Final Technical Report

ARRA Upgrades to the CERI Seismic Networks

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1. Executive Summary

All upgrades funded under this award are complete. Eleven broadband stations in the NM network were upgraded to widen the frequency response to 120 seconds and to add 3 channels of strong motion recording. Two broadband stations the ET network were upgraded to widen the frequency response to 120 seconds and to add 3 channels of strong motion recording. Three short-period analog stations in the ET network were upgraded to digital communications and to add 3 channels of strong motion recording.

2. Detailed Summary

Eleven station upgrades were performed in the NM network (figure 1). Previous sensors were the 30-second Guralp CMG40T seismometer with Guralp DM24 digitizers. New instrumentation includes 120-second Trillium 120P broadband seismometers, Reftek RT147 accelerometers, and Reftek RT130 data acquisition systems. The previous sensors were more than 15 years old and the upgrades provide new equipment with a wider recorded frequency band and significantly greater dynamic range.

Five station upgrades were performed in the ET network (figure 2): two broadband and three short period analog. The two broadband upgrades were performed to replace Guralp CMG3-ESP 30 second NSN hybrid response sensors and DM24 digitizers. The new equipment is the same as the upgraded NM stations and includes 120-second Trillium 120P broadband seismometers, Reftek RT147 accelerometers, and Reftek RT130 data acquisition systems. The three short period analog stations have three S-13 sensors with analog telemetry and a National Instruments 12 bit digitizer (aka the earthworm digitizer). The stations are now digitized on site with a Reftek RT-130 data acquisition system and telemetered with freewave spread spectrum radios. A Reftek RT147 accelerometer was also added to each station.

In all upgrades, all 6 channels are transmitted in real-time to CERI at 100 sps where they are made available to NEIC and archived at IRIS. Additionally, triggered data for the strong motion channels are saved to flash in the digitizer at 200 sps. The fidelity has been dramatically improved in time, frequency, and amplitude with increased operational and maintenance efficiencies.

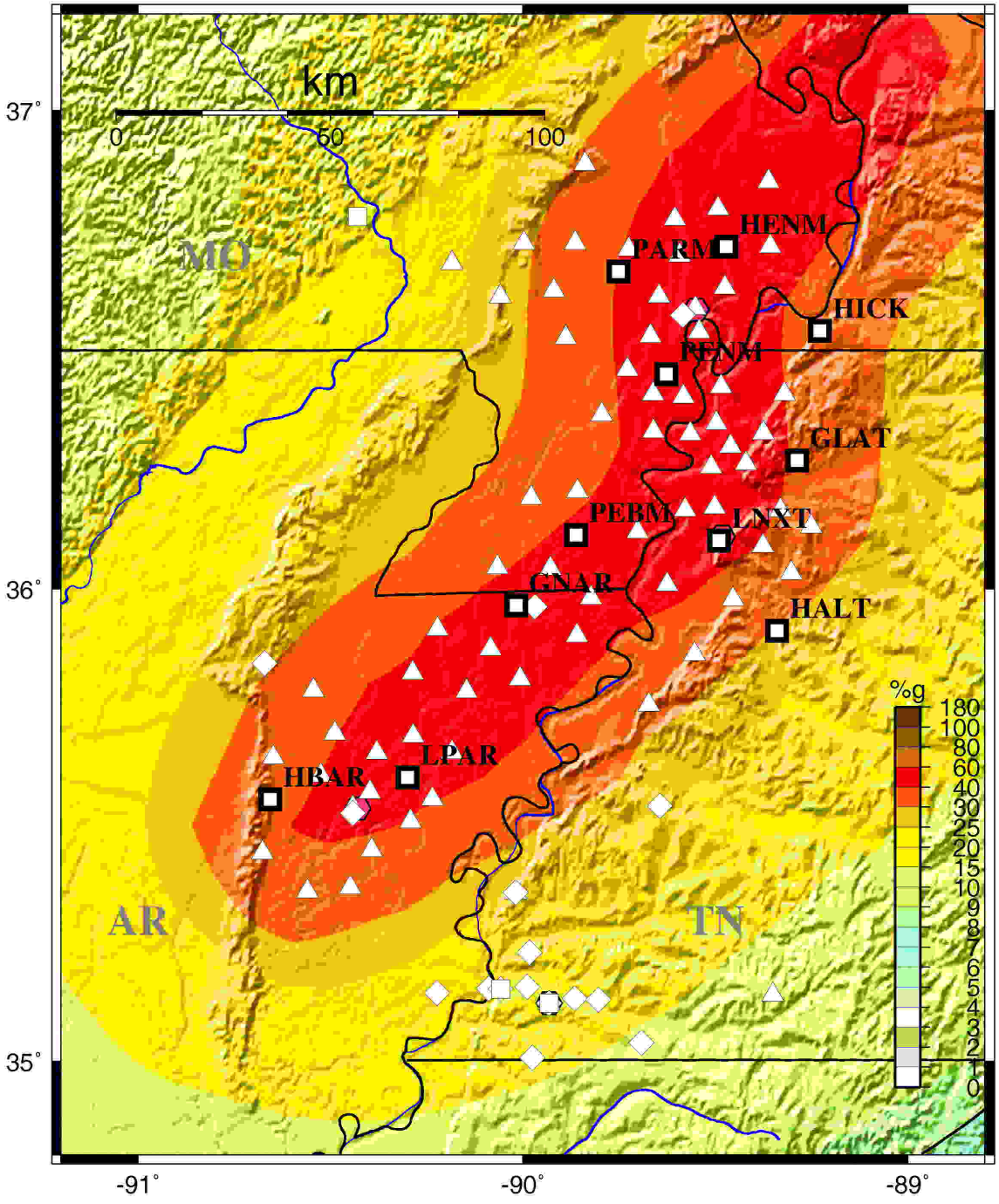

Figure 1. The CERI component of the NM network. Triangles are short period analog stations. Squares are broadband stations. Diamonds are strong motion stations. Squares outlined in bold and labeled were upgraded using ARRA funds.

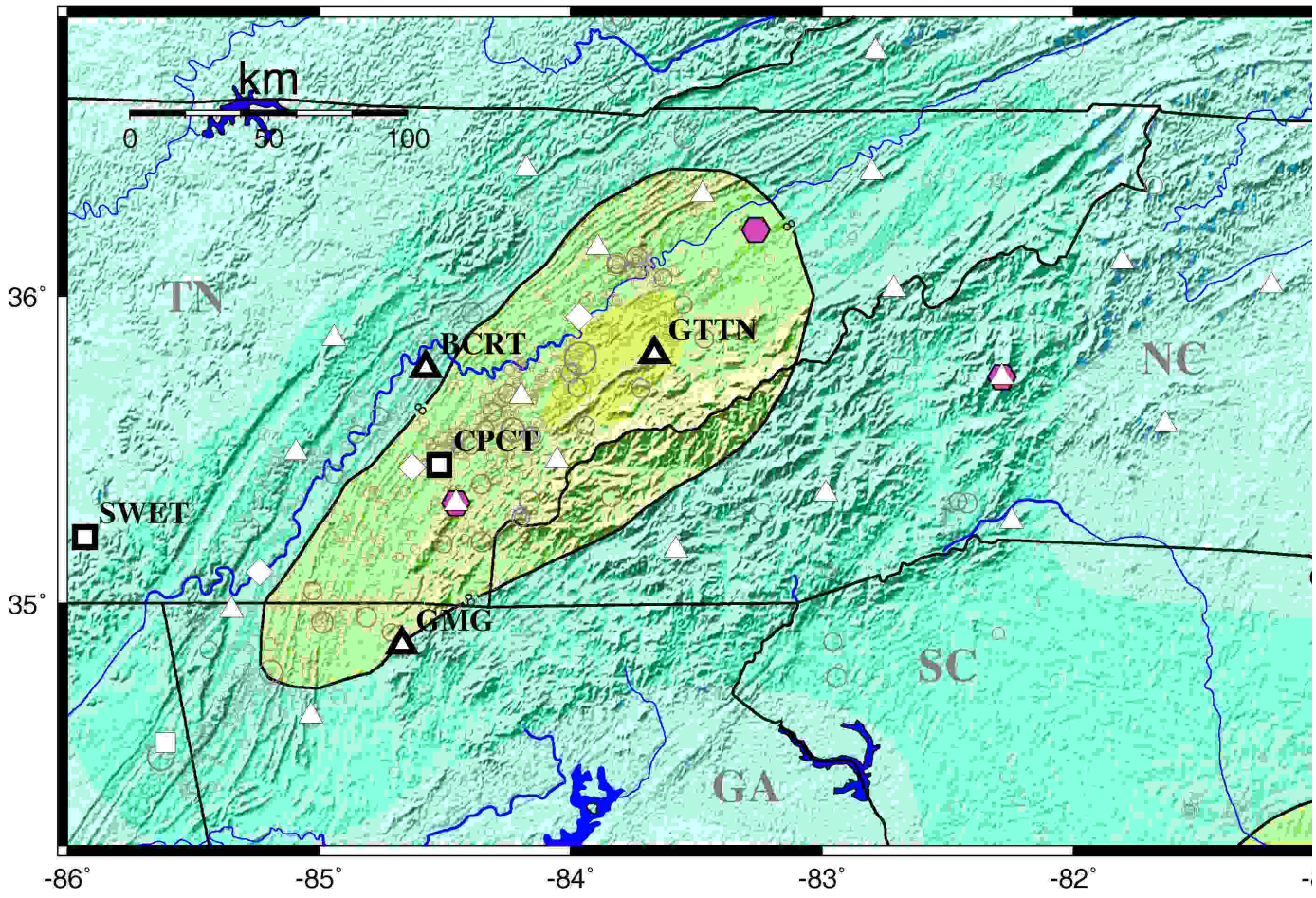

Figure 2. The ET network showing ARRA upgrades in bold. Triangles are short period, squares are broadband, and diamonds are strong motion.