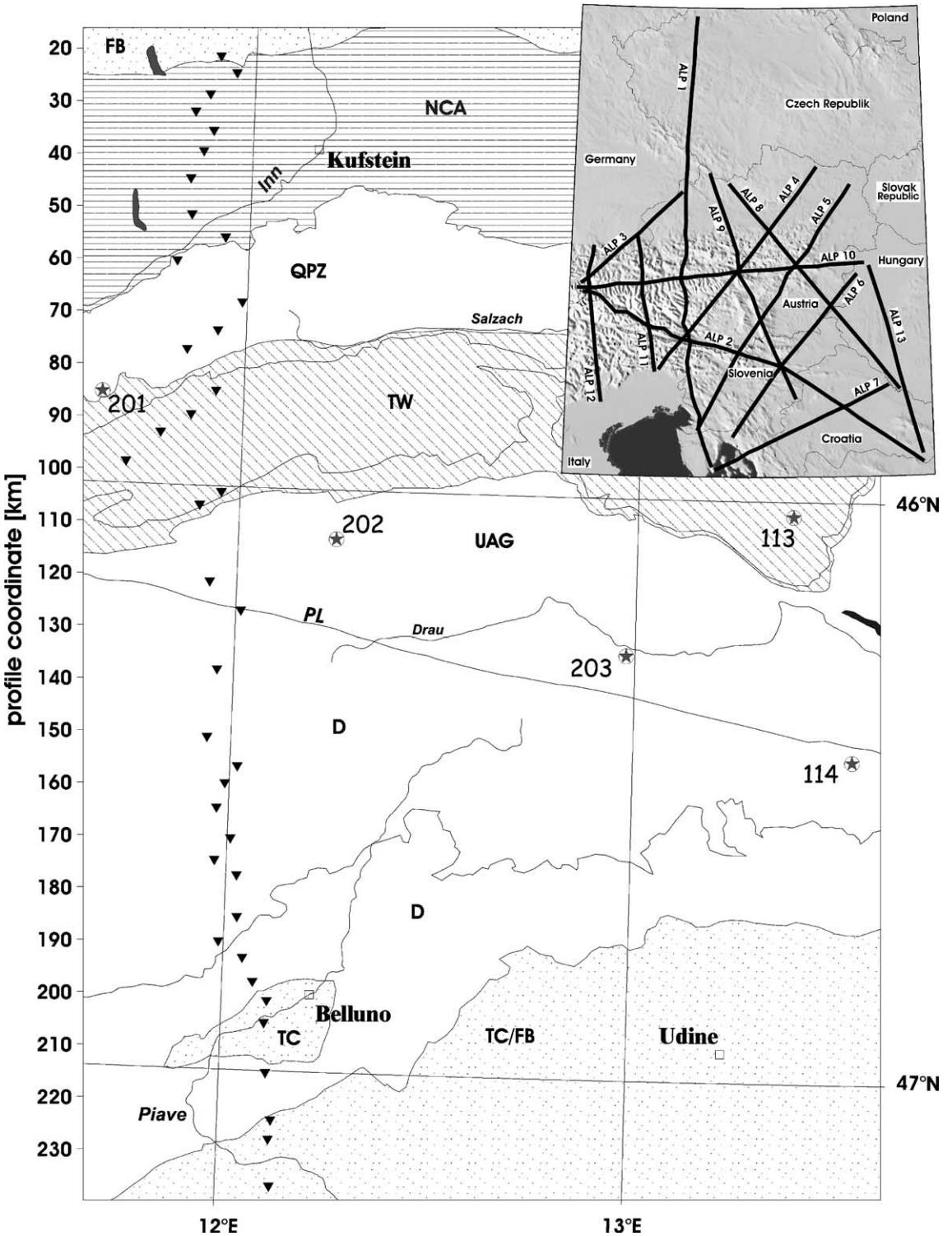

Fig. 1. Map of ALP 2002 seismic sources (★) used in this investigation and ALP12/TRANSALP three-component stations (▼). The inset displays all ALP 2002 receiver lines. FB—Foreland Basin, NCA—Northern Calcareous Alps, QPZ—Quartzphyllite Zone, TW—Tauern Window, UAG—Upper Austroalpine gneisses, D—dolomites, TC—Tertiary clastics, PL—Periadriatic Lineament.