History of the Oklahoma Geological Survey Observatory near Leonard, OK

In 1960 the Jersey Production Research (Oil) Co built the original Observatory. This location was selected because it was seismically and magnetically quiet (i.e. no heavy industrial and traffic vibrations) and was in driving distance from their Tulsa headquarters.

In 1965 Jersey gave the Observatory to OU in which it functioned as a small department in the College of Arts and Sciences.

Through the generosity of the Sarkys Foundation, the quarter section (160 acres, 64.8 hectares) of leased land at the site was purchased for the State of Oklahoma.

In 1976 a Nuclear Regulatory Commission grant through the Oklahoma Geological Survey provided for a statewide network of remote seismographs.

In 1978, the Observatory became part of the Oklahoma Geological Survey, and was named the "Oklahoma Geophysical Observatory". It was soon renamed the "Oklahoma Geological Survey Observatory".

During 1978, the last photo paper seismogram drum recorders were converted to heat writing (and some to ink writing). During 1989, a Dept. of Energy grant through Lawrence Livermore National Laboratories reworked a 760 meter deep borehole and placed vertical motion sensing seismometers at depths of five, 432, and 748 meters below the surface. Triggered digital recording was provided near the borehole winch. Digital data was analyzed on the Observatory's first Unix workstation, a SUN 3/50.

On June 1, 1990 Bush and Gorbachev signed a protocol that called for building a Soviet Nuclear Monitoring site near the Observatory Building. The Soviets (later Russians) were allowed to have a seismograph station there to record seismic waves from American, and an occasional British, underground nuclear blast in Nevada.

Seven years later, after Russian-UK-US Nuclear testing ended, Russia released the site, and the United States turned the dollar-per-year leased land back to Oklahoma.

(Read "The Soviet General in Blue Jeans")

The Defense Advanced Research Projects Agency (DARPA) provided a Sun SPARC 1+ workstation, and a six component seismograph system whose data was recorded, archived, and analyzed by the SPARC 1+. Soon, three remote seismic signals and three magnetic signals were added to this system which was called the Geneva system (its exact name was GSE=Group of Seismic Experts).

Two years later, a DARPA grant (unclassified as all grants to the OGS Observatory have been) allowed a three-component (vertical, north- south, east-west) broadband (high fidelity-covers a wide frequency

band) seismometer to be placed in a new 119 meter borehole. The data from this seismometer was recorded on the Geneva system.

In 1994 the Observatory became a station in the prototype International Monitoring System, which records seismic events and determines which are earthquakes, which are mining blasts, and which are underground nuclear tests. A grant from the US Air Force Technical Applications Center provided a Sun SPARC 20 and other equipment to aid in the monitoring. Digital seismograms were automatically emailed to the Prototype International Monitoring System. The Leonard facility was not made part of the permanent system, because Russians wanted the American stations further west.

A 1996 DARPA/DEPSCoR grant reworked an uncased borehole. It was cased, cemented, and deepened to 864 meters. A newly designed ultra-broadband three-component seismometer was placed at the bottom of the hole. This was the deepest broadband seismometer in the world. This seismometer had its digitizers, data communication, and data compression computer in the half-mile deep seismometer casing. Digital data was sent uphole and overland on optical fiber cable to a high- end PC. This system, called the "Oklahoma System" recorded data at rates of 200 samples per second for each component (about 200 megabytes per day).

In 1999 the Geneva System hardware and software became impossible to maintain. A rack digitizer was purchased from Guralp Systems in Reading, U.K. The digitizer cost six thousand dollars, weighs six pounds, and uses six watts of electric power. The rack digitizer digitizes data from three remote seismic stations at 200 samples per second. It also digitizes magnetic signals. The data is put on packets in a ring buffer and transmitted to the Oklahoma System PC. The digitizer drops each packet as soon as the PC sends an acknowledgement for the packet. The rack digitizer has a GPS (Global Positioning System satellite) receiver to give exact time for time tagging the data packets. If any data is missed, or the satellite time signal resyncs, the digitizer emails a message to staff.

The Guralp-made Oklahoma System software can communicate with any similar system in the world via the internet. OGS continually records one seismic channel from the University of Indiana. IU records three OGS signals.

During 1999, permanent archiving of all digital data was switched from exabyte tapes (holding five gigabytes) to writable CDROMs. These CDROMs allow quick random access to all data, and will last much longer than tapes. Each CDROM holds 660 megabytes of compressed data. OGS uses about 100 CDROMs per year.

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