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PKiKP/PcP amplitude ratios interpreted in terms of core-mantle boundary reflecting properties

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Ever since its first successful application 40 years ago, the PKiKP/PcP amplitude ratio has become a powerful tool to study the Earth's core. In particular, it has allowed estimating physical parameters of substances compounding both core boundaries along with their topography. However, lack of amplitude ratios measured after the steepest reflections is still a challenge mostly because amplitudes of such narrow angle reflections are tiny. We present 108 pairs of individual measurements of PKiKP and PcP waveforms recorded at Asian three component stations and arrays after two deep Pamir earthquakes. The ratios are evenly distributed in the range of epicentral distances from 7 to 30 degrees, come only from measuring PKiKP and PcP waveforms whose signal-to-noise ratio was increased by bandpass frequency filtering and include no upper bound amplitude estimates on the base of the noise level. The detected waveforms with signal-to-noise ratio above 1.5 show low travel time residuals with PREM and ak135. Measured amplitude ratios generally follow the predicted decay trend with distance growth, but exhibit a significant scatter between 15 and 19 degrees. The statistical and error analysis of the observed PKiKP, PcP and PKiKP/PcP amplitude dependence on the epicentral distance indicates the scatter is apparently due to PcP measurements. And in terms of core-mantle boundary reflecting properties this can be explained by a zero in PcP amplitude near 17 degrees and the phase change of PcP. This interpretation, however, makes the relevant density jump on the core-mantle boundary inconsistent with standard Earth models.