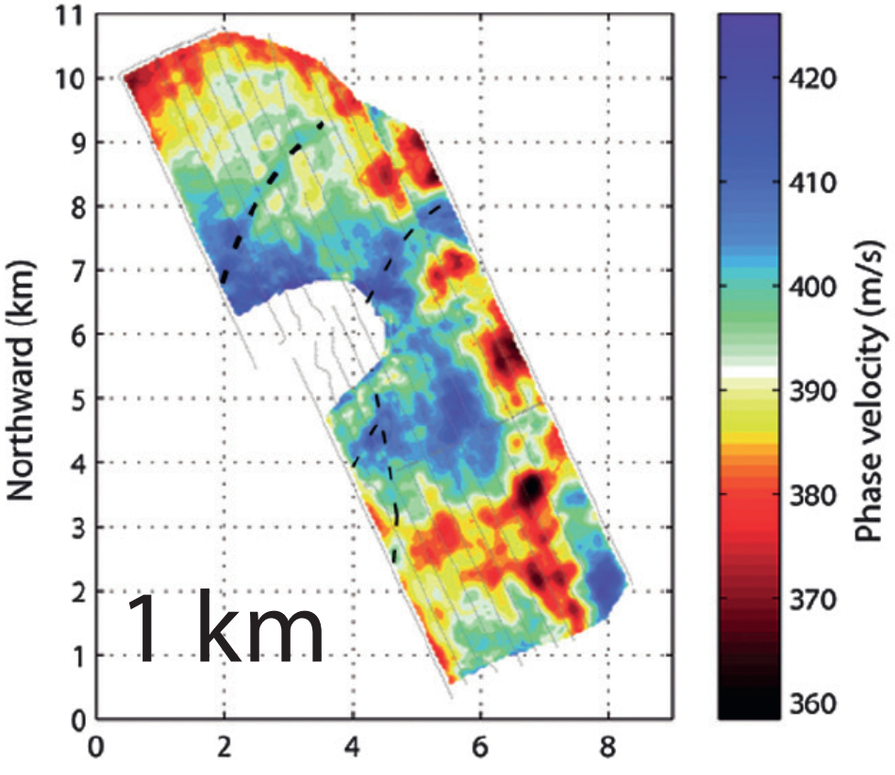
Earth Imaging using Body Waves extracted from Teleseismic Noise Correlations

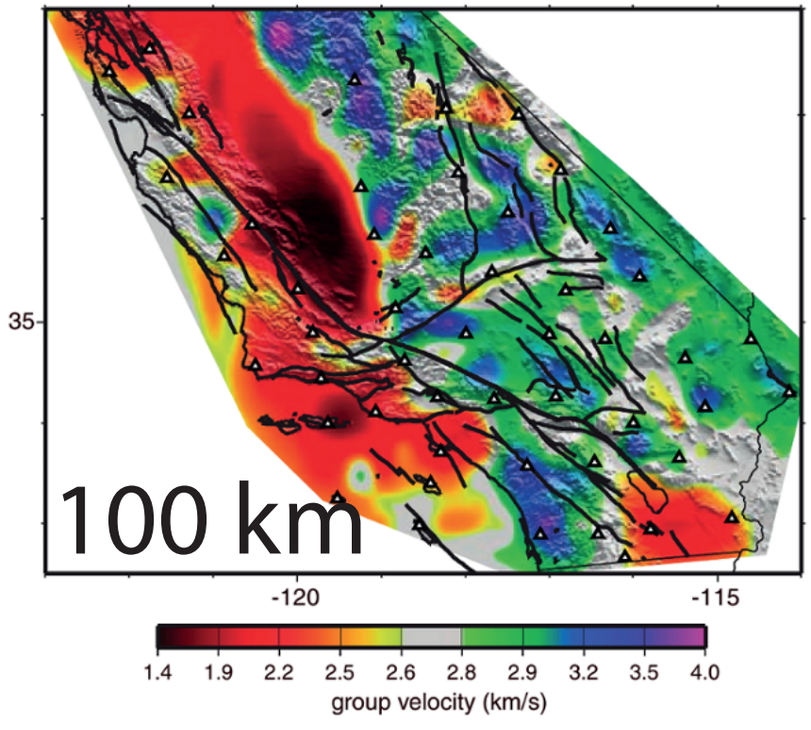
Lise Retailleau, Pierre Boué, Lei Li, Michel Campillo

Imaging using surface waves

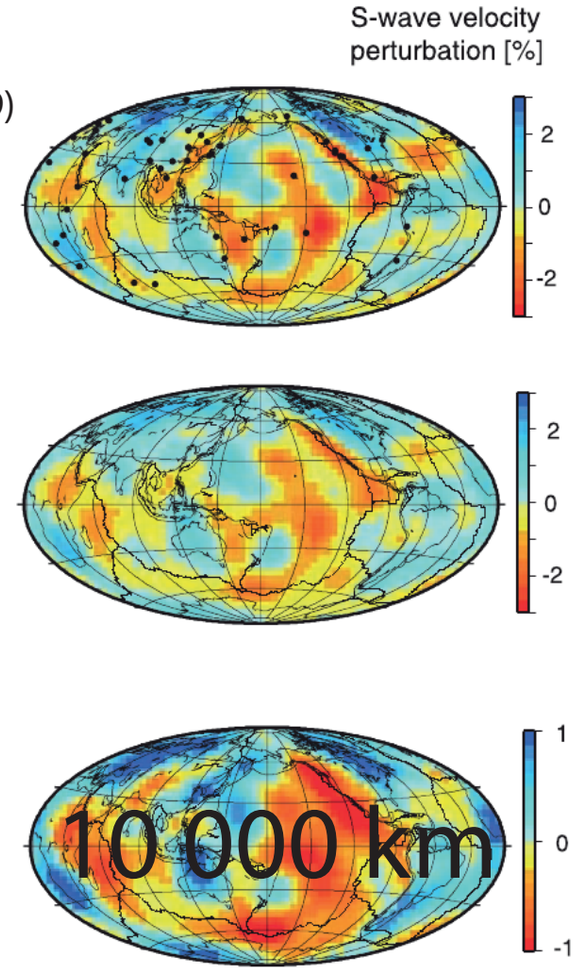
Mordret et al. (2013)



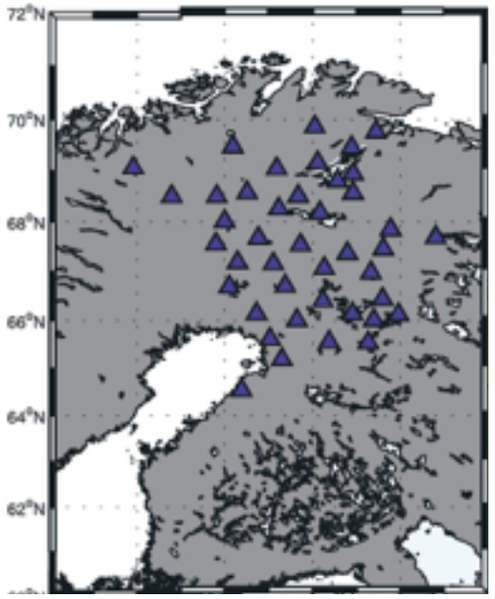
Shapiro et al. (2005)



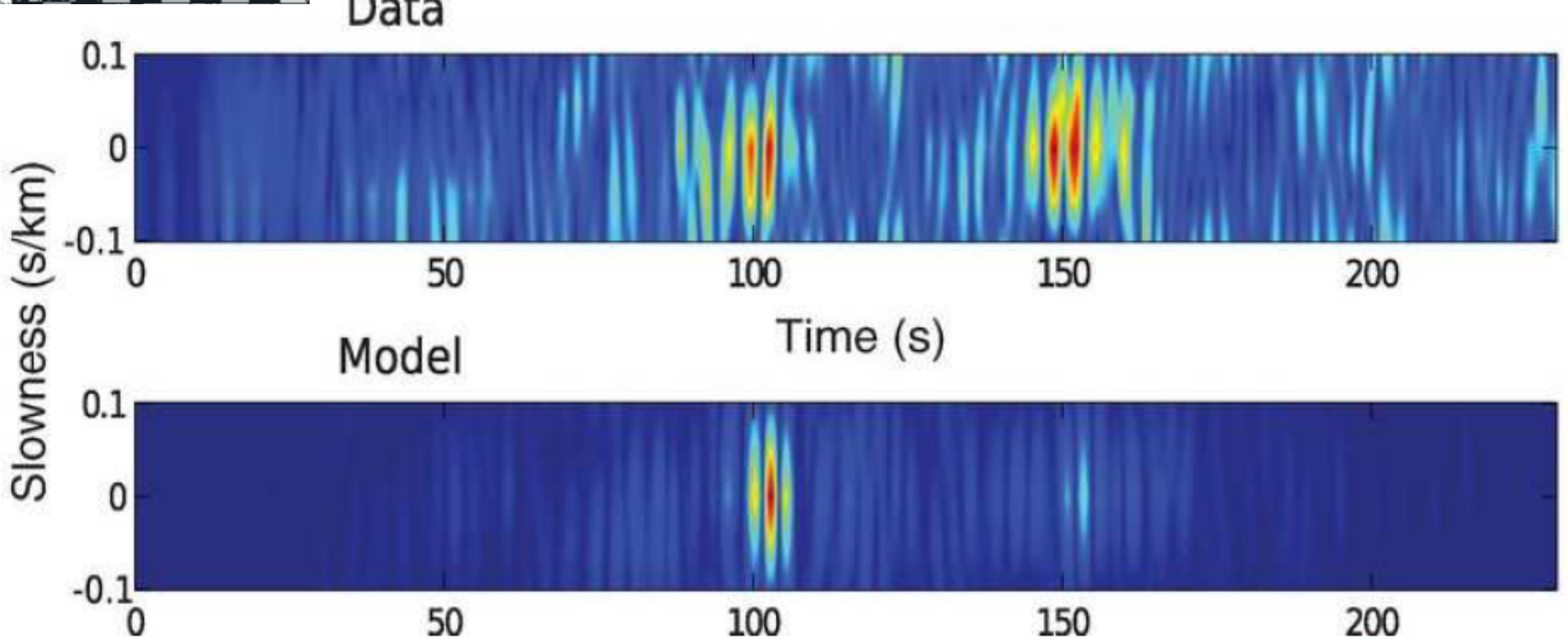
Nishida et al. (2009)



Extraction of body waves from correlations

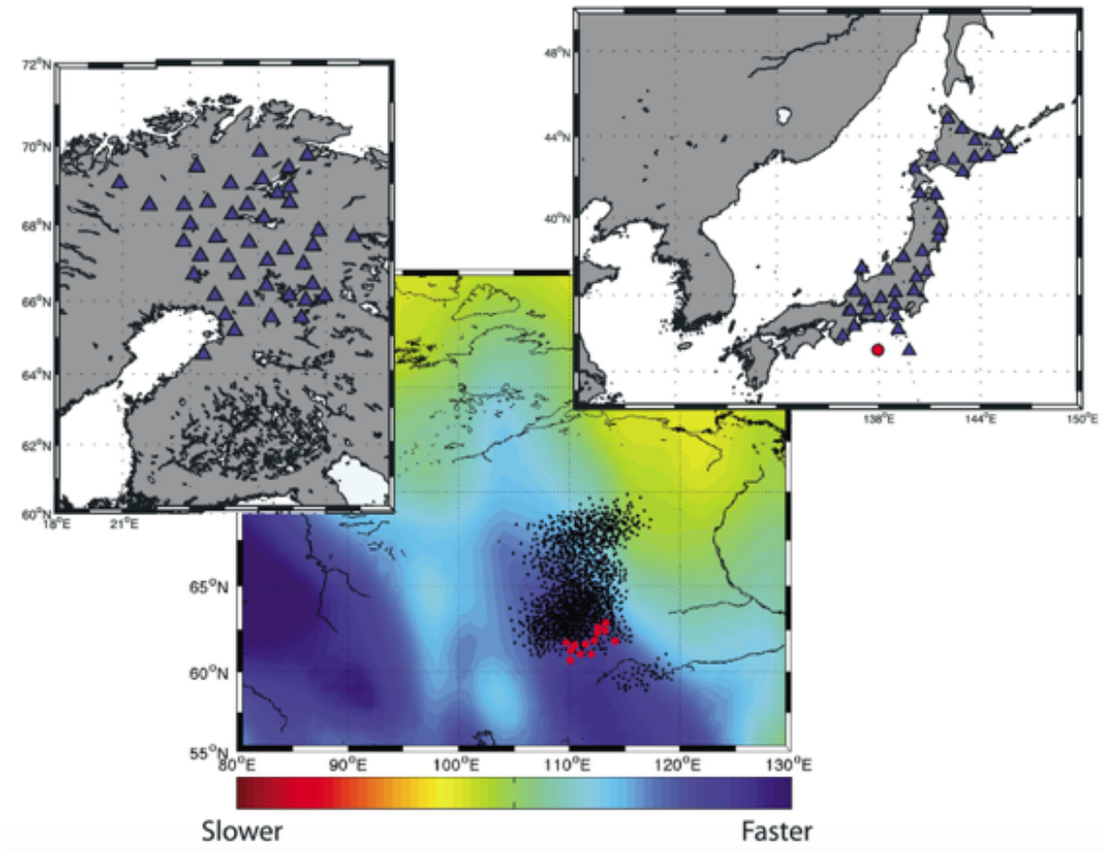


P reflection at 410 and 660km

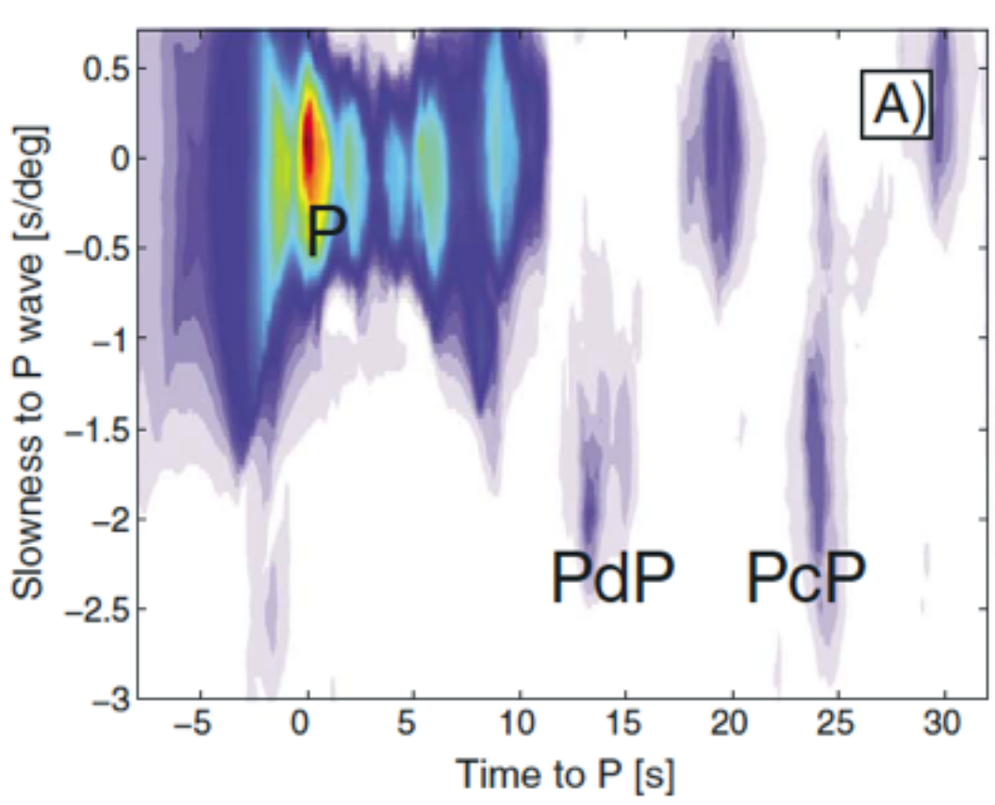


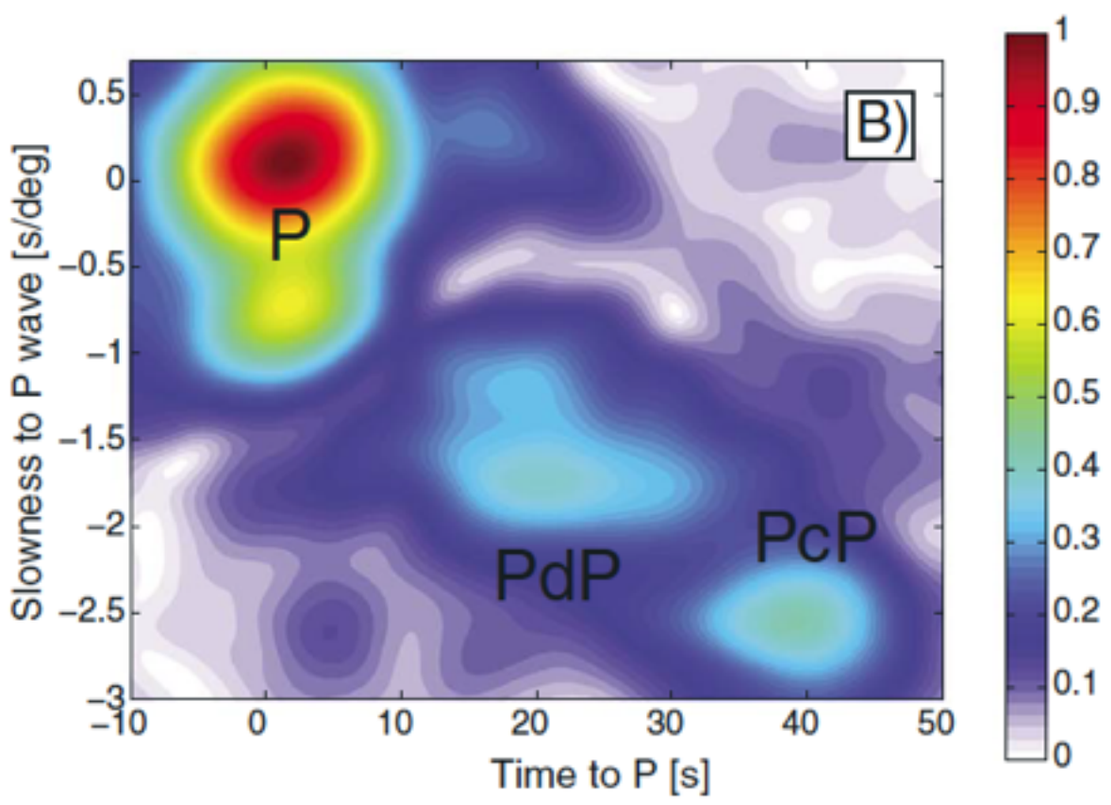
Poli et al 2012b

Extraction of body waves from correlations



Vespagram analysis

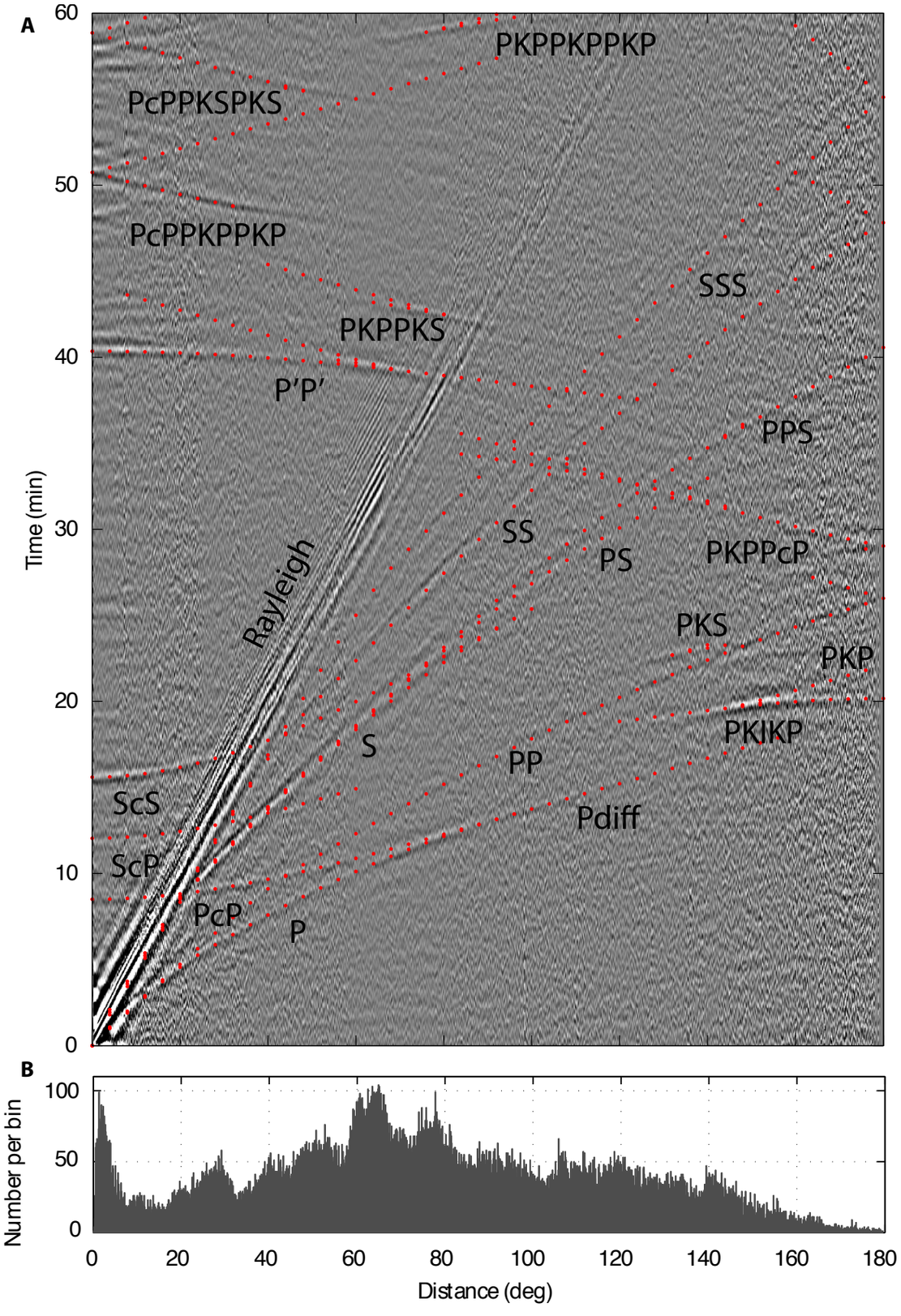


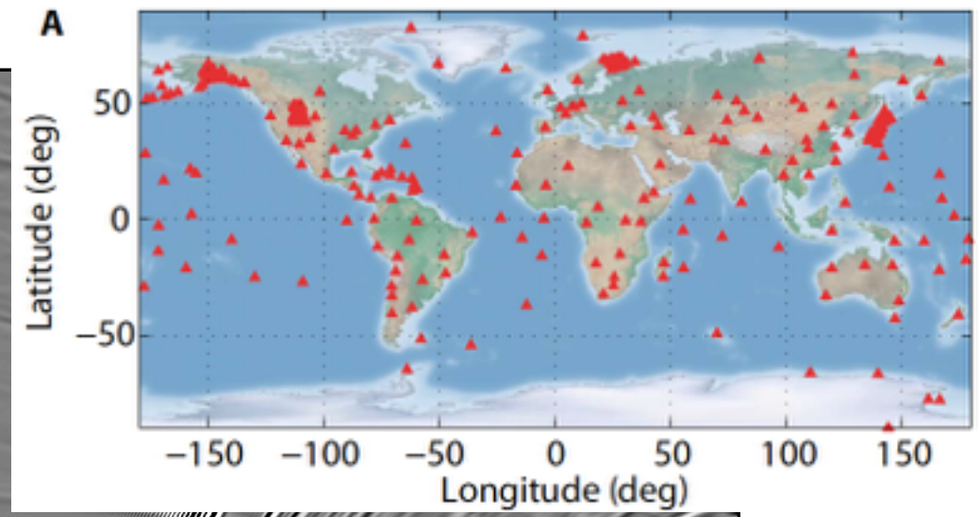


Poli et al 2015

Teleseismic body waves at global scale

25-100 seconds



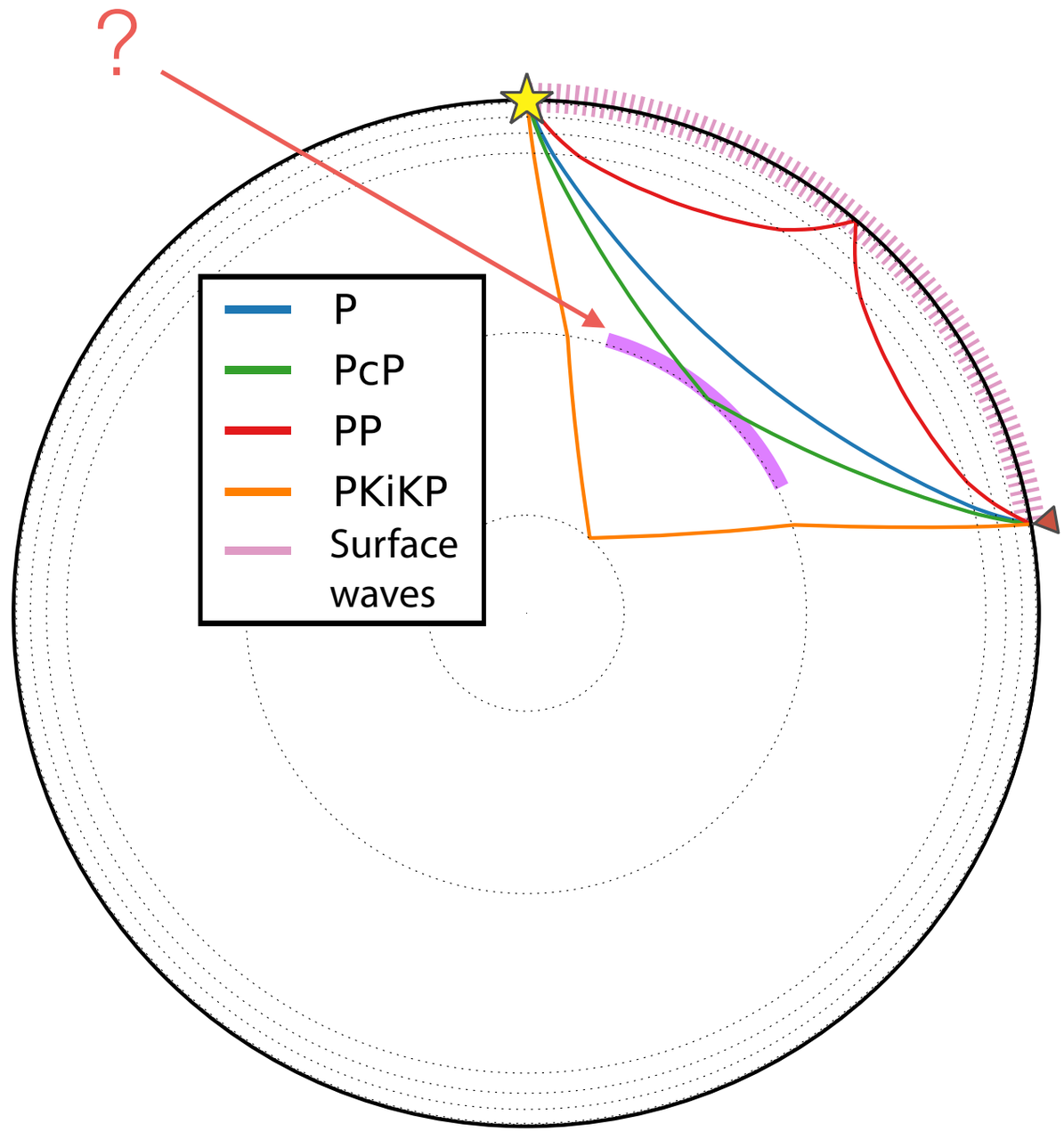


Bins of 0.1 degree

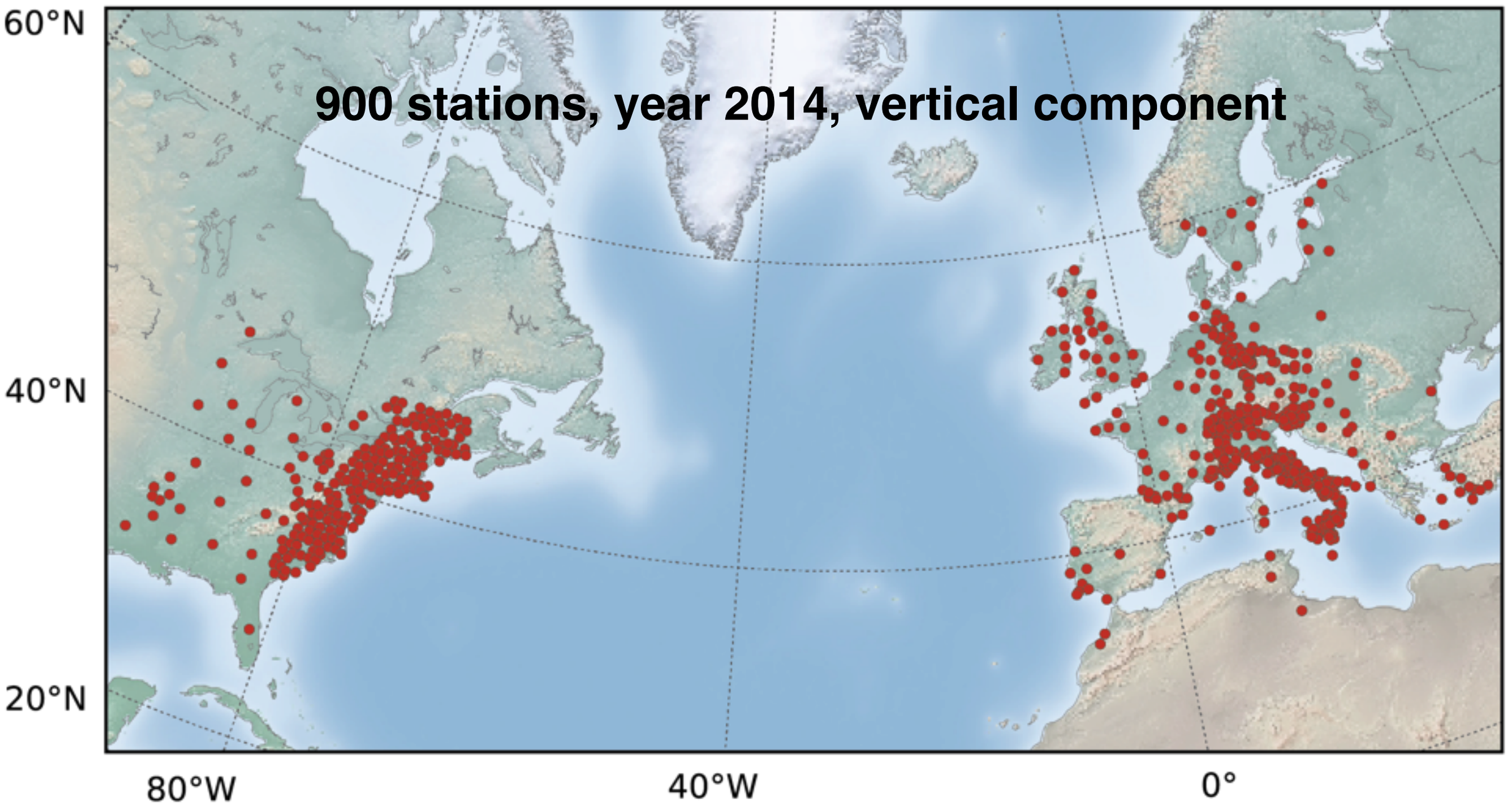
Boué et al. (2013)

Teleseismic body waves extracted from correlations
Regional scale

Imaging with body waves

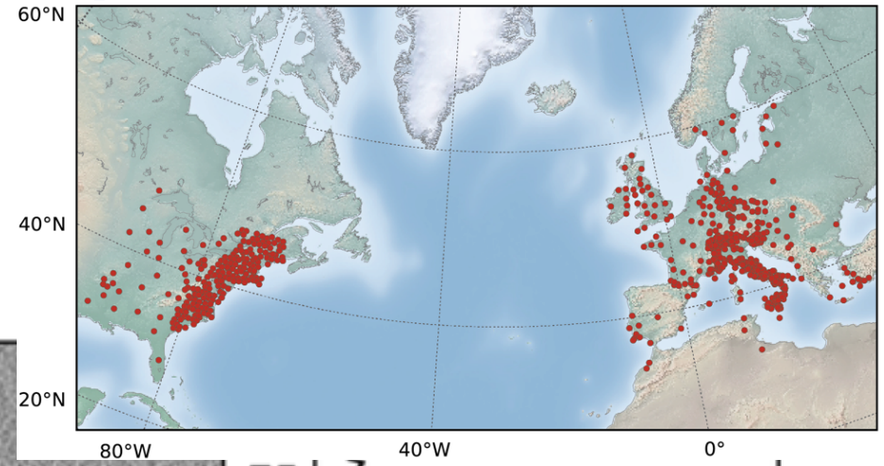


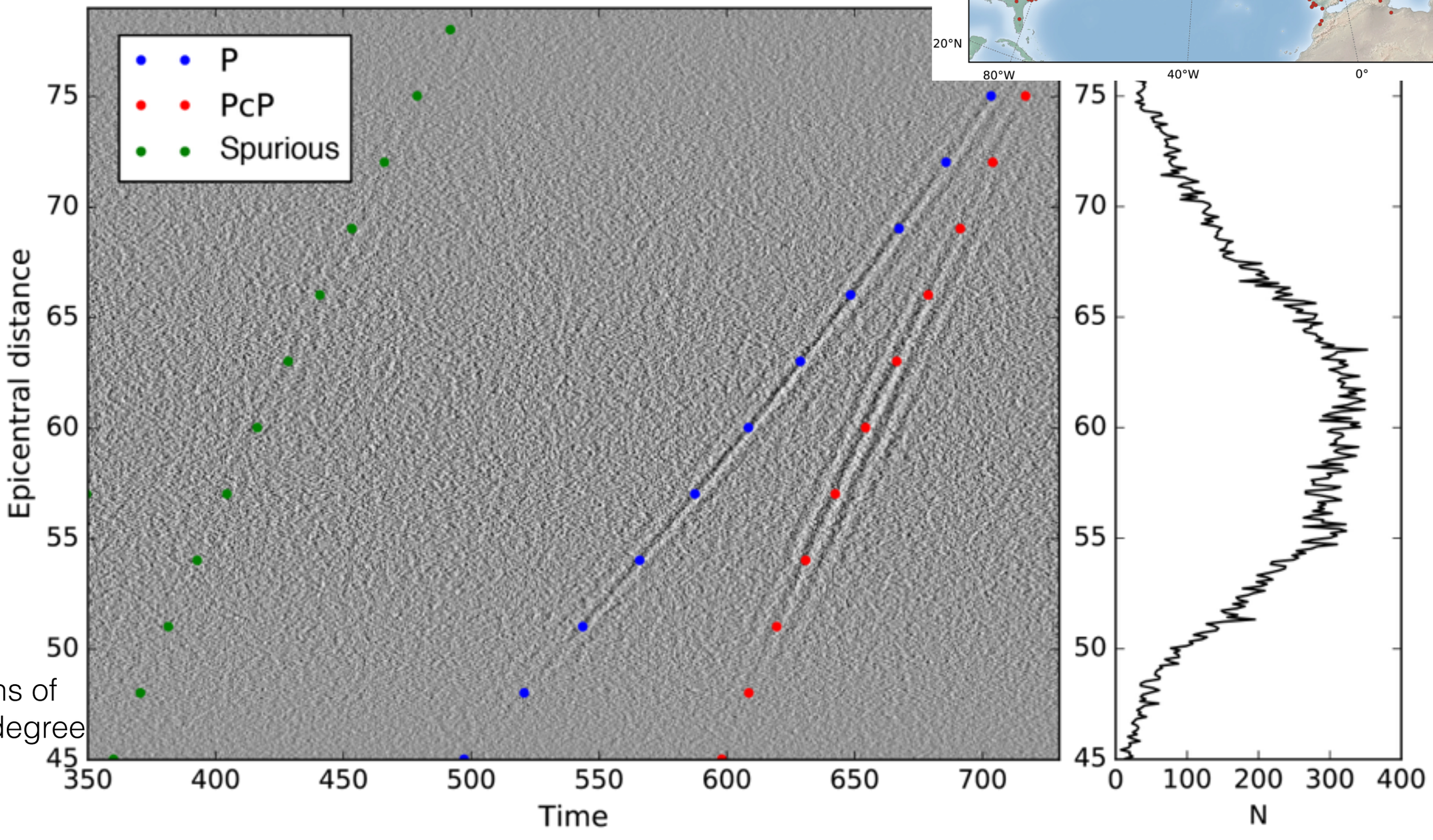
Core Mantle Boundary Imaging Underneath the North Atlantic Ocean Dataset



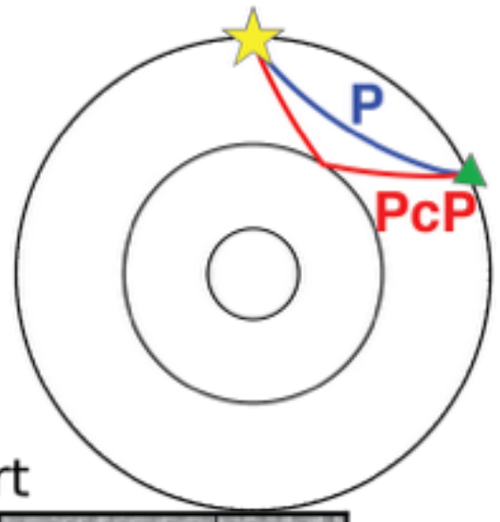
Correlations computed between Europe and the US

1-10sec of period

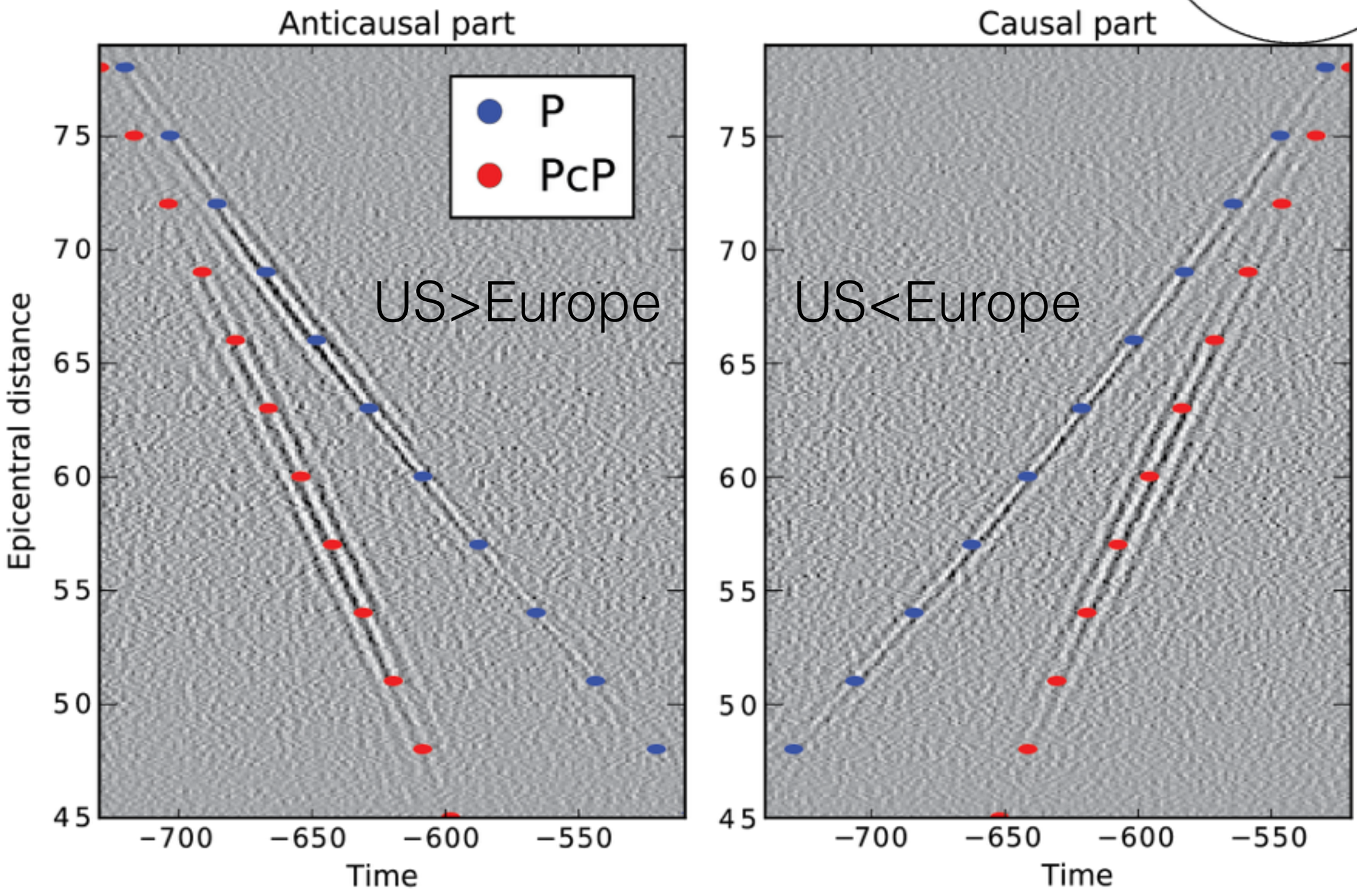




Correlations computed between Europe and the US

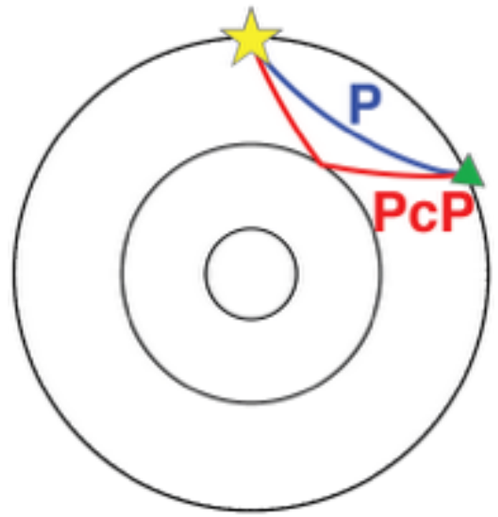


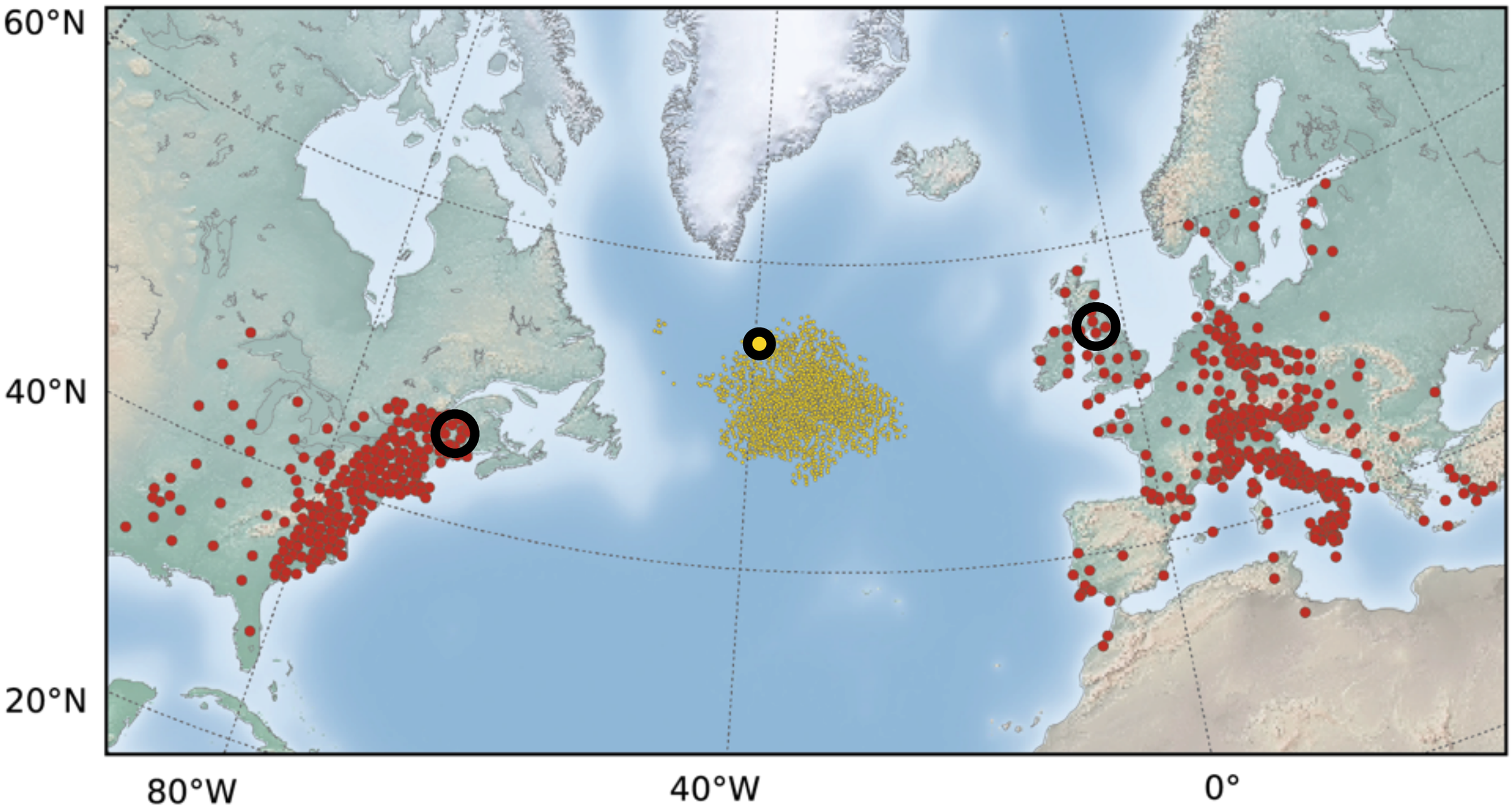
3-8sec of period



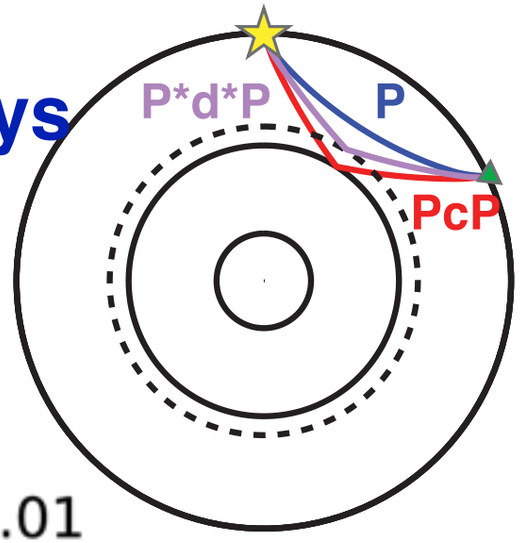
Imaging process:

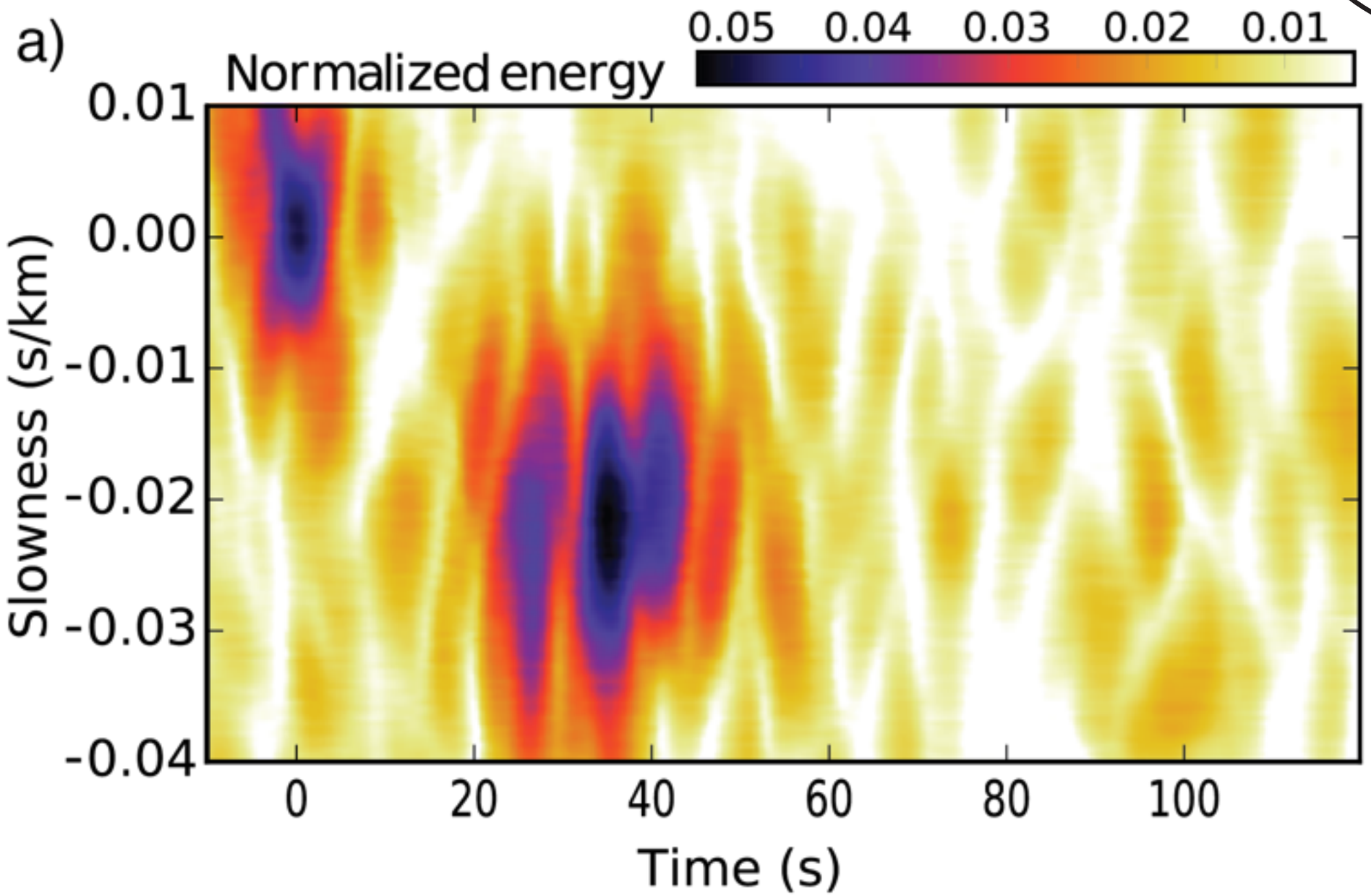
Construction of sub-arrays
Array analysis
on at least 150 stations per reflection point





Imaging process:
Vespagram for each combination of sub-arrays





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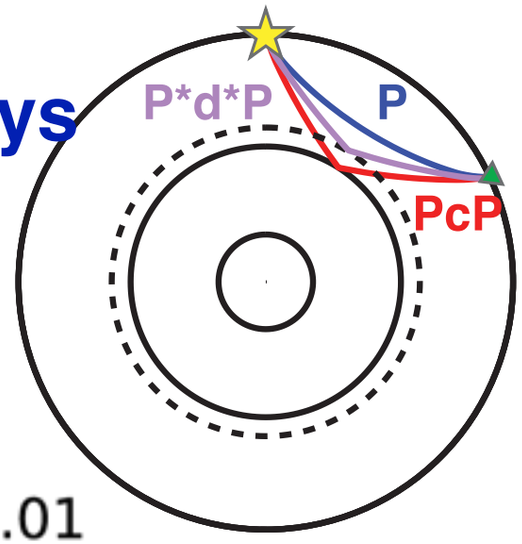
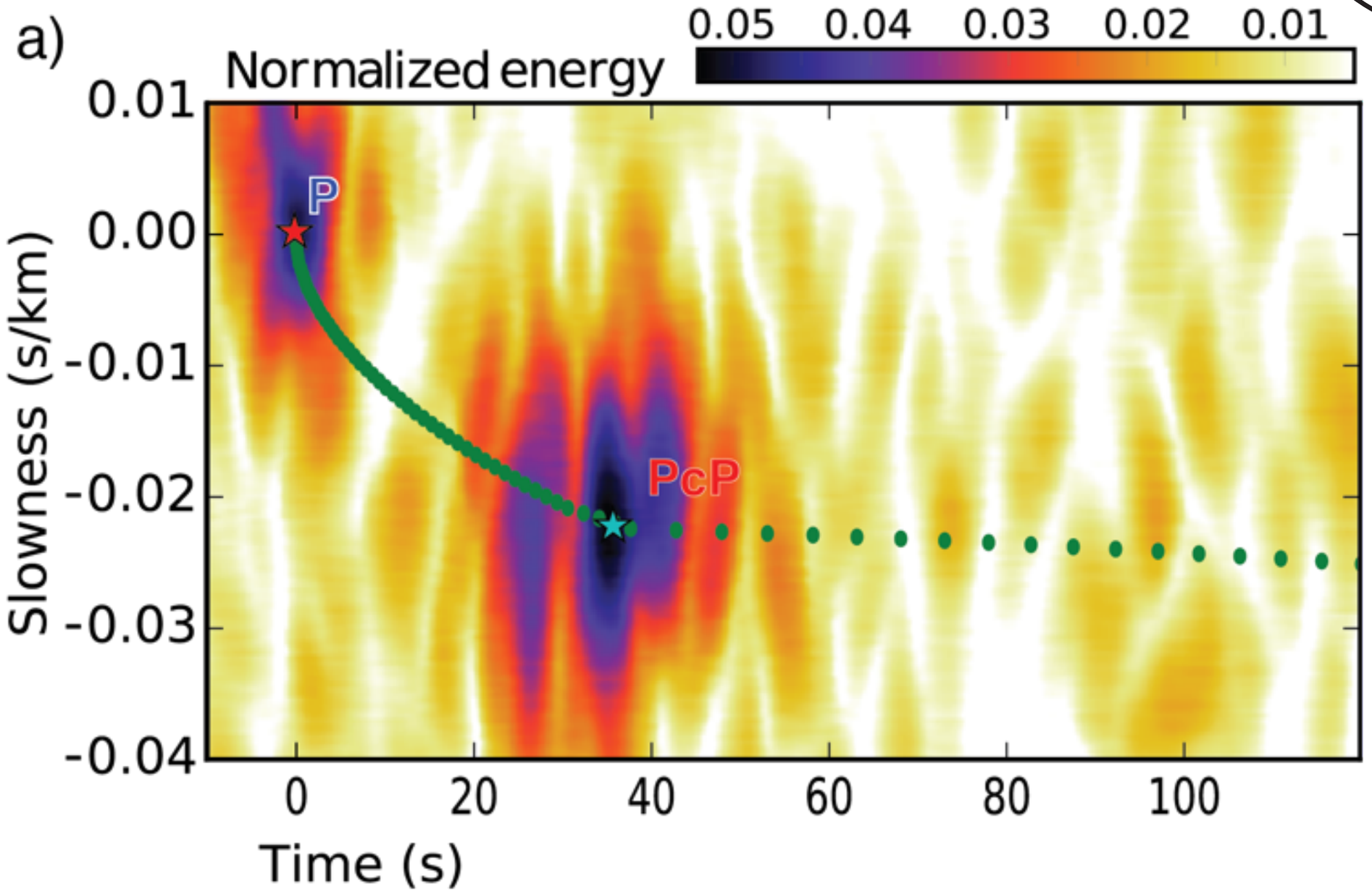


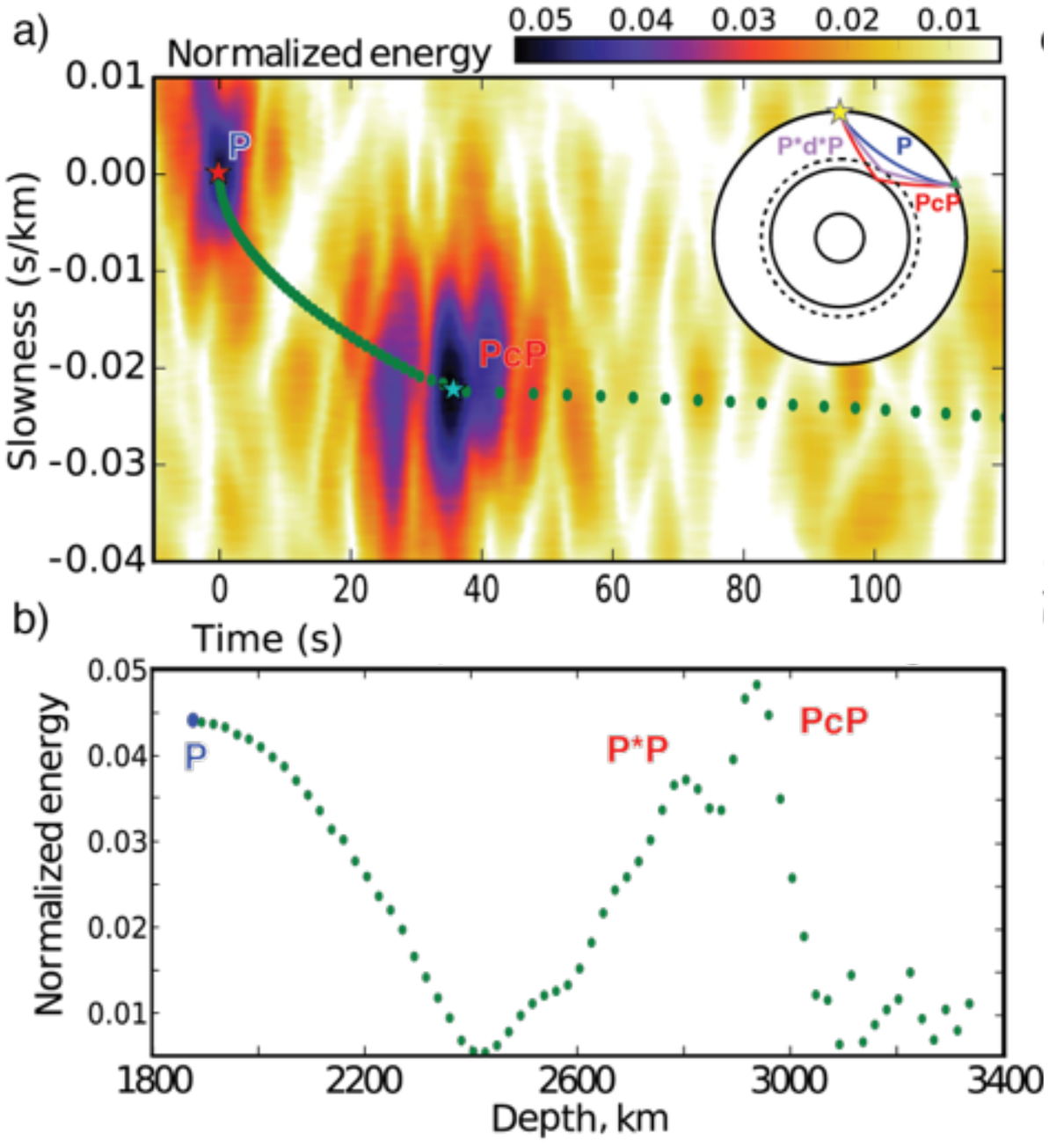
Vespagram(time,slowness)



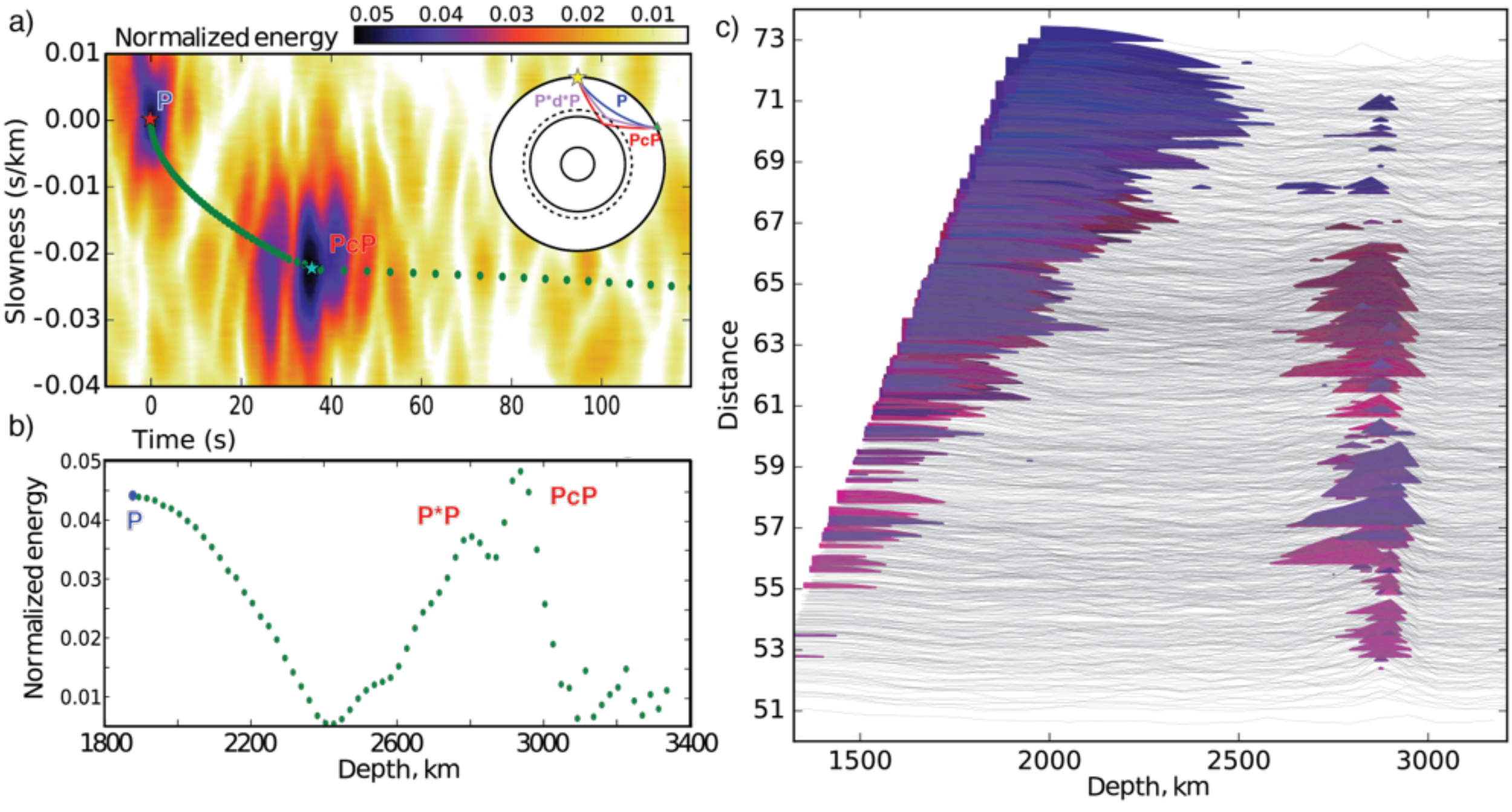
(time,slowness)
from
Crotwell et al 1999
Buland and Chapman
1983

Vespagram for each combination of sub-arrays

Vespagram(time,slowness)>Vespagram(depth)

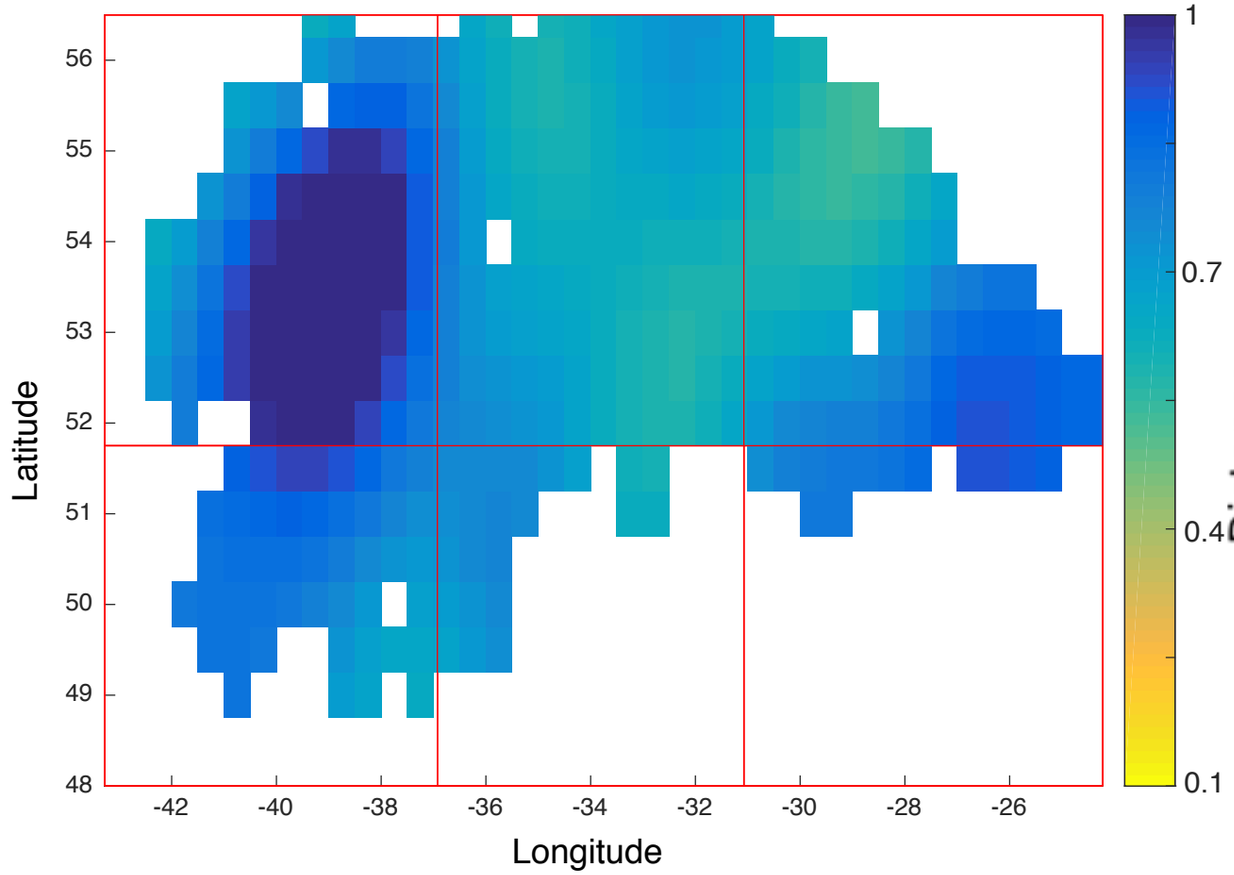


Vespagram(Depth) for each combination of sub-arrays

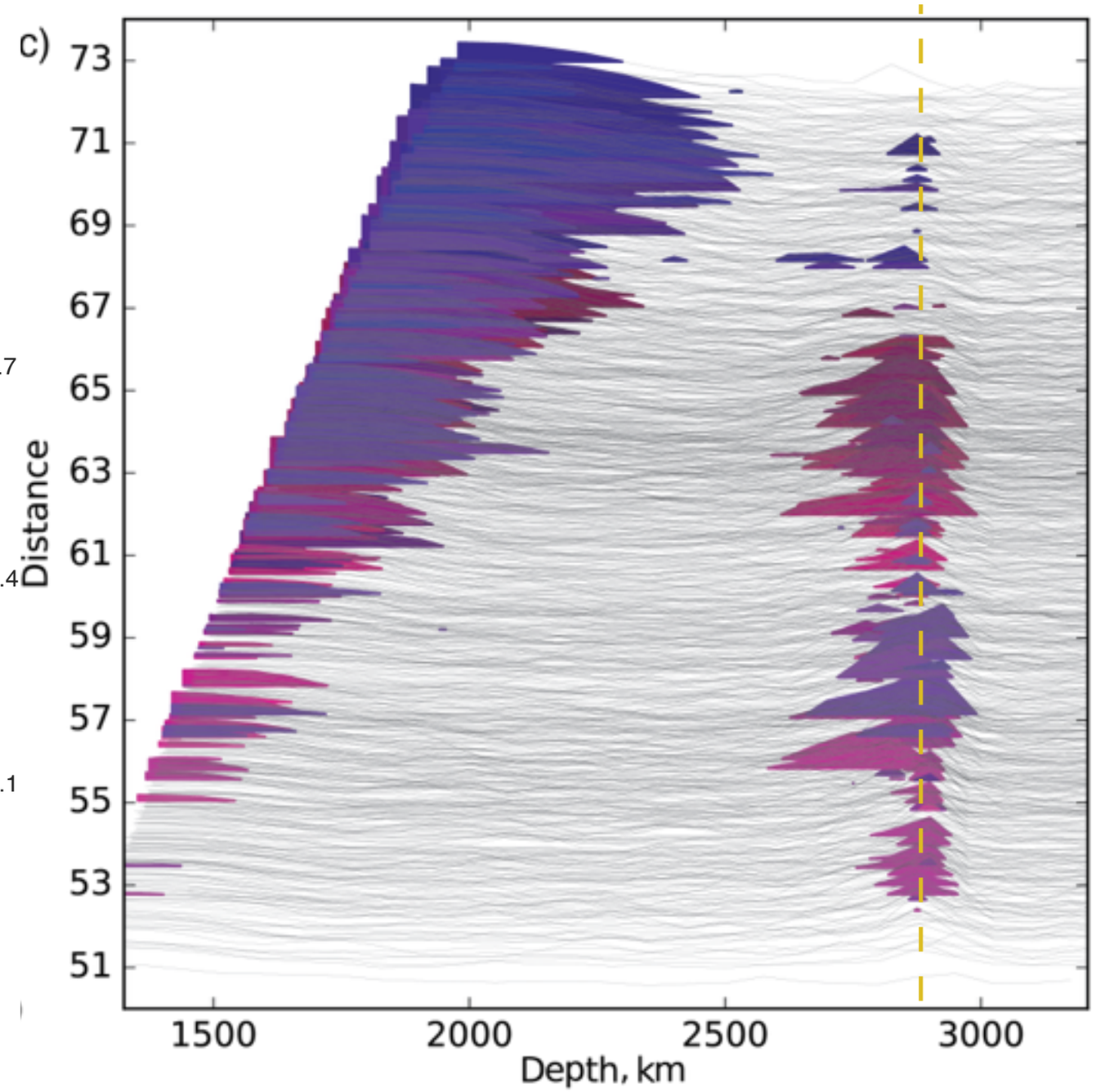


Vespagram(Depth) for each combination of sub-arrays

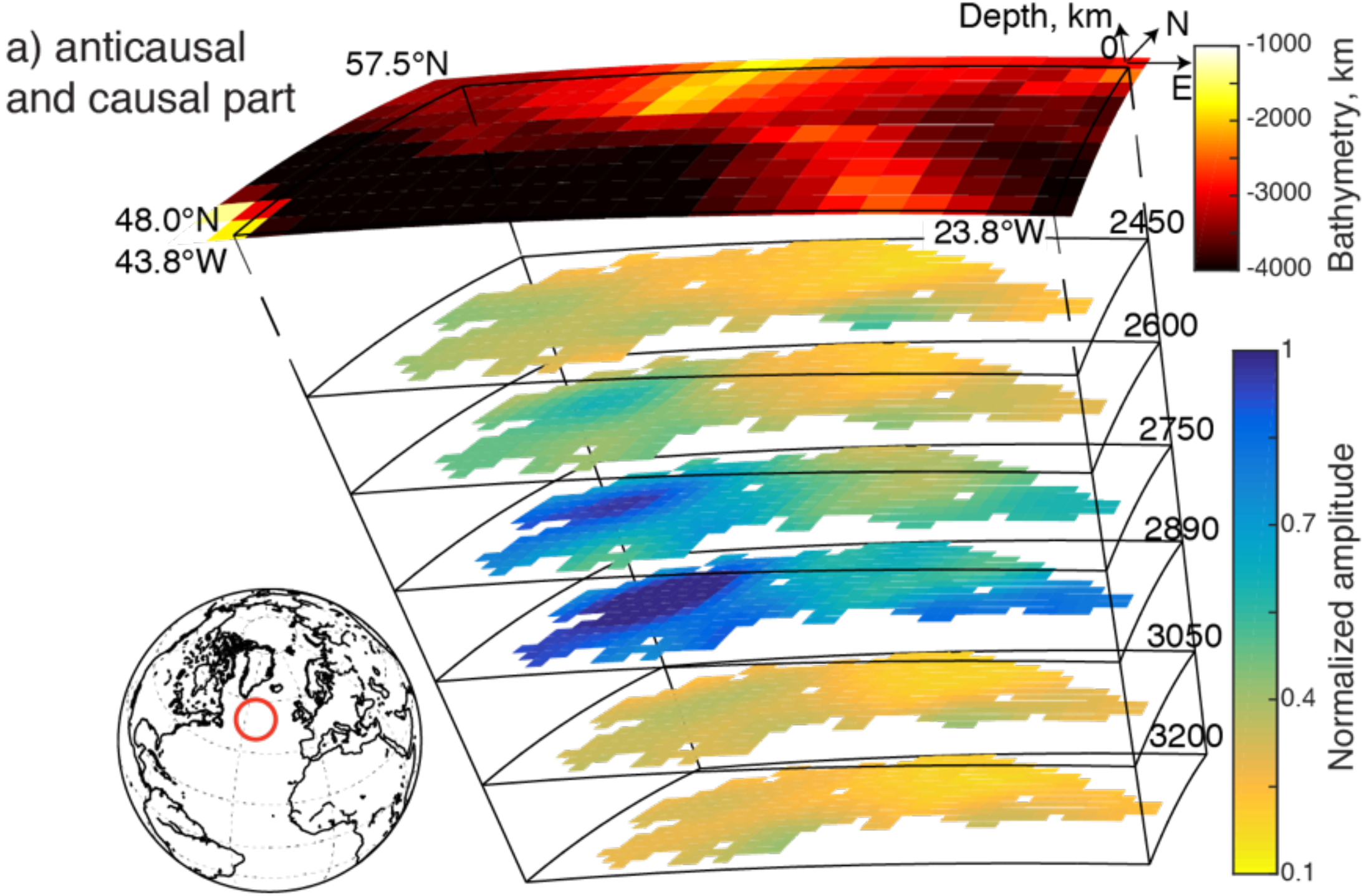
Vespagram(Depth,lon,lat)



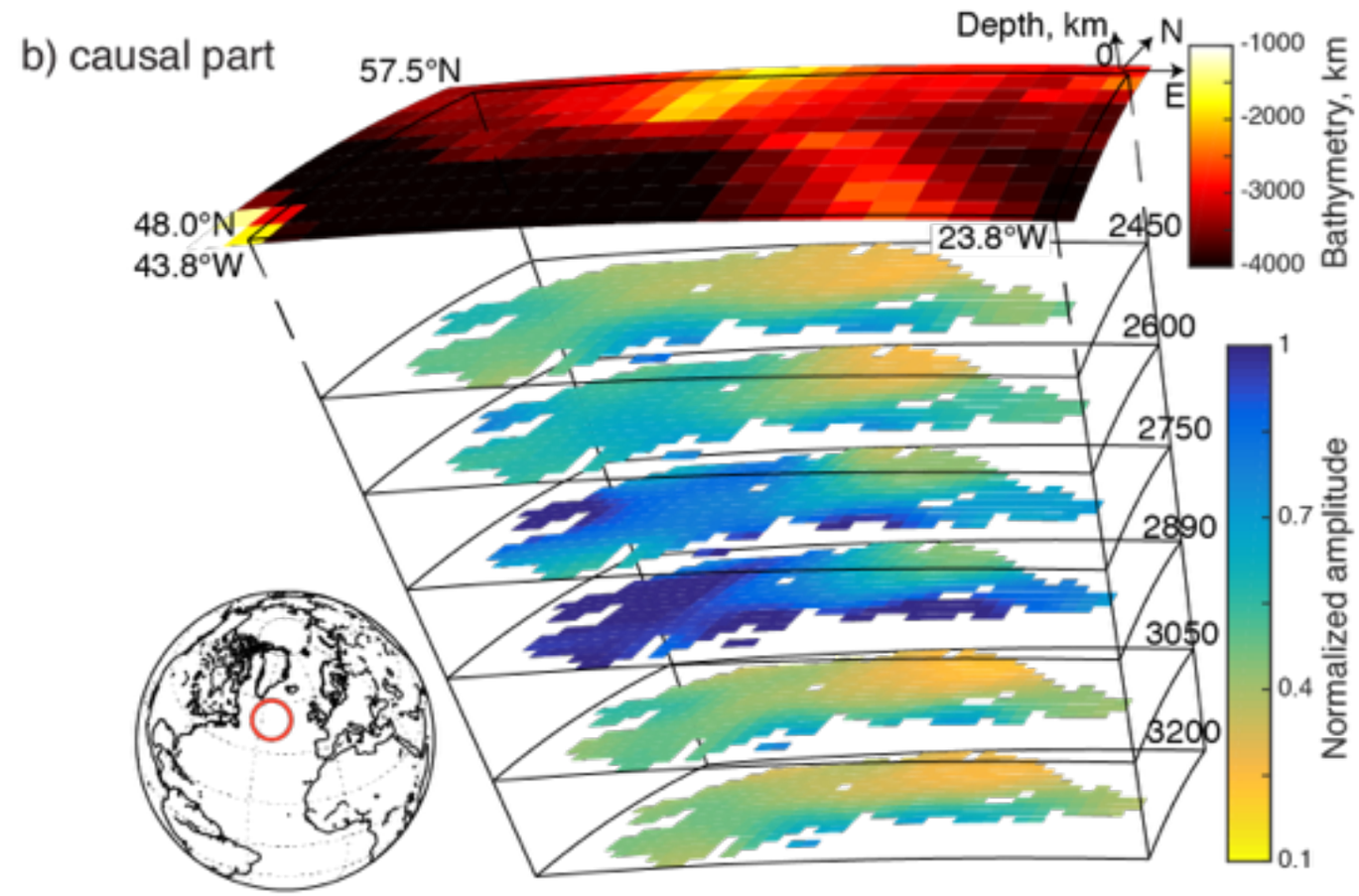
Vespagram(Depth,dist)

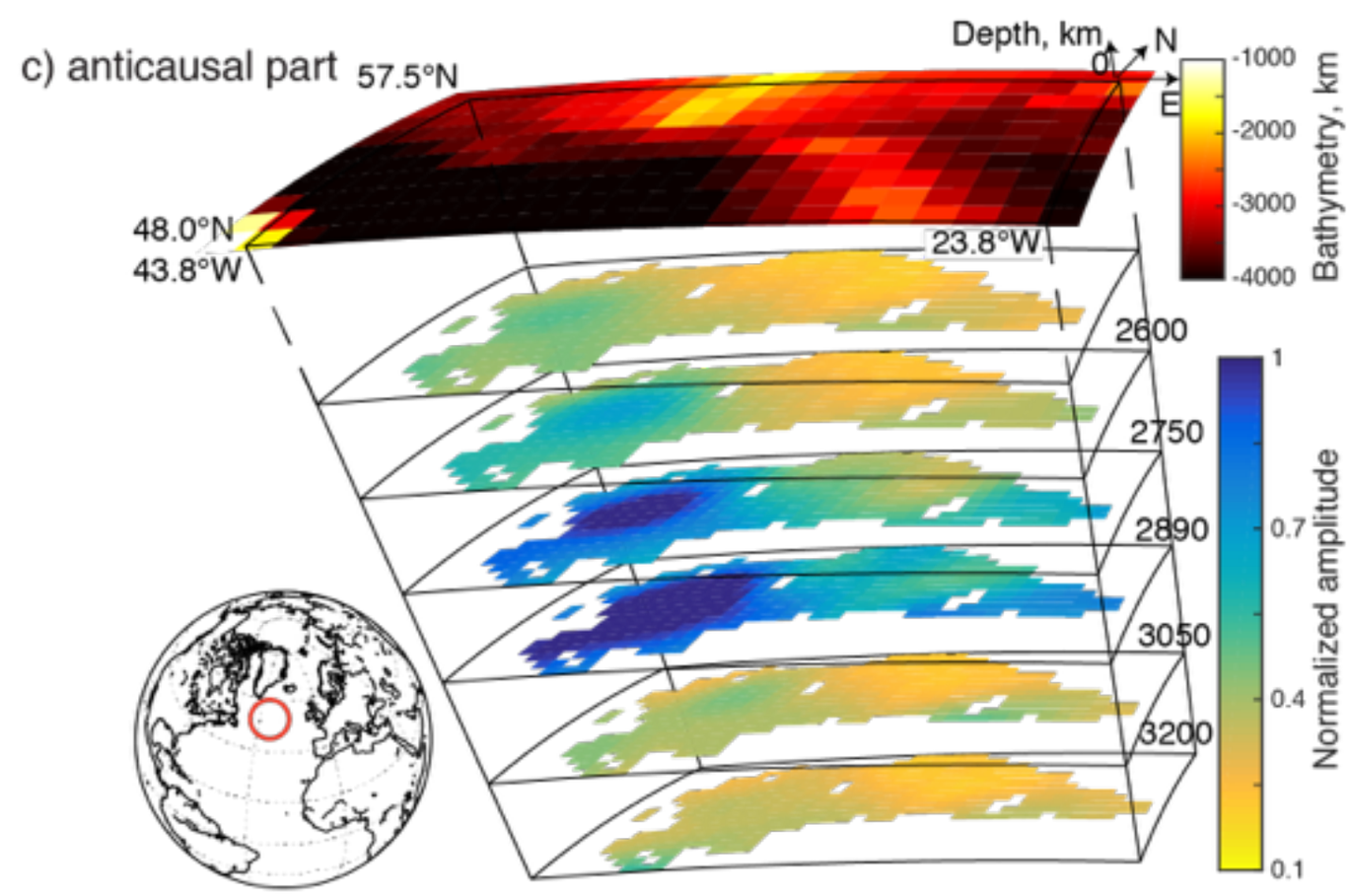


Mapping the lowermost mantle



Imaging the lowermost mantle





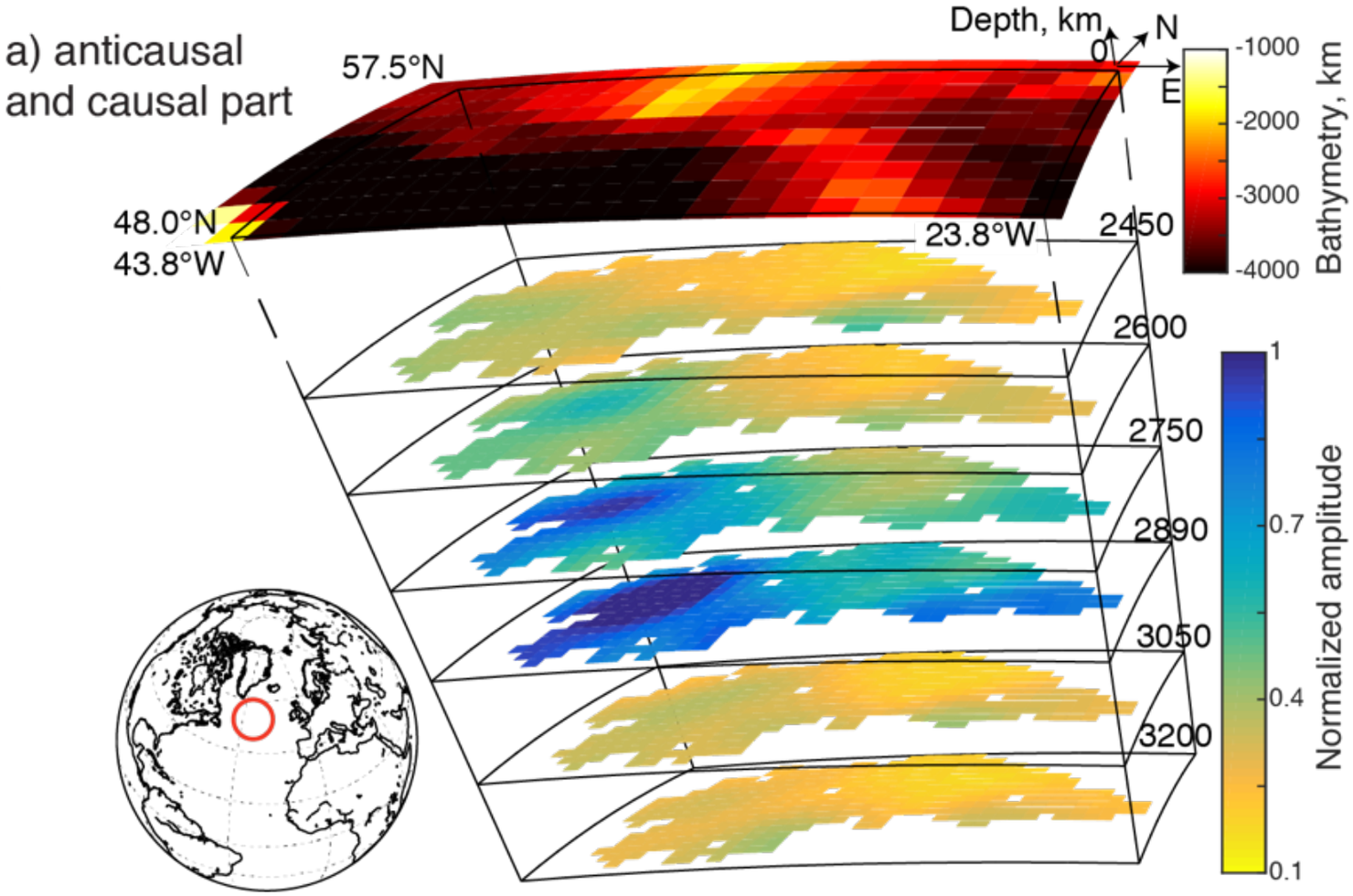
Conclusion

Imaging the lowermost mantle using body wave phases extracted from ambient noise correlations

Beamforming analysis in time and slowness of P arrivals

Period band 3-8s

Analysis in the causal and anticausal part of the correlation functions



Thank you