Soviet–U.S. Seismological Data Exchange

The article "U.S., Soviets share seismic posts" by R. Jeffrey Smith (News & Comment, 25 Aug., p. 807) incorrectly describes a recent agreement in seismological data exchange as "intelligence gathering" and refers to seismic stations as "listening posts," with the implication that these stations could be used to verify compliance with treaties limiting nuclear tests. The article makes no mention of the fact that the Soviet agreement is an extension of a long-term effort by U.S. seismologists to develop and maintain a uniform, global array of seismograph stations to provide the data essential for progress in the science.

In 1960 the United States began to provide support for the development and deployment of 120 stations of the Worldwide Standardized Seismograph Network (WWSSN). Many significant advances in plate tectonics, earthquake source characterization, and Earth structure were based on data from the WWSSN. Moreover, the program established the precedents and standards for international data exchange and an infrastructure of stations and support facilities that could easily be expanded and improved with new technology. The U.S. Geological Survey (USGS) has operated the WWSSN, with modifications of certain stations, since 1973.

By 1984 the enormous scientific potential of a worldwide network of modern seismic stations, which took advantage of recent advances in the development of broad-band seismometers and digital recorders, was widely recognized. Seismologists in the United States banded together to form the Incorporated Research Institutions for Seismology (IRIS) with a principal objective of building on the foundation of the existing networks and establishing 100 permanent stations with standardized, modern equipment.

In 1988 the Academy of Sciences of the Soviet Union accepted an IRIS offer to expand the global network with five stations within the U.S.S.R. The Soviet Academy, IRIS, and the USGS have recently completed an agreement to maintain these stations and install additional stations. The data from the Soviet stations will be merged with data from other worldwide stations and will be distributed by IRIS and the USGS. These data can be used for *research* on earthquake hazards reduction, on Earth structure, on the nature of earthquake sources, and, indeed, on scientific problems related to the monitoring of nuclear testing. However, these stations are unsuitable for monitoring in the context of treaty verification. The equipment cannot operate unattended; it is not tamper-proof; the stations are not placed in optimum locations, and the data can easily be deleted or altered.

The recent developments in seismological data exchange with the Soviet Union should be seen in this perspective. These developments are an extension of over 25 years of effort on the part of seismologists throughout the world to acquire and exchange data routinely and efficiently.

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BU "Takeover" of Chelsea Schools

The News briefing about the so-called "takeover" of the Chelsea (Massachusetts) school system by Boston University (BU) (29 Sept., p. 1453) leaves much unsaid. This may be the first "leveraged buyout (LBO)" of a public school system by a private university. The consequences are potentially as serious in their long-term implications for education as most business LBO's are for our economic well-being.

Chelsea's problems go much deeper than its school system. BU will do little to solve those problems and much to exacerbate them. As noted, BU intends to seek outside financing in order to institute a large number of costly "innovations," including capital improvements. Most *wealthy* communities cannot afford all of the improvements BU proposes to accomplish.

Little consideration appears to have been given to what will happen when BU withdraws, successfully or unsuccessfully, from the "takeover." Assuming some success in establishing the costly programs and capital improvements, how is Chelsea, one of the poorest towns in Massachusetts, supposed to support those programs when it is left on its own?

Furthermore, little has been made public about who will evaluate the entire project. Since BU has insisted on *not* being publicly accountable and has attempted to bypass the guarantees of openness, such as open meeting laws generally required of public institutions, it appears as if it will be both the experimenter and the judge of the experiment's success. Thus, the project may be of dubious credibility, notwithstanding the so-called "watchdog" committee appointed to monitor the situation.

To "rescue" the Chelsea school system requires that Chelsea be assisted in many other respects, if it so desires. The proper role of a major university would be to offer to direct its resources toward helping to improve all aspects of a community in an open, accountable manner. Sound business, management, environmental, economic, political, scientific, and educational help, on a continuing basis, altruistically offered and carried out, is the kind of approach needed to satisfy BU's stated goal of attracting young people to its school of education and to its other schools as well.

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Top Quark Search

In his Research News article "New physics, old rivalries" Jeremy Cherfas (20 Oct., p. 323) conveys an unnecessarily pessimistic note when he writes, "When it comes to the top quark, the searchers know where to look, even though no accelerator presently has the capability of producing it." At Fermilab we believe that the Tevatron, the first superconducting synchrotron, has sufficient energy to produce top quarks. Recently the Collider Detector at Fermilab (CDF) collaboration set a lower limit on the top quark mass of 78 billion electron volts times the speed of light squared (GeV/c^2) with a 95% confidence level. Theoretical arguments give an indication that the mass is probably less than 220 GeV/c^2. Quarks of this mass can be discovered by the CDF and D0 detectors at the Tevatron.

The cross section for producing a quark and an antiquark decreases rapidly as the mass of the top quark increases. Hence, more massive quarks can be discovered as the integrated luminosity is increased. The present limit on the top quark mass was a consequence of the spectacular performance of the Tevatron, which reached a luminosity of 2×10^{30} per square centimeter per second (cm^{-2} sec^{-1}), twice the design goal. By 1993 we expect to reach and exceed 10^{31} cm^{-2} sec^{-1}, which will allow the discovery of the top quark if its mass is less than or equal to 180 GeV/c^2. If it is heavier than this, its discovery will have to await the construction of the main injector, a new injector for the Tevatron, which will allow a further fivefold increase of the luminosity to greater than 5×10^{31} cm^{-2} sec^{-1}. That luminosity should be sufficient to extend the sensitivity of the search to 220 GeV/c^2. The present explorations have indicated that the signal for the top should be clean and un-