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Aftershock Characterization Using A Dense Array And Backprojection: A Quantitative Comparison Of Densely Spaced Geophones And Traditional Arrays

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After the 2011 Mw 5.7 Virginia earthquake, a ~200-geophone array (AIDA) was deployed at 200-400 m spacing for 12 days. Backprojection was used to automatically detect and locate aftershocks. The AIDA backprojection aftershock catalog is complete to M –0.5 and includes 1673 events. A network of 36 traditional stations was also deployed at 2-10 km spacing. The traditional network catalog is complete to M –0.1 with 813 events. Only 494 of these, with a completeness of M +0.2, were located with accuracies comparable to backprojection. The AIDA catalog observes the same pattern of seismicity, but absolute uncertainty is reduced. Additional details illuminated by AIDA include: the main seismicity zone is not large faults but a tabular zone of many small faults; a broad zone of newly detected events lies above the main zone at shallow depth; a newly detected shallow cluster exists off the main zone; and the Gutenberg-Richter b-value decreases with depth. AIDA illustrates the benefits of dense arrays and backprojection for aftershock studies.
In 2012, coincident seismic surveys were acquired in Idaho. Broadband stations were deployed at quiet sites every 15 km. With similar effort per kilometre, 4.5-Hz geophones were deployed at roadside every 200 m. The geophone and broadband seismograms and spectra were comparable down to ~0.05 Hz for an M 7.7 teleseism and down to ~0.5 Hz for ambient noise. Inexpensive, rapidly deployed, passive seismometers produce good signal far below the corner frequency. Non-aliased array data provide back-azimuth and slowness information to enable wavefield imaging.

Numbers highlighted are currently being confirmed/refined.
Max 250 words; currently 249.
Due Friday 12 October (in the United Kingdom)
Meeting: https://nagedinburgh.wordpress.com/
I was invited to speak

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