

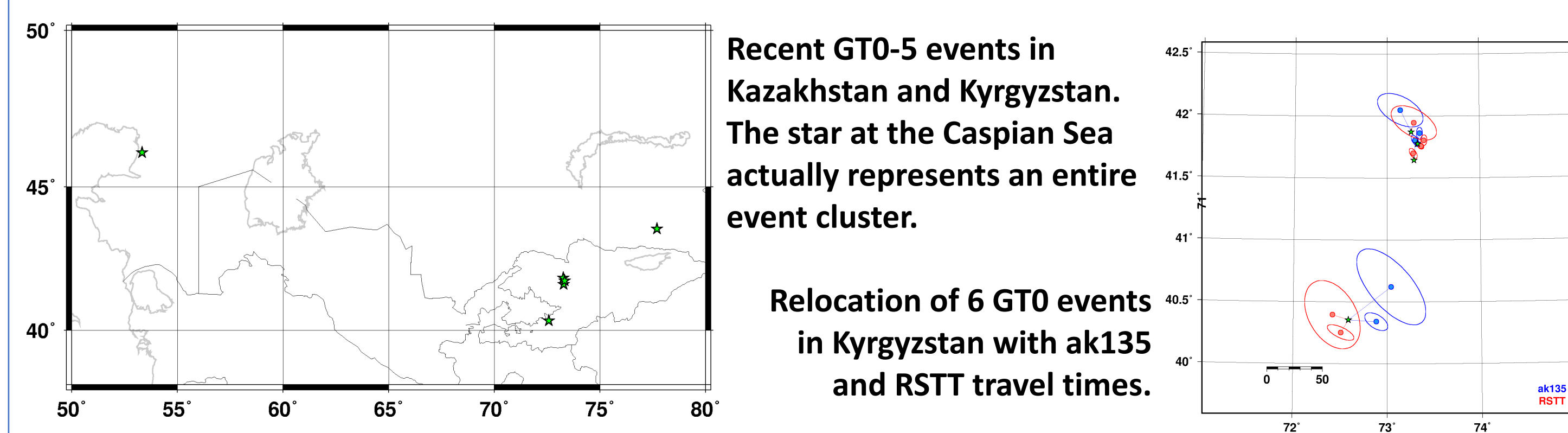


## Abstract

Travel-time predictions from the Regional Seismic Travel Time (RSTT, Myers et al., 2010) a global three-dimensional velocity model of the crust and upper mantle are tested and validated in the Middle East, Central Asia and Caucasus regions. Using the *iLoc* (Bondár and Storchak, 2011; Bondár et al., 2018) location algorithm and ground truth (GT) events as benchmark locations we relocated events both with ak135 and with RSTT predictions and compared the accuracy of the locations with respect to the ground truth. We demonstrate that RSTT brings an overall improvement in location accuracy.

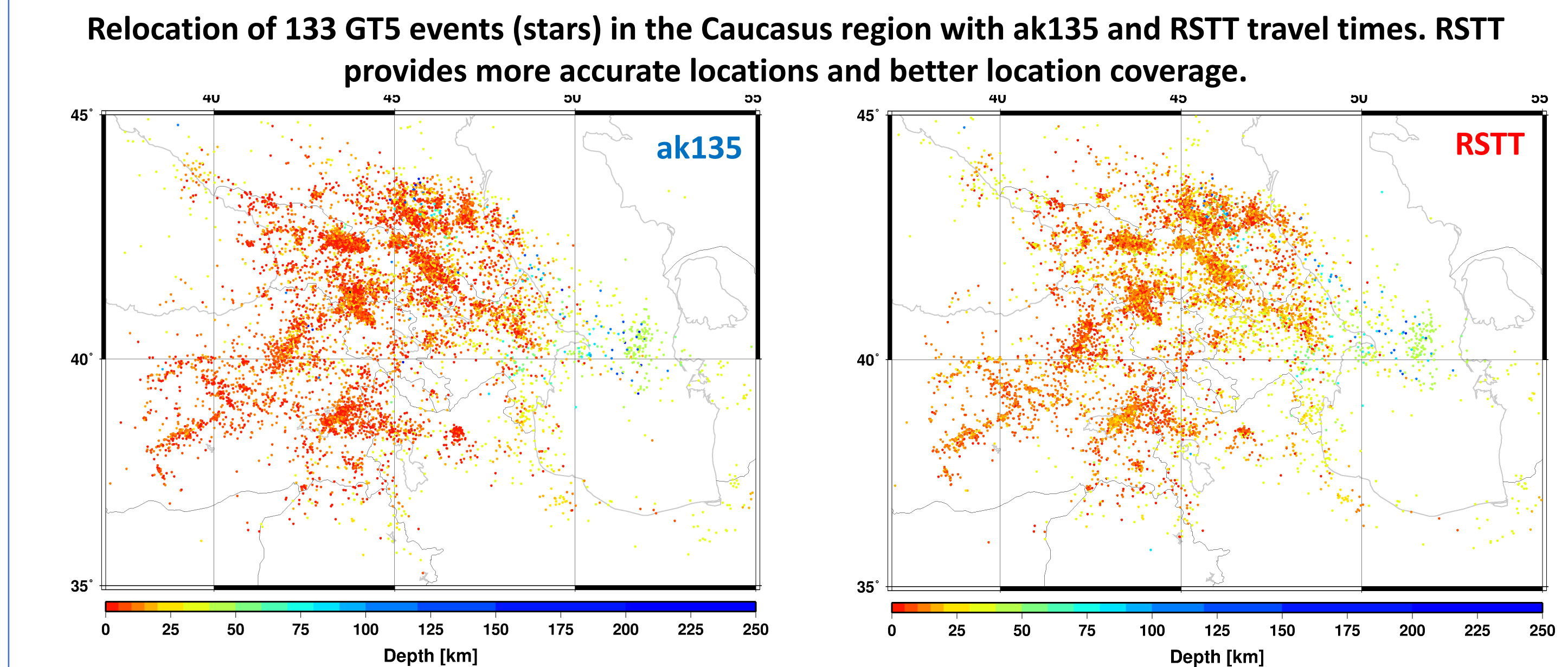
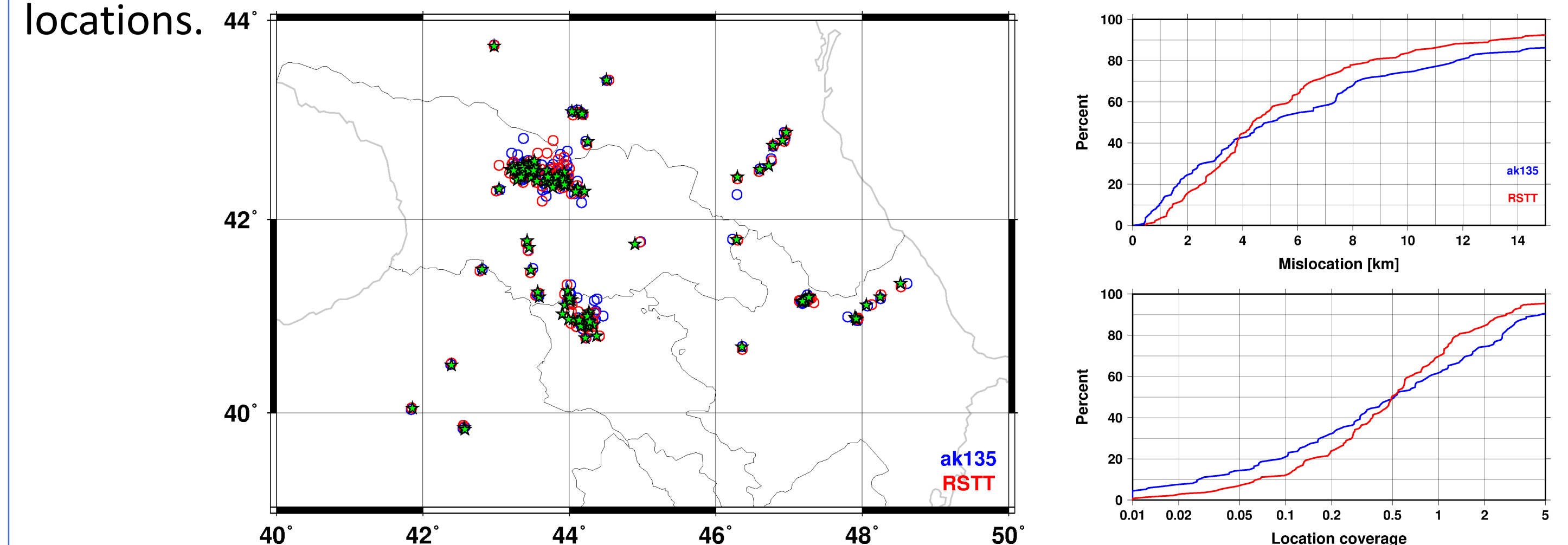
## New and potential GT events in Kyrgyzstan and Kazakhstan

Berezina et al., (2013) have reported 6 GT0 chemical explosions in Kyrgyzstan. Mukambayev et al., (2019) have identified further GT5 candidates in Kazakhstan.



## GT events and seismicity of the Caucasus

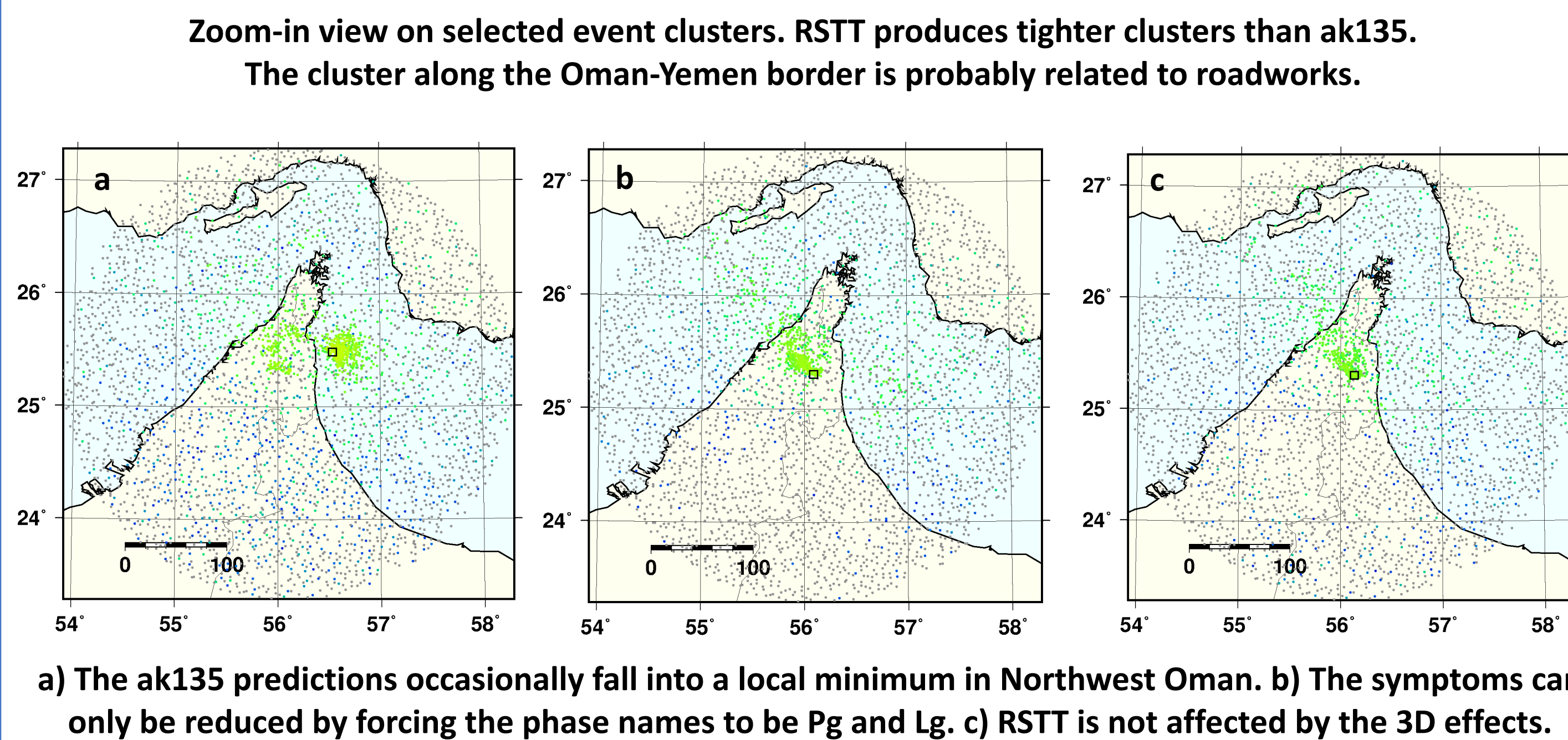
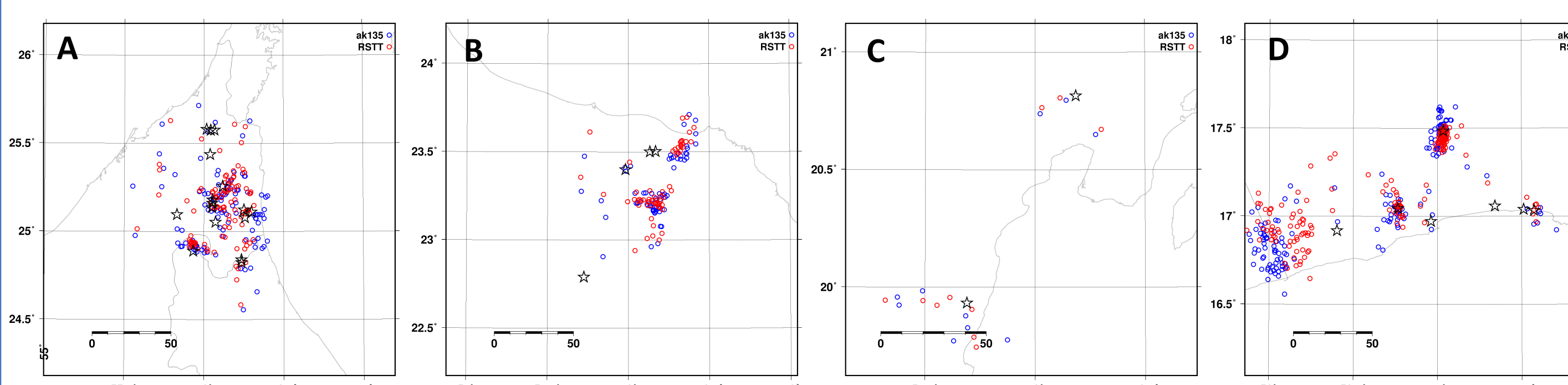
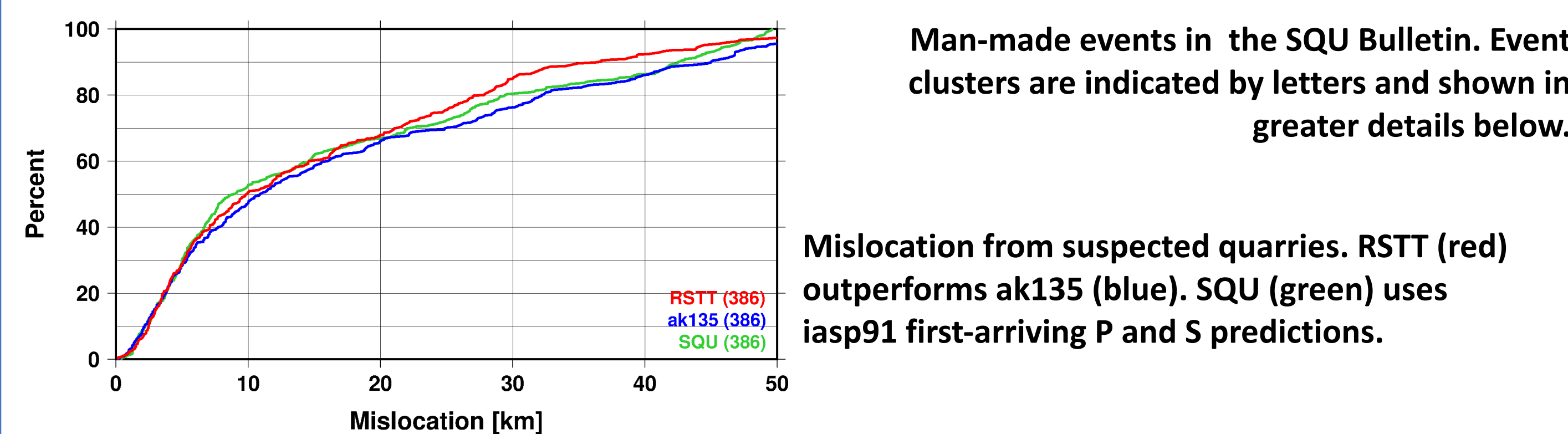
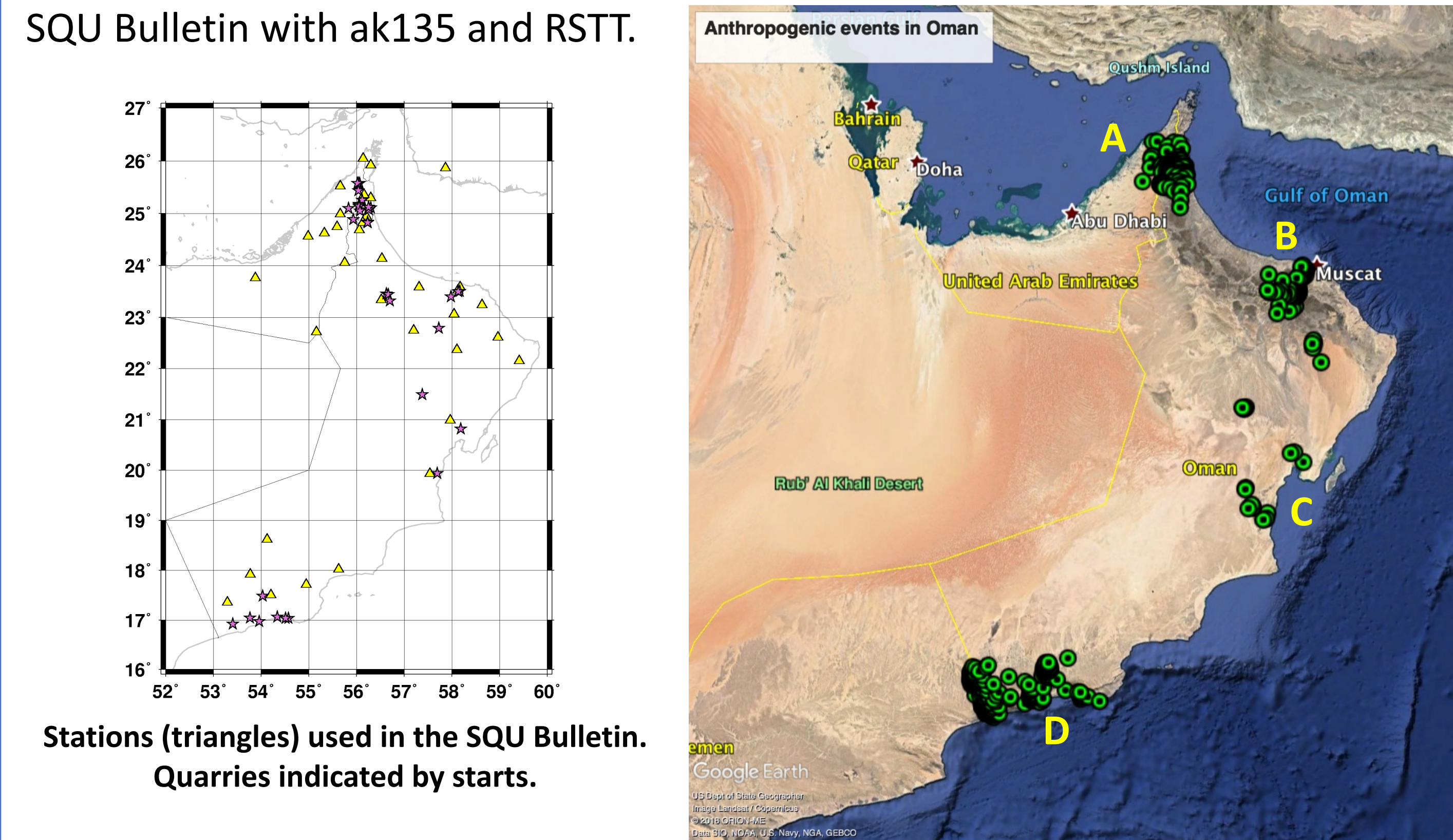
Currently there 133 GT5 earthquakes in the Caucasus region. We relocated the events with ak135 and RSTT travel time predictions. The relocations with *iLoc* show that RSTT consistently provides more accurate locations in the region than ak135. We also relocated the entire seismicity of the Caucasus region with *iLoc* (Onur et al., 2019). As with the GT events, RSTT provides better clustered locations.



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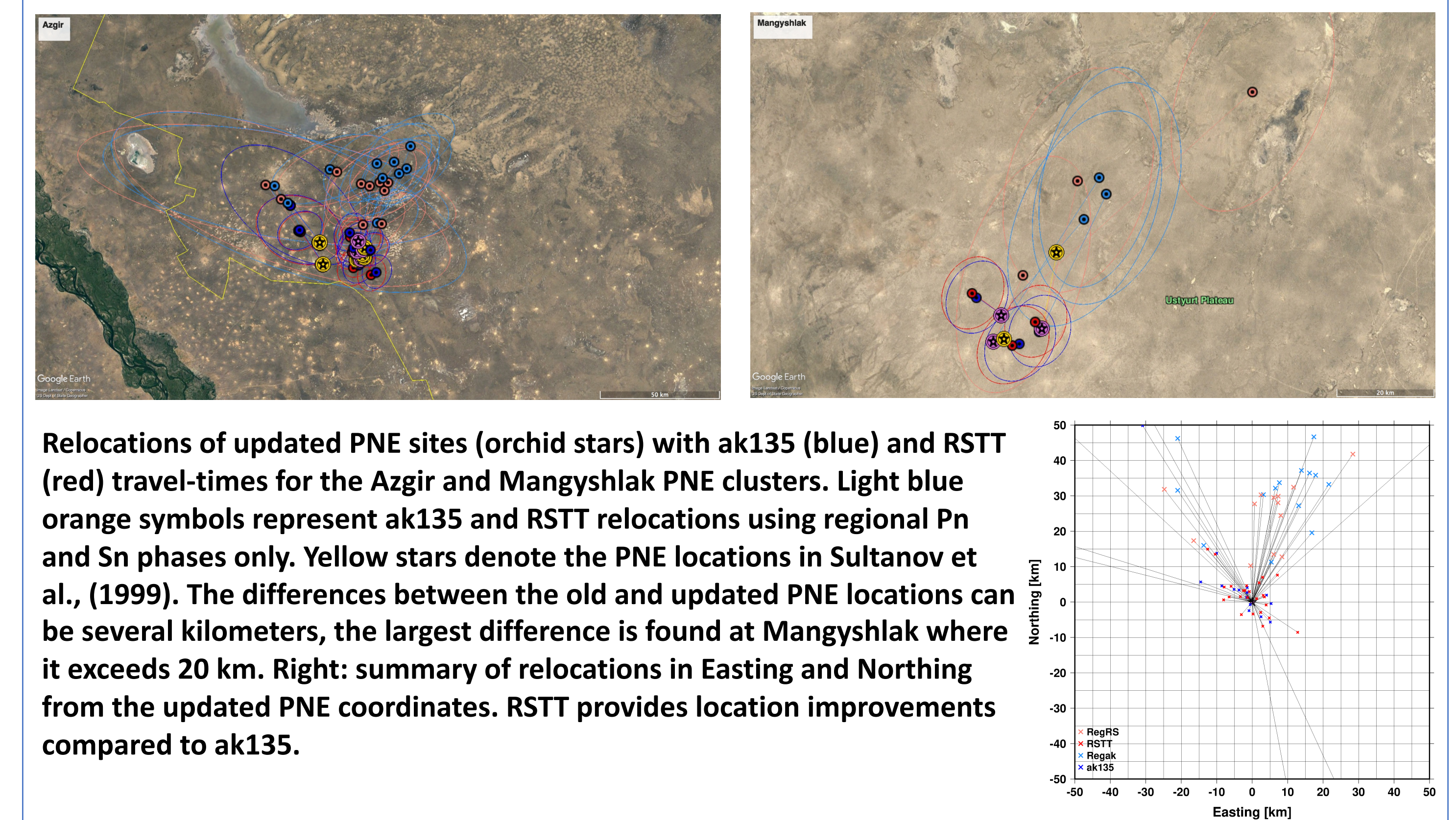
## Anthropogenic events in Oman

The Earthquake Monitoring Centre of the Sultan Qaboos University (SQU) in Oman confirms the occurrence of suspected quarry blasts and industrial explosion with the local authorities. Although the origin times are not known, the events represent a potential source for ground truth events, many of them recorded at regional distances. We relocated the anthropogenic events from the latest, 2018 SQU Bulletin with ak135 and RSTT.



## Updated PNE locations

The Soviet Union conducted 122 Peaceful Nuclear Explosions in its territory between 1960s and the late 1980s. The locations were listed in Sultanov et al. (1999) and many of them were considered as GT0-1 ground truth events and used in the developments of travel-time correction surfaces (SSSCs). However, many of these locations were proven to have larger errors. Kevin Mackey and colleagues (Mackey et al., 2012, 2015; Fujita et al., 2013) systematically visit the PNE sites and update their coordinates. We relocated 27 updated PNEs already in the IASPEI GTDB with and without RSTT.



## Conclusions

RSTT, in conjunction with *iLoc*, is increasingly used to relocate the seismicity of larger regions. RSTT almost invariably provides more accurate locations and offers an improved view of the seismicity. As the example of the updated PNE locations shows, accurate ground truth information is absolutely vital for building high-quality validation data sets on which various velocity models can be tested.

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