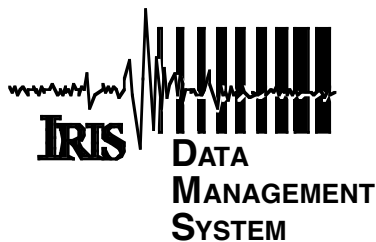# ECEX

Elephant Communications Experiment
Etosha National Park, Namibia

Seth Haines
Stanford University
Stanford, CA

Data Set 02-009

Elephant communications experiment
Etosha National Park, Namibia

June 4-13, 2002

Seth Haines
Geophysics Department
Stanford University
Stanford, CA 94306
shaines@pangea.stanford.edu

OVERVIEW

The purpose of this exeperiment was to record the vocalizations of elephants, and other large wildlife, in their natural setting in order to test the hypotheis that elephants communicate using Rayleigh waves over long distances.
  We deployed 6 RefTeks along a transect extending 800m radially outward from Mushara waterhole in Etosha National Park in Namibia. The biologists in charge of the experiment (Caitlin O'Connell-Rodwell, Stanford, head) observed the animal behavior noting times of vocalizations and other activity. Data collected included mainly 12 vertical channels at 75m spacing, along with 3 microphones and 3 horizontal channels interspersed along the transect.

Acquisition

The six 72A-06 RefTeks (16 bit A/D) equipped with Mark Products L-28 (4.5Hz) 3-component geophones were deployed at 150m intervals along the transect line and left in place for the duration of the experiment (June 4 to 13, 2002). Recording was conducted from 15:00 to 06:00 GMT daily, at 500sps. Additional complexity of the recording setup was added over the course of several days, including microphones and antenna geophones (additional L-28 geophones (vertical only) deployed between the RefTek stations) for a final phone spacing of 75m. Throughout the experiment at least the vertical component of ground motion was recorded at each RefTek station.

Postition information was provided by Omnistar DGPS, supposedly good to a couple tens of cm. Stations were positioned using this DGPS system to determine offsets along the azimuth of the transect. Each position recorded (and shown in the included file) is the average of 30 DGPS estimates of that position.

Microphones are all Neumann KM100 series omnidirectional low-frequency microphones, equipped with Sound Devices MM1 pre-amp/phantom power devices. Gain on the MM1 device is always set to 18.

Station Timing

All traces have been corrected to GPS time using the PASSCAL functions 'refrate' and 'clockcor', and the .pcf files included with this data submission. It should be noted that after time correction, at least one noticable error still exists. Instrument 6067 shows at time shift of approx 500 ms for an arrival at 02:162:17:44:00, based on the arrival times of that event on adjacent instruments.

'refrate' was used with the -m option to merge the two log files for each DAS.

Some GPS clocks were un-cooperative at different times, so some stations do not have clock locks for up to 24 hour periods. The clock on instrument 6057 temporarily claimed that it was getting clock locks on day 052, though in fact it was day 162. The clock was exchanged for another, and normal opperation returned before the evening's recording began, so none of the recorded data should have been effected.

Data Organization

Data is submitted in PASSCAL SEG-Y format, as output by the PASSCAL utility 'ref2segy'. The traces have been corrected to GPS time as described above, and otherwise are uncut and unaltered. Organization is as output by 'ref2segy', organized in directories named for the day and the data stream number.
For example:

R157.06/02.157.02.59.59.6047.1

is a single-trace SEG-Y file (w/o reel header) containg the data recorded by channel 1 of DAS 6047, beginning at time 02:59:59 on Julian day 157, 2002. This is the 6th data stream of day 157.

Data trace length is 3 hours plus two minutes, starting every 3 hours (for two minutes of overlap between files from consecutive datastreams.)

Log files and err files as output by 'ref2segy' are submitted also. 'ref2segy' was run on a Sun.

Submission

included files:

1. report.txt (this document)

2. map.ps   (sketch map of deployment geometry)

3. log_files (directory containing logfiles as output by ref2segy, named as
      2002:185:17:24.6065.log, where the log file corresponds with instrument 6065, and was created on day 185 of year 2002. Each instrument has two logfiles, as RefTek hard drives filled and were deleted mid-way through the experiment, resulting in two separate 'refdump' files.)

4. DAS_info.txt (Though the position of each RefTek was constant for the duration of the
      experiment, the inputs for each channel varied. This file describes, DAS by DAS, what the inputs were at any given time during the experiment.)

5. receivers.txt (receiver positions by channel for recordings from day 161 to day 164. This is the
      bulk of the experiment, with 12 vertical channels, 3 mics, 3 horizontal chans. Information in each column is as labeled. Positions are determined by DGPS.)

6. err_files   (directory of err files as output by 'ref2segy',

7. pcf_files   (directory containing PASSCAL Clock Files (pcf) as created by 'refrate', with the -m
      option to merge info from both logfiles for each instrument. Files are named as XXXX.pcf, where XXXX is the DAS number.)

8. sgy_data.tar (tar file of the data, organized as described above.)

Schematic Map of Mushara water hole

Artesian Well

Water hole

150 m

Camp

Key

REFTEK seismograph (3 channel)

Vertical geophone

M Microphone

N