Description of 2018-2019 Dry Alluvium Geology (DAG) 1,2, and 3 Gradiometry Data for Release

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# Data Release Information

Robert Abbott and Daniel Wells ( ORG 8911 ) would like to release seismic gradiometry data collected at the Nevada National Security Site over the course of three buried chemical explosion tests (DAG 1-3) during 2018 and 2019 to a public data repository. The data is part of the seismic data recorded for the Source Physics Experiment (SPE) Phase II. We will contribute the data to the IRIS/earthscope seismic data repository. The dataset consists of a set of 42, 30-second-long seismic traces for each of two gradiometers for each of 3 explosive tests, compiled into two separate files per test. These data encompass a continuation the release of SPE Phase II data, the majority of which is already available at IRIS/earthscope at the following URLs: <https://ds.iris.edu/mda/21-020/>, <https://ds.iris.edu/mda/21-021/>, <https://ds.iris.edu/mda/21-022/>, and <https://ds.iris.edu/mda/21-023/>.

# Data Information

## Installation

The buried chemical explosions were not repeated due to inelastic, non-linear deformation. Each explosion was at a different depth and size. (Table 1). The two gradiometers which recorded the seismic waves for each explosion were deployed 1.5 km ENE (Gradiometer Array East, GAE) and NNW (Gradiometer Array North, GAN) from the surface ground zero of the explosions ( Figure 1 ). Each gradiometer consisted of 14 Geospace Technologies GS-11D 4.5 Hz, three-component geophones recording to RefTek RT130 data loggers at a sample rate of 500 Hz, where 13 of the 14 geophones were arranged circularly around the 14th geophone in the center.



Figure 1: DAG 1-3 Gradiometer installation arrangement. The inset in the upper right of the figure shows the arrangement of geophones in each gradiometer.

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## Data Collection

Data were collected at 500 samples/second (sps) for 30 seconds starting at the explosion. The unit of measure was in millivolts. The data in this release has been corrected for the instrument response, with the final units being in nm/s. The data are prepared in the MATLAB .mat file format and contain appropriate metadata, including exact geophone location.

## Contents of data set

The data set to be released consists of:

* 252 (14 geophones x 3 components x 2 gradiometers x 3 tests) 30-second seismic recordings (Table 2)
* Two Microsoft Excel files (.xlsx) with the coordinates, in latitude/longitude format and northing/easting format, of the geophones of both gradiometers and the source.
* One README.txt file that describes the data (Appendix 1)
* The total data volume is 58.3 MB.

## Data Access

The collection of seismic data from the DAG tests is available from:

smb://snl/Collaborative/GeophysicsDept/GeophysicsDept/Projects/SPE/WELLS\_2020/DATA

The data can be viewed via MATLAB or any module capable of reading MATLAB .mat data files. In MATLAB, the command *load('/PATH\_TO\_DATA/DAG1/gae\_data.mat')* will load the GAE data for DAG1.

# Data Transfer and License

The date will be uploaded to IRIS/earthscope seismic data repository and will have a creative commons CC-BY license attached. This license allows re-users to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to Sandia National Laboratories.

# Tables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **Date** | **Depth (m)** | **Explosion size (tons TNT equiv.)** | **SDOB (m/kt1/3)** |
| DAG-1 | 20 July, 2018 | 385 | 0.91 | 3156 |
| DAG-2 | 19 Dec., 2018 | 300 | 51 | 642 |
| DAG-3 | 27 Apr. 2019 | 150 | 0.91 | 1229 |

**Table 1: The DAG experimental schedule.** The date, depth, yield and scaled depth of burial (SDOB) for each of the DAG explosions with associated gradiometric data.

# Appendix 1

Readme.txt

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The data are arranged into 3 subfolders, DAG1, DAG2, and DAG3. Each subfolder contains a file for the GAE and GAN data in MATLAB .mat data format.

The data have been deconvolved with the instrument response such that the units are velocity in nm/s.

Each data file contains the 14 associated seismic traces for each component of vertical, north, and east (traces), the sampling interval (dt), the data units (nm/s), and the date and time of the recording (nzdttm, kzdate, kztime), the names of each geophone/station (statname), and the station position in easting (east) and northing (north).

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