

Empirically based seismic location criteria for simple to complex geological structures: a jackknife approach for local/regional networks

Richard A. Brazier¹, K. B. Boomer²

¹*Penn State University, DuBois, US*

²*Bucknell University, Lewisburg, US*

Keywords: *seismic location; jackknife; empirical*

Determining accurate seismic locations with representative uncertainty estimates is of fundamental importance to ground-based nuclear explosion monitoring, including the assignment of accurate ground truth (GT) levels. The monitoring community relies on selection criteria for classifying seismic events at the GT5 level, which specifies the absolute location and depth errors as being less than 5 kilometers. A new approach to obtaining empirically based (EB) criteria for estimating GT levels of seismic events recorded on a regional network has been developed using a jackknife resampling method applied to carefully picked phase arrival times for GT reference events.

A criterion for the Archaean Kaapvaal craton using reference events from several South African gold mines and recorded locally on the Southern African Seismic Experiment (SASE) network has been developed. This criteria developed on a relatively simple crustal structure is compared to a preliminary criterion in the more complex region of Ethiopia and the global criterion. In addition we explore transporting criteria to similar geological structures such as the Archean Tanzanian craton where no reference event is available.