

Low Frequency Electromagnetic Signals to Explore Historic Nuclear Test Observations

Wednesday, 21 June 2023 09:08 (1 minute)

Impulsive, low frequency, electromagnetic signals were observed during historic United States underground nuclear tests. The source of these signals is uncertain though a prime candidate is the so-called “magnetic bubble”. This mechanism creates a magnetic signature when the hot plasma shell from the explosion expands in the Earth’s magnetic field. At low frequencies, this signal can diffuse to the surface where it can be detected. We have conducted experiments with an underground synthetic source at the Nevada National Security Site to emulate possible magnetic bubble signals and to investigate propagation through the intervening overburden. The synthetic source has a peak magnetic dipole moment of 100 kA-m². The signals from the source can be detected at ranges of several hundred of meters through the saturated tuff overburden using commercially available induction magnetometers and capacitive electric field sensors. The principal noise sources in our experiments have been anthropogenic noise (utility 60 Hz and harmonics) and impulsive atmospheric noise.

E-mail

bjunor@lanl.gov

Promotional text

Impulsive, low-frequency, electromagnetic signals were observed during historic United States underground nuclear tests. These signals may have been created by the so-called “magnetic bubble”. We are investigating the phenomenology with a synthetic source.

Oral preference format

in-person

Primary author: Mr JUNOR, William (Los Alamos National Laboratory (LANL))

Co-authors: Mr MACLEOD, Gordon (Los Alamos National Laboratory (LANL)); Mr YANG, Xianjin (Lawrence Livermore National Laboratory (LLNL))

Presenter: Mr JUNOR, William (Los Alamos National Laboratory (LANL))

Session Classification: Lightning talks: P2.1, P2.3, P4.4

Track Classification: Theme 2. Events and Nuclear Test Sites: T2.1 Characterization of Treaty-Relevant Events