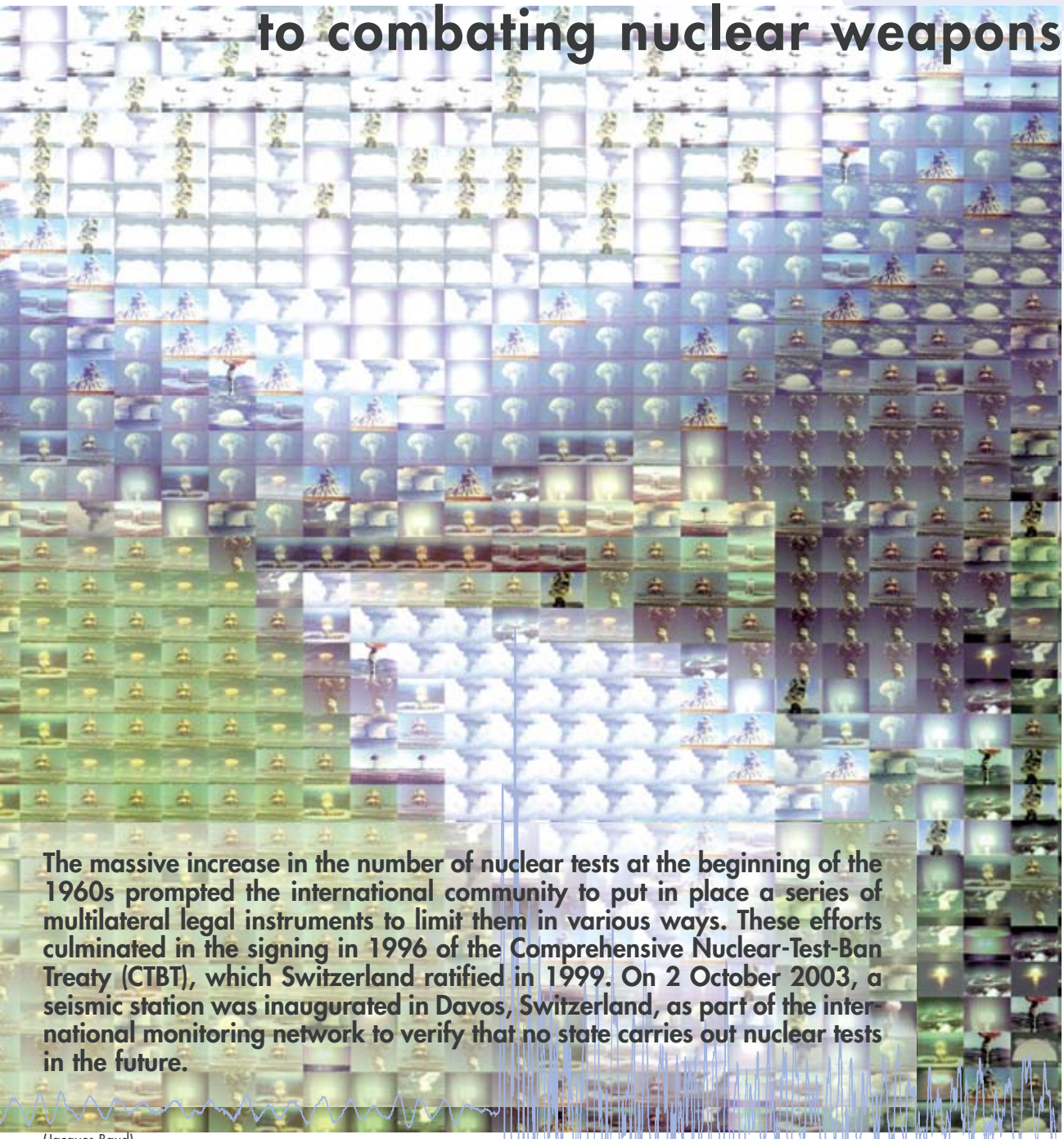
Swiss Update

DAVOX

Seismische Messstation · Station sismique
Stazione sismica · Seismic Station

October 2003

A Swiss contribution to combating nuclear weapons



The massive increase in the number of nuclear tests at the beginning of the 1960s prompted the international community to put in place a series of multilateral legal instruments to limit them in various ways. These efforts culminated in the signing in 1996 of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which Switzerland ratified in 1999. On 2 October 2003, a seismic station was inaugurated in Davos, Switzerland, as part of the international monitoring network to verify that no state carries out nuclear tests in the future.

(Jacques Baud)

ZiSP CPSi CiPS
Zentrum für Internationale Sicherheitspolitik
Centre de Politique de Sécurité Internationale
Centro di Politica di Sicurezza Internazionale
Centre for International Security Policy

Eidgenössisches Departement für auswärtige Angelegenheiten
Département fédéral des affaires étrangères
Dipartimento federale degli affari esteri
Departament federal d'affars exteriurs
Swiss Federal Department of Foreign Affairs

CTBTO preparatory commission for the comprehensive nuclear-test-ban treaty organization
PREPARATORY COMMISSION

CTBTO headquarters in Vienna

The CTBT: a treaty and its organisation

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) was opened for signature on 24 September 1996. It is a multilateral agreement aimed at banning all tests of nuclear weapons and all other types of nuclear explosions. While it does not require that current nuclear arsenals be abolished, the CTBT is an arms control agreement because, by making it less likely that nuclear tests will be carried out, it also prevents nuclear weapons being perfected and developed. In addition, the CTBT encourages the non-proliferation of nuclear weapons and makes it possible to envisage that negotiations on nuclear disarmament will take place in the best possible conditions.

To facilitate application of the CTBT, the text provides that, as soon as the Treaty has been ratified by all the 44 States that have either civilian or military nuclear reactors, a verification body called the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) will be established. So far (in October 2003), ratification is still required from 12 of these States; and the only part of the organization already operational is a Provisional Technical Secretariat (PTS), headquartered at Vienna. The Secretariat is responsible for co-ordinating the installation and management of the International Monitoring System (IMS) and operation of the International Data Centre (IDC), where information supplied from over 300 national measuring stations worldwide is processed.

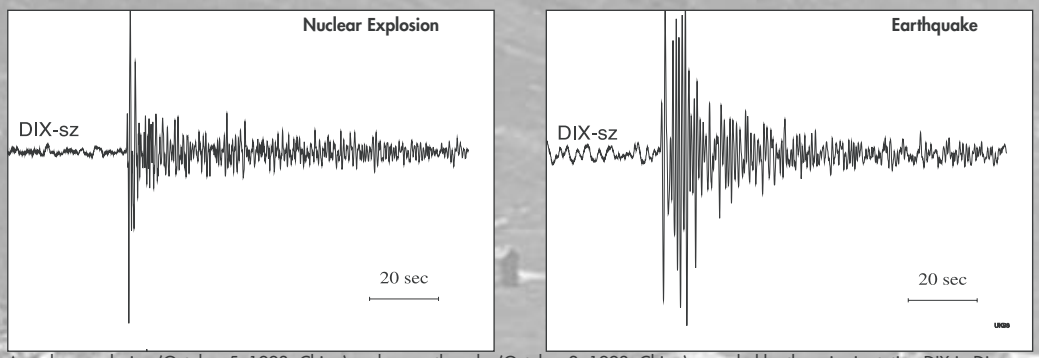
The CTBT is associated with the United Nations system. This means that in the event of a violation of the Treaty, the matter is brought to the attention of the UN Security Council. Furthermore, it is the task of the UN Secretary-General, as the depositary of the CTBT ratification instruments, to convene conferences intended to speed up the Treaty's entry into force.■

The Davos seismic station: a brief history and some technical details

In 1996, following a decision by Switzerland's Federal Council, the Swiss Seismological Service (SED) at the Swiss Federal Institute of Technology in Zurich (ETHZ) was given a mandate to manage a seismic measurement station, with construction envisaged as being in the Davos region.

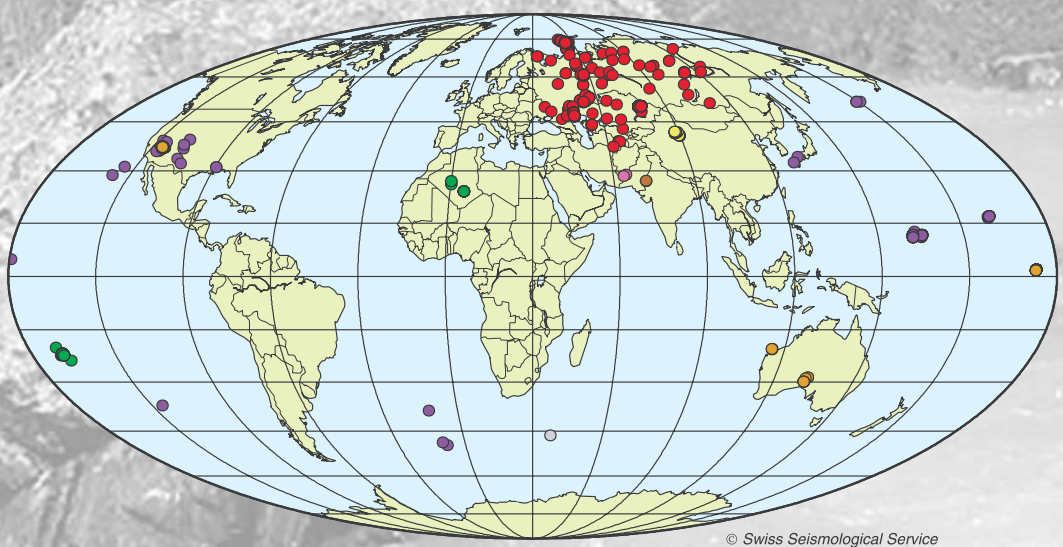
After some years examining six different sites within ten or so kilometres, a site at Dischmatal was finally chosen because of its distance from all major sound sources that would have impaired the quality of the signals recorded. In addition, the ground there is composed of various types of gneiss. This rock has the property of minimally attenuating the seismic waves emitted by an earthquake or other seismic event. The site is at an altitude of 1 800 metres, in a nature protection area, and is accessible at all times of the year.

Work on constructing the seismic station began in 2002. In August 2003, the Davos seismic station was certified following several months of tests conducted by experts from the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) in Vienna. It thus became the ninth certified station out of a total of 120 auxiliary stations planned to be built as part of the CTBTO's international verification system. As with the other stations, a code has been assigned to it, giving it the name DAVOX. The SED will maintain this station from an annual payment granted by the Federal Department of Foreign Affairs (DFA).■



A nuclear explosion (October 5, 1993, China) and an earthquake (October 2, 1993, China) recorded by the seismic station DIX in Dixence in the canton of Valais.

Nuclear Explosions 1945 – 1998



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USA [1039 Events]
Soviet Union [718 Events]
France [198 Events]
China [45 Events]
Great Britain [45 Events]
India [3 Events]
Pakistan [2 Events]
Unknown [1 Event]

The hut in Davos belonging to the Swiss Federal Institute for Snow and Avalanche Research.

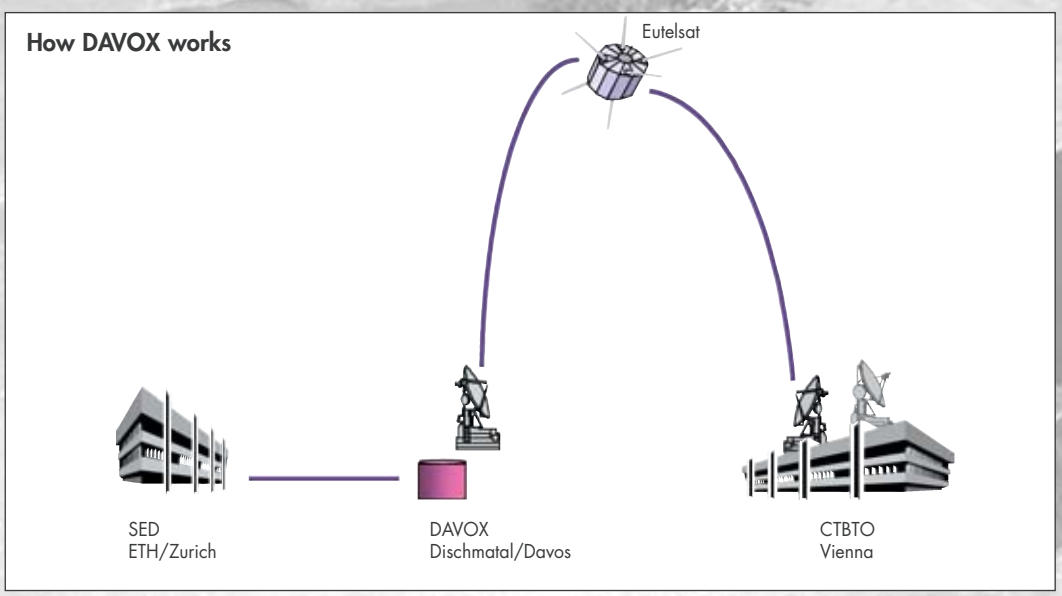
The CTBTO's mission

The CTBTO has been given responsibility for collecting all the data that come from the stations in the International Monitoring System (IMS). In a second stage, the data is presented in a daily bulletin for States that are party to the CTBT. It is then incumbent on these countries to undertake the diplomatic initiatives, for which there is provision, in the event that analysis of the data proves that a clandestine nuclear test has been carried out. When the whole IMS monitoring network has been established, the CTBTO will be able to detect four types of signals:

- pressure waves in the atmosphere (detected by infrasound),
- vibrations in the oceans (detected from hydro acoustic data),
- radioactive particles in the air (detected by monitoring radio nuclides),
- vibrations in the earth (from seismic data).

The Dischmatal seismic station was designed to monitor the last-mentioned type of signal. The station actually has two functions. The first is to record seismic events such as earthquakes, volcanic eruptions, powerful explosions and nuclear tests, on an international scale. As the station forms part of a national network for monitoring earthquakes, its second function consists of recording shock waves produced in Switzerland and in the immediately surrounding regions.

DAVOX comprises two units: a concrete vault bolted to the gneiss bedrock and containing highly sophisticated measuring equipment which can take the data recorded and relay it electronically to a communications installation inside a hut at a lower altitude. The hut belongs to the Swiss Federal Institute for Snow and Avalanche Research, in Davos, and is equipped with computers, which continuously transmit the recorded seismic waves to the SED in Zurich. The information communicated is also stored on the spot and, as soon as a request for it is received from the CTBTO – which happens several times a day – the data are immediately and fully automatically sent to Vienna via the Eutelsat W3 satellite. ■



Vault containing measuring equipment

The CTBT and Switzerland

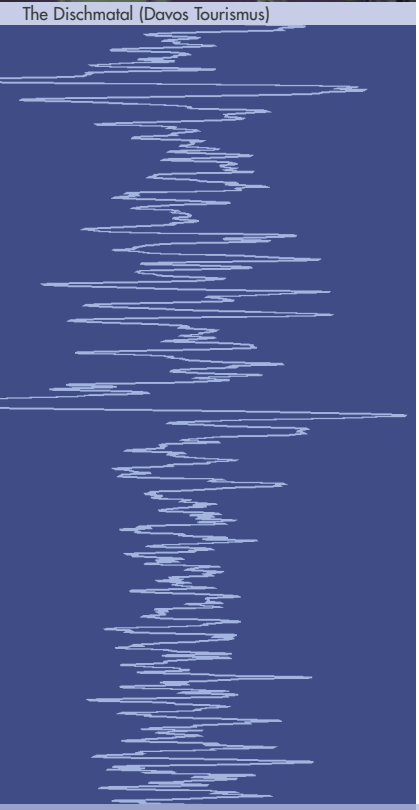
Switzerland signed the Comprehensive Nuclear-Test-Ban Treaty (CTBT) on 24 September 1996 and ratified it on 1 October 1999. Our country's accession to the Treaty was a result of our traditional policy objective to achieve disarmament, arms control and non-proliferation of all types of weapons of mass destruction. This policy is fundamental to Switzerland's activities in promoting peace and stability.

Like most other States, our country has always asserted that it favours speedy entry into force of the CTBT and thus comprehensive establishment of the verification instruments. To this end, Switzerland regularly participates in all meetings aimed at bringing into effect the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO), and contributes 1.27% of the Organisation's budget, amounting to approximately USD 1.15 million for 2003.

At the same time as contributing through the seismic station at Davos, our country is also participating, through the Spiez Laboratory, in work drawing up a manual for on-site inspections (OSI), another aspect of the Treaty's international verification system. ■

Nuclear explosion in the Nevada desert, November 1951 (Defense Threat Reduction Agency)

The Dischmatal (Davos Tourismus)



Useful links:

Swiss Federal Department of Foreign Affairs: www.eda.admin.ch

Swiss Seismological Service, ETH Zürich: www.seismo.ethz.ch/bsv

Comprehensive Nuclear-Test-Ban Treaty Organization: www.ctbto.org

What is the CiSP?

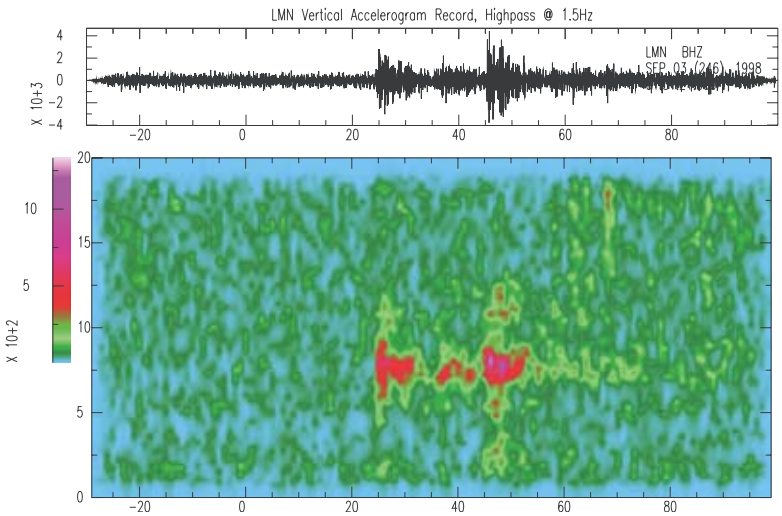
The Centre for International Security Policy (CiSP) is part of the Swiss Federal Department of Foreign Affairs (DFA) and is responsible for all aspects of Swiss foreign policy as it relates to international security and disarmament. It works closely with the other relevant sections of the DFA and the federal administration. CiSP co-ordinates the formulation of Switzerland's foreign security policy and works to implement it in the international context.

Swiss Update is published by the Centre for International Security Policy (CiSP) of the Swiss Federal Department of Foreign Affairs (DFA) and informs about Switzerland's projects in the area of international security. This edition is available in English, German, French and Italian and can be ordered free of charge via ZISP@eda.admin.ch.

Ascertaining the details of a plane crash: another civil and scientific service provided by the CTBTO

Information supplied by the seismic stations play a key role in determining the nature of accidents involving aircraft. Analysis of data from the seismograms can rapidly provide indications of the location of an accident, which can prove life-saving by directing searches in areas that are remote, wooded or covered with snow. In addition, the information supplied by the seismic stations can help determine whether the aircraft was intact at the moment of impact; it can also narrow down assessments of the speed at which the aircraft hit the ground.

Among the most recent examples where information supplied by seismic stations helped clarify the nature of an air crash, we can mention the crash in 1988 of the PanAm Boeing 747 over Lockerbie, Scotland, following a mid-flight explosion caused by a terrorist bomb, and the 1998 crash of a Swissair MD 11 into the sea at Peggy's Cove, near Halifax, Canada, which was caused by a fire on board. In the latter case, the information supplied by a very close seismic station made it possible to state the exact moment of the crash and also how violent the impact was. ■



Signal analysis of the Swissair MD-11 crash, recorded by a seismic station in Canada. (Geological Survey of Canada)

What future for the CTBT?

Currently (in October 2003), the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is supported by the great majority of States: 168 have signed the Treaty and 104 have ratified it. Nevertheless, the clause by which it comes into force specifies that ratification is required by the 44 States that themselves have either civilian or military nuclear reactors. So far, 12 of these States have not yet ratified the Treaty, which prevents it from achieving universality.

Furthermore, the fact that some States are giving nuclear weapons a new role – no longer limited to deterrence – gives rise to additional uncertainties with regard to the CTBT coming into force soon. In addition, some of the nuclear powers have developed techniques to simulate nuclear tests in a laboratory setting, and this somewhat frustrates the aim of the Treaty.

Consequently, each year that passes without any notable progress being made limits the ability of both the Treaty and the CTBTO to attain their objectives. There is a risk of the Organisation having more and more difficulty combining its provisional nature with the growing financial requirements ($88 million for 2003) necessitated by the eventual establishment of the international verification system.

However, even though the CTBT has not yet come into force, the global verification regime is already able to detect a nuclear explosion taking place anywhere on Earth. It may be supposed that, if such an event occurred, the international community, having been informed immediately, would not remain inactive, and that the matter would probably be referred to the United Nations Security Council. The political fallout for the State that had carried out the test would be highly damaging, and the repercussions would be worldwide. It is therefore not an exaggeration to say that, even though it has not yet come into force, the CTBT and its organization are already fulfilling part of their deterrent role.

Finally, as another positive sign, we can note that a moratorium on nuclear tests has, since 1998, continued to be respected by the States that possess nuclear weapons, whether they have declared them or not. Last but not least, what becomes of the CTBT will depend to a great extent on the active commitment of all the States that have already ratified the Treaty and on their ability to influence those governments that are still hesitating to do the same. ■