



On the reliability of PKIKP phase identification at a single station

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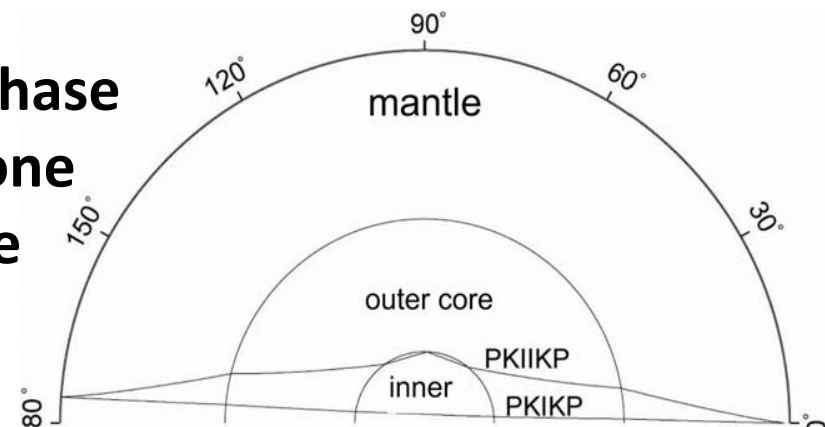
Moscow, Russia

Motivation

Correct identification of the PKIKP phase is necessary to study the contact zone between the inner and outer core

Tasks

- 1. To estimate the effect of S and P waves velocity variations in the upper mantle and inner core on the amplitudes of PKIKP wave**
- 2. To offer more reliable way for PKIKP phase identification**



Method (Zhao, Chevrot, 2011)

Relationship between relative amplitude and relative velocity perturbation

$$\delta \ln A = \iiint_{\oplus} K_{V_p}^A \left(\frac{\delta V_p}{V_p} \right) d^3 \mathbf{x}$$

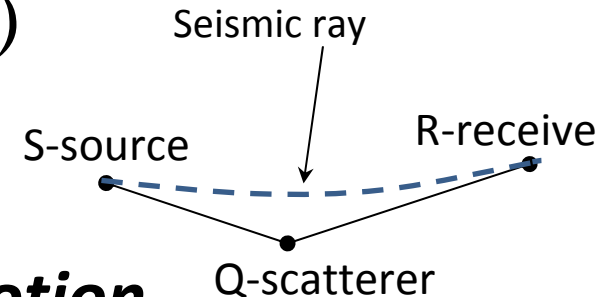
$$\delta \ln A = \iiint_{\oplus} K_{V_s}^A \left(\frac{\delta V_s}{V_s} \right) d^3 \mathbf{x}$$

Amplitude full-wave Frechet kernels

$$K_{V_{P(S)}}^A = f(V_{P(S)}^Q, \rho_Q, \nabla^Q F(\nabla^S G), \nabla^R G)$$

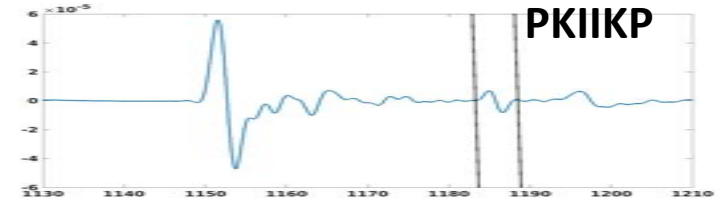
G – Green tensor,

fundamental solution of equation of motion



$$\rho \partial_t^2 \mathbf{G} - \nabla \cdot [\boldsymbol{\Lambda} : \nabla \mathbf{G}] = \mathbf{I} \delta(\mathbf{r} - \mathbf{r}_s) \delta(t - t_s)$$

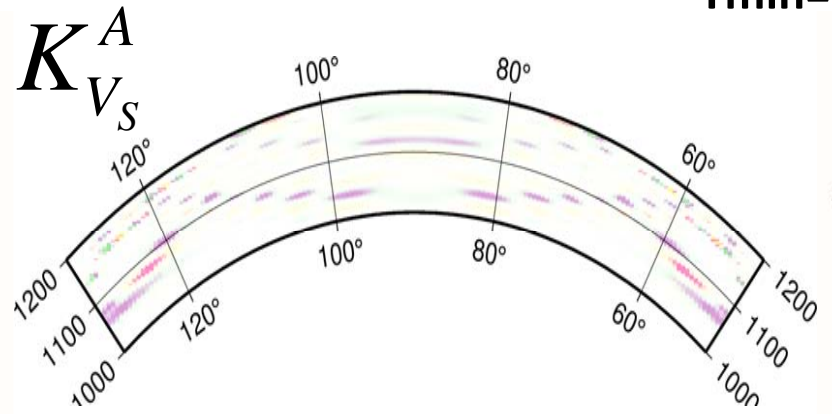
Results for PKIKP by using DSM Kernel Suite (Fuji et al., 2012)



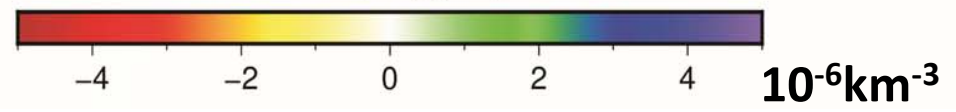
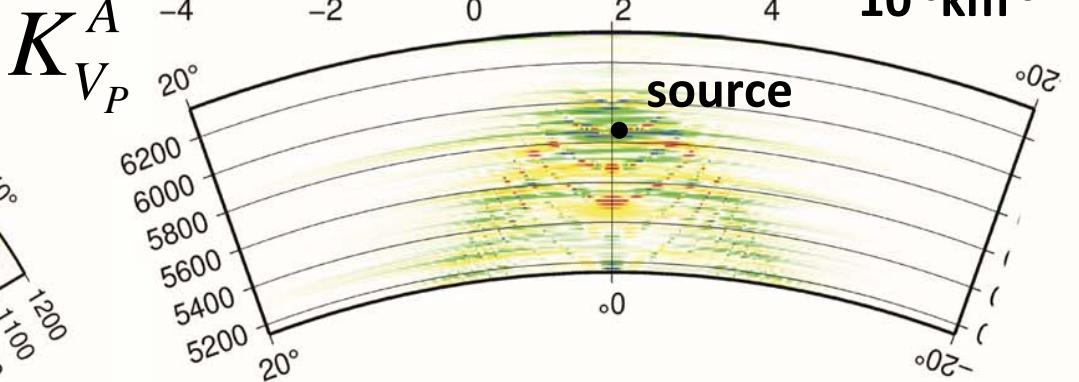
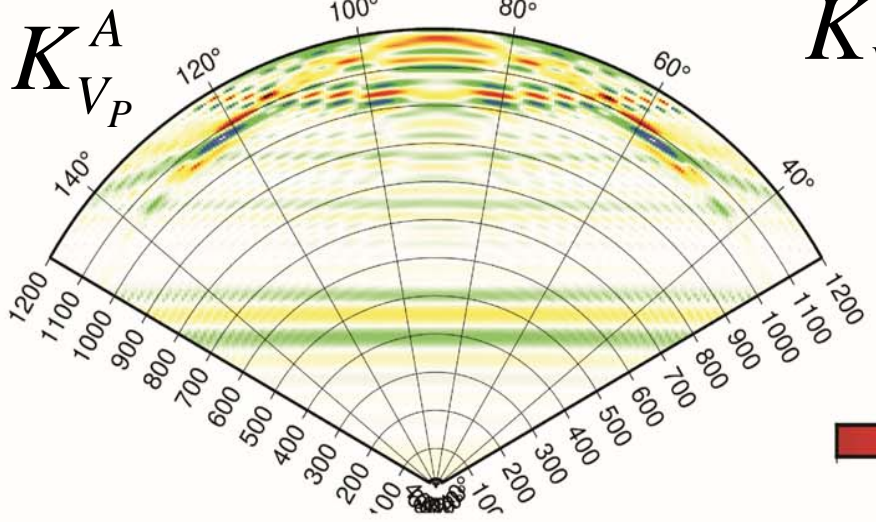
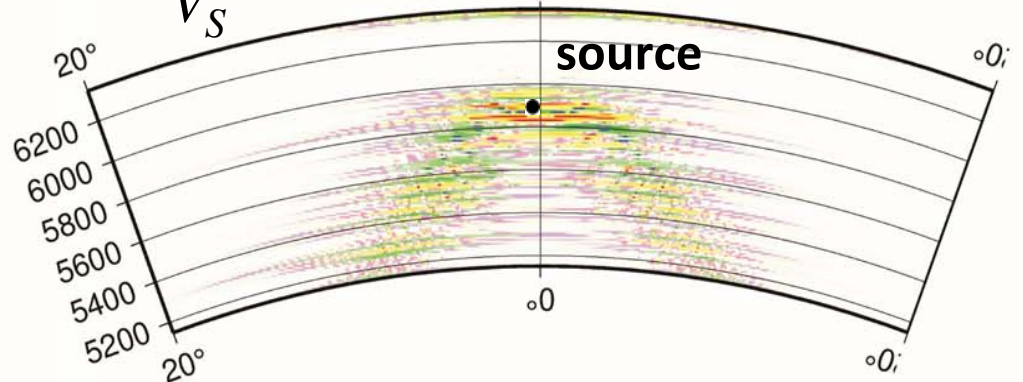
$\Delta=180^\circ$

$T_{min}=1.2s$

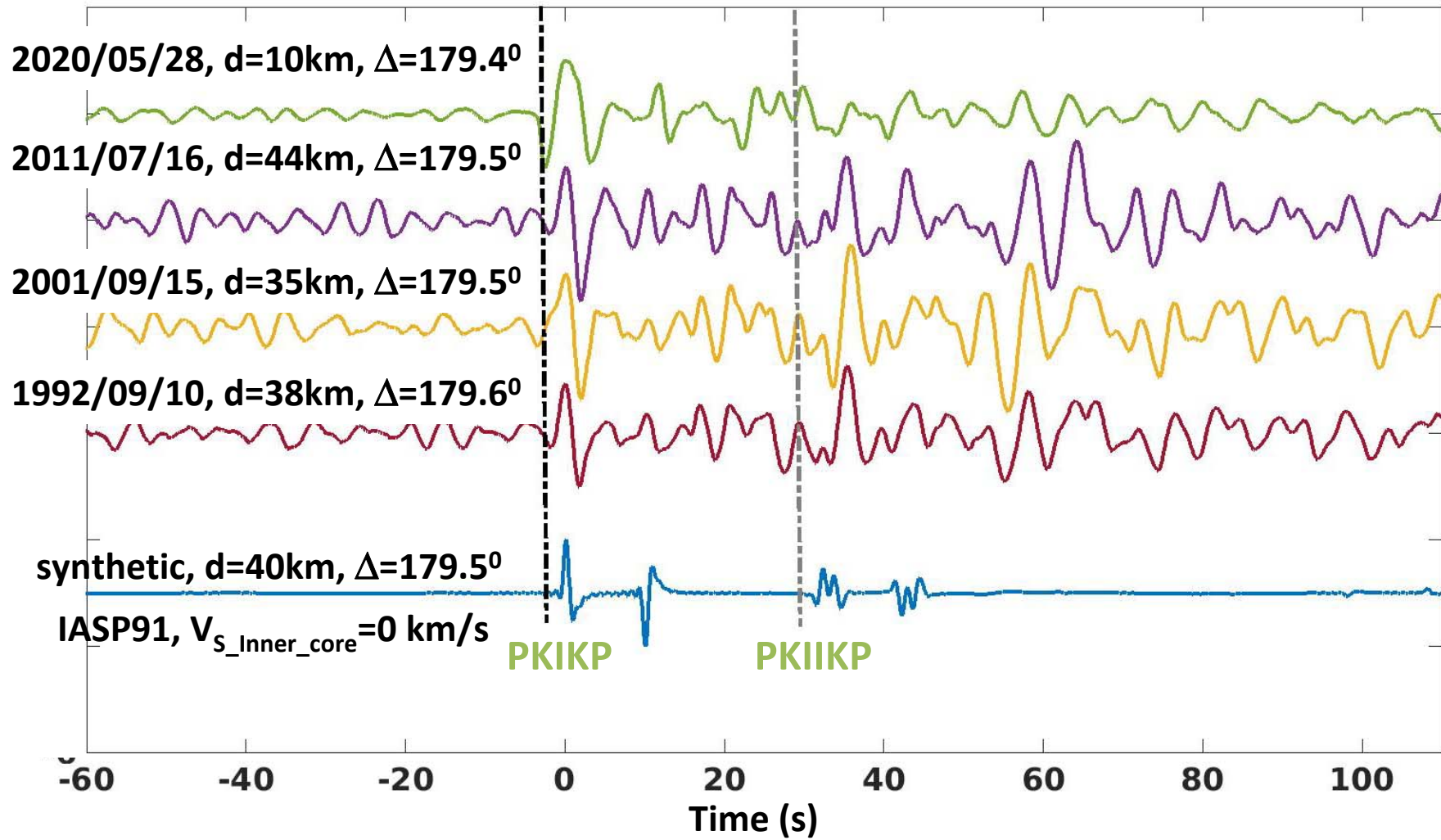
Inner core



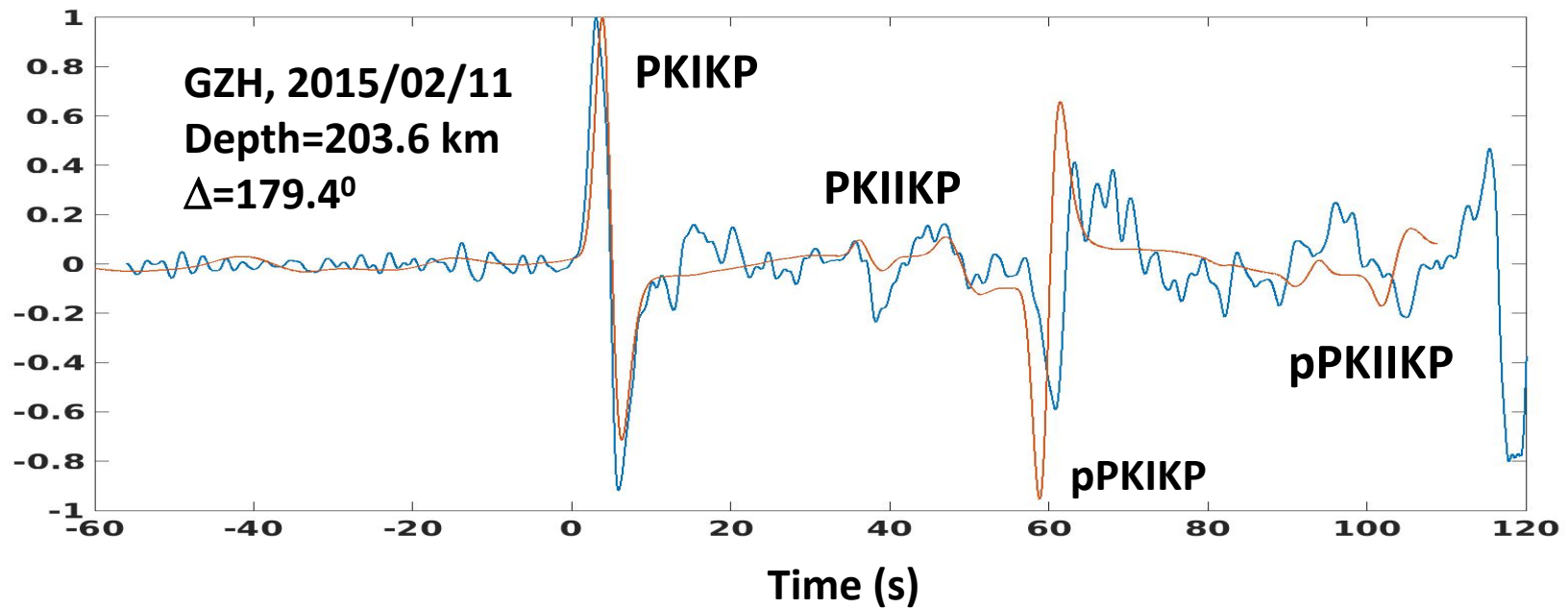
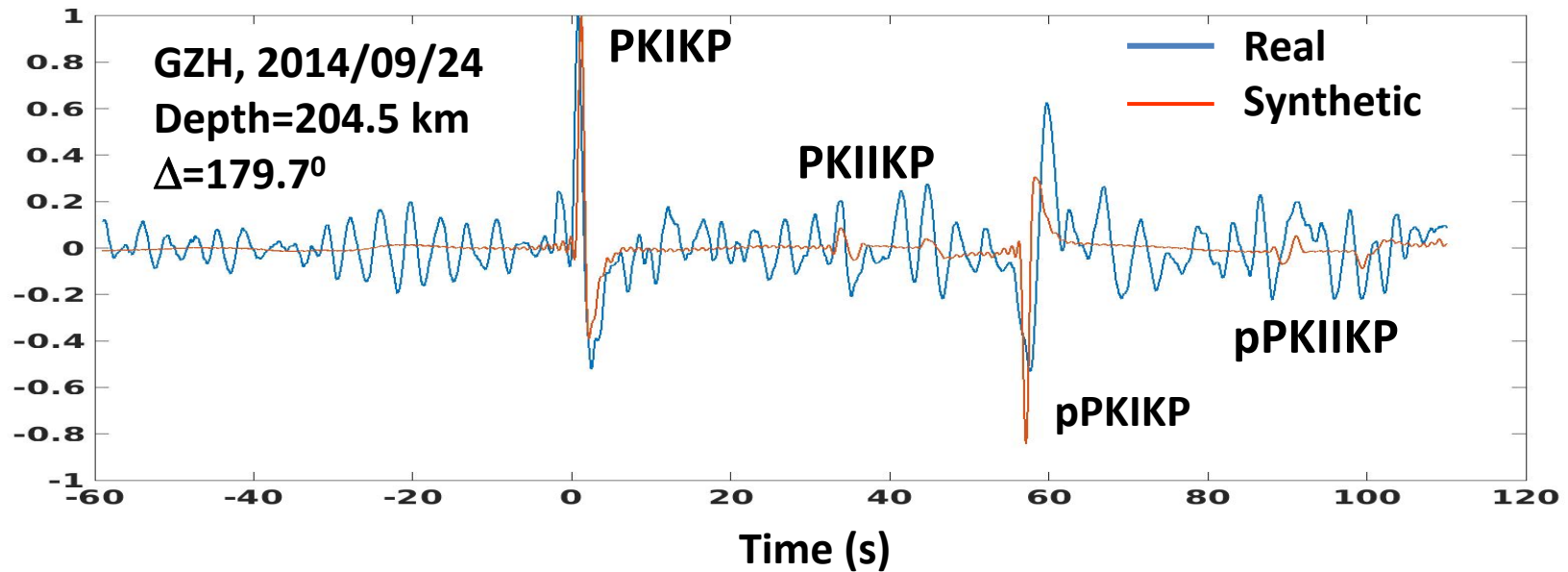
Upper mantle



Observations on the TAM station



Observations of PKIKP and pPKIKP



Conclusions

- 1. We calculated *Frechet* kernels for upper mantle and inner core, noting more strong influence of mantle heterogeneities in PKIKP amplitude**
- 2. We revealed records with PKIKP and pPKIKP arrivals**
- 3. The reliability of the PKIKP phase identification can be improved by means of information about the pPKIKP waves and compare the observed seismograms with synthetic ones**