**Study area and seismic stations**

Our study area is the Eastern Alps-Carpathian-Pannonian Basin region, where a dense seismological network allows a detailed analysis of the crust mantle boundary. The Pannonian Basin is a geologically complex extensional back-arc-basin in Central Europe (Fig. 1). The Moho discontinuity is generally at shallow depth (20-35 km) in the Pannonian Basin as a result of a Miocene extensional event (Hovhannisyan et al. 2006). However, the Eastern Alps and Carpathians are characterized by deeper Moho (35-50 km) and a more complex lithospheric structure. In recent years the permanent networks became denser and several temporary deployment campaigns, such as the Carpathian Basin Project (CBP), the South Carpathian Project (SCP) and the AlpArray experiment (Hetényi et al. 2018a) took place. Thus, we used the data of 221 seismological stations for the receiver function analysis.

**Event selection**

- Teleseismic earthquakes
- 28–35° epicentral distances
- Magnitudes larger than 5.5
- Broadband three-component waveforms filtered between 0.1 and 1 Hz
- 3 year 3 months of data from the AlpArray temporary network
- 2 years data from CBP and SCP stations for the Hungarian and other permanent stations we used all available data since they entered operations up until March 31 2019

**Quality control**

We applied three quality control methods. The first (QC1) was an STA/LTA detector with detection threshold 3.5. The second (QC2) was performed in time window 30 s before and 90 s after the first-arriving P wave. Waveforms with a signal-to-noise ratio above threshold were accepted (Hetényi et al. 2018b). The last quality control method (QC3) was performed on calculated receiver functions. Receiver functions were rejected as poor quality if the Ps peak below threshold. We tried to keep only the best receiver functions for the further processing methods.

**Table 1. Number of seismograms with downloading QC1, QC2 and QC3**

<table>
<thead>
<tr>
<th>QC1</th>
<th>QC2</th>
<th>QC3</th>
</tr>
</thead>
<tbody>
<tr>
<td>454.089</td>
<td>240.828</td>
<td>71.255</td>
</tr>
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</table>

**Event selection**

Teleseismic earthquakes for the receiver function analysis we used the iterative time domain deconvolution (Ligoria and Ammon, 1999) with 150 iterations. Fig. 3. shows the stacked receiver functions of PB2 section. P, Ps and PpPs multiples are clearly visible in the Pannonian Basin, but we can identify only P and Ps peaks in the Pannonian Basin in the most cases. Fig. 4. presents the radial and transversal receiver functions at PSZ and BUD station. Owing to the automatic detection of the P and Ps peaks are clearly visible in all azimuthal ranges.

**Migrated P-to-S receiver function cross-sections for lines a, PB1 and b, PB2.**

The dotted green lines show the migrated depth of Moho beneath each station from H-K grid search method. The dotted orange lines show the interpolated depth of Moho from the H-K method. We present a preliminary Moho map from 1D H-K grid search interpolation, and compare it with that of Grad et al. (2009). We expect to produce a more detailed map in the future.

**Migrated common conversion point (CCP) receiver functions**

We performed common conversion point (CCP) migration to image the Moho depth beneath the Pannonian Basin independently from the H-K analysis. We defined two profiles, the first from the Eastern Alps to the Southern Carpathians (PB1) and the second section from the Dinarides to the Western Carpathians (PB2). Fig. 1. shows the locations of migrated cross-sections.

**H-K Grid search method**

We performed the H-K grid search method (Zhu and Kanamori, 2000) for the accepted receiver functions. We set different initial Vp velocity for each station, depending on the sedimentary cover. We set the weights of P, Ps, PpPs and PpPs-PpPs separately for each station (Kalmar et al. 2019). The Moho is between 35 and 50 km in the studied area. The extent of the red area (86% of the peak) around the maximum (star) is the uncertainty for the uncertainty.

**Moho map**

We present a preliminary Moho map from 1D H-K grid search interpolation, and compare it with that of Grad et al. (2009). We expect to produce a more detailed map in the future.