SEISMIC LOCATION CALIBRATION IN THE MEDITERRANEAN, NORTH AFRICA, MIDDLE EAST AND WESTER EURASIA

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ABSTRACT

The objective of the Group 2 Consortium, which comprises the authors of this paper, is to improve seismic event locations and reduce bias and uncertainties in the Mediterranean, Middle East, North Africa and Western Eurasia by providing calibrated travel times for stations in the region. To achieve this goal we follow a model-based approach. High-quality reference events (ground truth or GT 0-5) are collected and validated to facilitate the validation of the global three-dimensional (3-D) models and travel-time correction surfaces.

The project is in its second and final phase. In Phase 1 we demonstrated that significant improvements are achieved by using travel-time correction surfaces generated from global 3-D models. Improved velocity models have reduced *a priori* travel-time variances by 50% while maintaining 90% coverage.

In Phase 2 improved 3D global models, such as the CUB2.0 (Shapiro *et al*, 2002) and the PS362 (Antolik *et al*, 2002) are employed to generate travel-time correction surfaces via ray-tracing. The CUB2.0 model, a global upper mantle model combined with the CRUST2.0 crustal model (Bassin *et al*, 2000), is used to generate correction surfaces for regional phases. For teleseismic travel-time correction surfaces, we employ the PS362 global whole mantle model where the crust is taken into account as a crustal correction derived from CRUST2.0.

A substantially larger set of GT0-5 reference events collected as part of the Consortium effort allows a thorough validation of the models and predicted travel times. Event cluster analysis (Engdahl and Bergman, 2002; Israelsson *et al*, 2002) plays an important role in validating reference events, predicted travel times and error models.

Preliminary results show that further improvements are achieved relative to our Phase 1 results. The comparison of the CUB2.0 travel-time predictions with empirical path corrections obtained from cluster analysis indicates significant improvements in model-based predictions. The potential of using calibrated teleseismic phases in conjunction with calibrated regional travel-times is demonstrated.