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Electromagnetic (EM) earthquake precursor transmission and detection regarding experimental field and laboratory results.

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Aside from understanding the animal kingdom reacting to a per-earthquake signal, a transmission source is apparent. The focus of this investigation is an electromagnetic emission approach and detection capable of becoming both practical and reliable to other plausible earthquake precursors. To better determine this method, several prototype magnetometers were devised and built with each successive version improving upon the next. Two twin (prototype #2) antennae were deployed to field settings outside the NE Texas town of Timpson, TX back in February, 2013 and very recent laboratory tests using the most refined (prototype #4) experimental antenna for detecting unconfined, granitic block fracturing.

Field testing encompassed the small NE Texas town of Timpson, TX, which endured an earthquake phenomenon (May, 2012 – September, 2013). A rare sequence of events was strictly attributed to hydraulic fracturing activity in the immediate area all for hydrocarbon capture; thus, a chance to detect and record man-made earthquake activity. By swiveling two directional antennae at three locations, one mobile, the antennae could 'zero' in on a signal source until its pattern was well established and mapped, accordingly. Three signals were detected, two strong and one moderately strong, each with epicenter implications several kilometers from known seismological sites. Six months later, two M4s and a M2.4 earthquake hit over the 2013 Labor Day weekend. Hydraulic pump pressure increased deep Earth pore pressure, reduced friction, and displaced opposing tectonic stresses causing rock to fracture. This was the last earthquake sequence in the Timpson area, due to personal involvement and area citizens in contact with their state representatives. Well and drilling operations have since moved 40-50 miles SE of Timpson, TX and rare earthquake activity has now occurred there.

Laboratory testing was next performed using cored granitic blocks and the latest, improved antenna with an increased, variable geometry. The blocks were all successfully fractured with expansionary cement netting consecutive and identical EM emission results very similar to the Timpson pre-earthquake results. Cored granite made up the largest amount of rock test types, due to the large volume occurring as basement rock.

EM transmission in the ELF range ascending from depth was theorized to follow paths of least resistance via faults and other fracture spaces than actual penetration through solid rock, which may attenuate both signal strength and frequency response. Fault geometry, fracture orientation/termination, and subsurface reflection may make epicenter determinations problematic; however, EM emissions will continually occur and be detectable with further signal analyses in refining epicentral locations.