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

CTBTO Spectrum

CTBTO NEWSLETTER ISSUE 8 | JUNE 2006

Who we are

The Comprehensive Nuclear-Test-Ban Treaty bans all nuclear weapon test explosions. It opened for signature in New York on 24 September 1996 and enjoys worldwide support.

The CTBTO Preparatory Commission was established to carry out the necessary arrangements for the implementation of the Treaty and to prepare for the first session of the Conference of the State Parties to the Treaty after its entry into force. It consists of all States Signatories and the Provisional Technical Secretariat.

Inside this issue

IMS: The pioneering years

In the early days of August 1997, I chaired the first meeting of the initial International Monitoring System (IMS) team. Some of our team members were seasoned veterans from the Geneva negotiations, but most of us were completely new to the Treaty and to the world of multilateral diplomacy. Coming from nine countries and very different backgrounds, we faced the daunting task of building the global IMS network of 321 stations and 16 laboratories within three years. At that time it was thought that the Treaty could get the number of ratifications needed for entry into force within three years, and the monitoring system had to be ready by then.

Before coming to Vienna, many of us assumed that a complex and challenging project like building the IMS would go through the normal phases of project development such as design, proof of concept, testing and implementation. The instructions from the governing bodies, however, made it very clear that the build up of the monitoring system had to start as rapidly as possible. Consequently, the IMS team initiated the construction of the stations according to the technical specifications approved by the Preparatory Commission for the CTBTO, while, at the same time, they had to develop many innovations, such as authentication and certification procedures and incorporate them into the commercially available equipment in all verification technologies.

This build-as-you-design phase was characteristic of the early years. Contrary to the optimism in Geneva, many stations of the 120 auxiliary seismic station network did not exist or were abysmally below the technical specifications. The majority of those already in existence were built by international consortia for scientific purposes with the support of local institutions. The IMS team had to forge numerous alliances and establish agreements with parent networks before being in a position to upgrade and connect these

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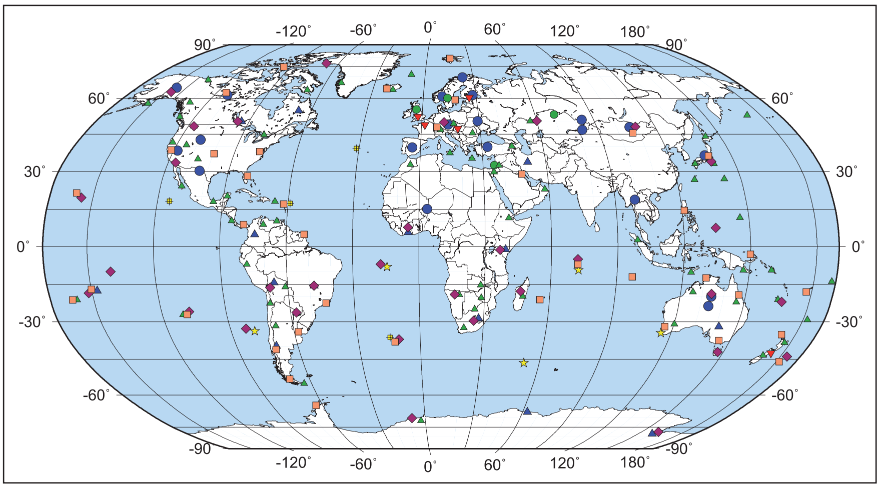
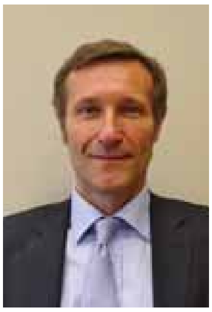


IMS STATIONS IN IDC OPERATIONS AS OF 31 MAY 2006 (184 STATIONS)

Editorial



2006 marks the 10th anniversary of the opening for signature of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Almost ten years after its conclusion, the CTBT is close to universalization, with 176 States Signatories and 134 ratifiers, the latest being Viet Nam. Although the Treaty has not yet entered into force, it has proven its significance by contributing to the establishment of an international norm against nuclear testing.

The build-up of a functioning verification regime which needs to be in place when the Treaty enters into force is progressing in a dynamic manner. A further five facilities were certified since the end of last year, bringing the total number of certified stations and laboratories to 161 and six, respectively. The growing momentum in station installation and the considerable increase in data traffic over the last two years – the latter has almost tripled in volume from five to 14 gigabytes per day – means that more and more Member States are receiving verification data and products on a test basis. Currently, approximately 700 end users in 90 countries are participating in the provisional operation of the verification regime.

In order to make optimum use of these data, States Signatories are invited to participate in the capacity building activities of the CTBTO Preparatory Commission and its Secretariat with the aim to fulfil their verification responsibilities under the CTBT and to fully realize the potential benefits deriving from the Treaty. In addition to the traditional training methods, e-training offers a range of possibilities for deepening and broadening capacity building. In this context, the Provisional Technical Secretariat (PTS) is developing a global e-learning project that will provide electronic, interactive access to training courses and technical workshops for authorised users. The European Union is supporting this initiative with more than 1.1 million Euros.

The question of capacity building in order to maintain and develop a global Treaty regime is not only crucial for Member States but also for the interaction between the worldwide scientific community, the Commission and the States Signatories. For this reason and to celebrate the achievements of the Commission, the PTS is organizing a scientific symposium which will be held on 31 August and 1 September in Vienna. The symposium will provide a forum for the exchange of ideas between the verification community and the wider scientific community with the aim to increase global capacity in the fields of science and technology related to the activities of the Commission. It will also provide latest information on the multi-faceted benefits of verification technologies and International Data Centre (IDC) data.

Besides providing an outlook on the scientific symposium by Ola Dahlman, former Working Group B Chairman, this issue of CTBTO Spectrum looks at the many interactions between the South-East Asia, the Pacific and the Far East (SEAPFE) region and the CTBT. The PTS is particularly honoured to publish an interview with the Minister of Disarmament and Arms Control of New Zealand, Hon Phil Goff, focusing, inter alia, on the eminent role of New Zealand in nuclear disarmament and non-proliferation. Furthermore, a special feature article by Ambassador Yukiya Amano of Japan looks at his country's contribution to the Treaty. The Ambassador of Vietnam, H.E. Nguyen Truong Giang, gives his personal view on Viet Nam's decision to ratify the CTBT as the 34th Annex 2 State.

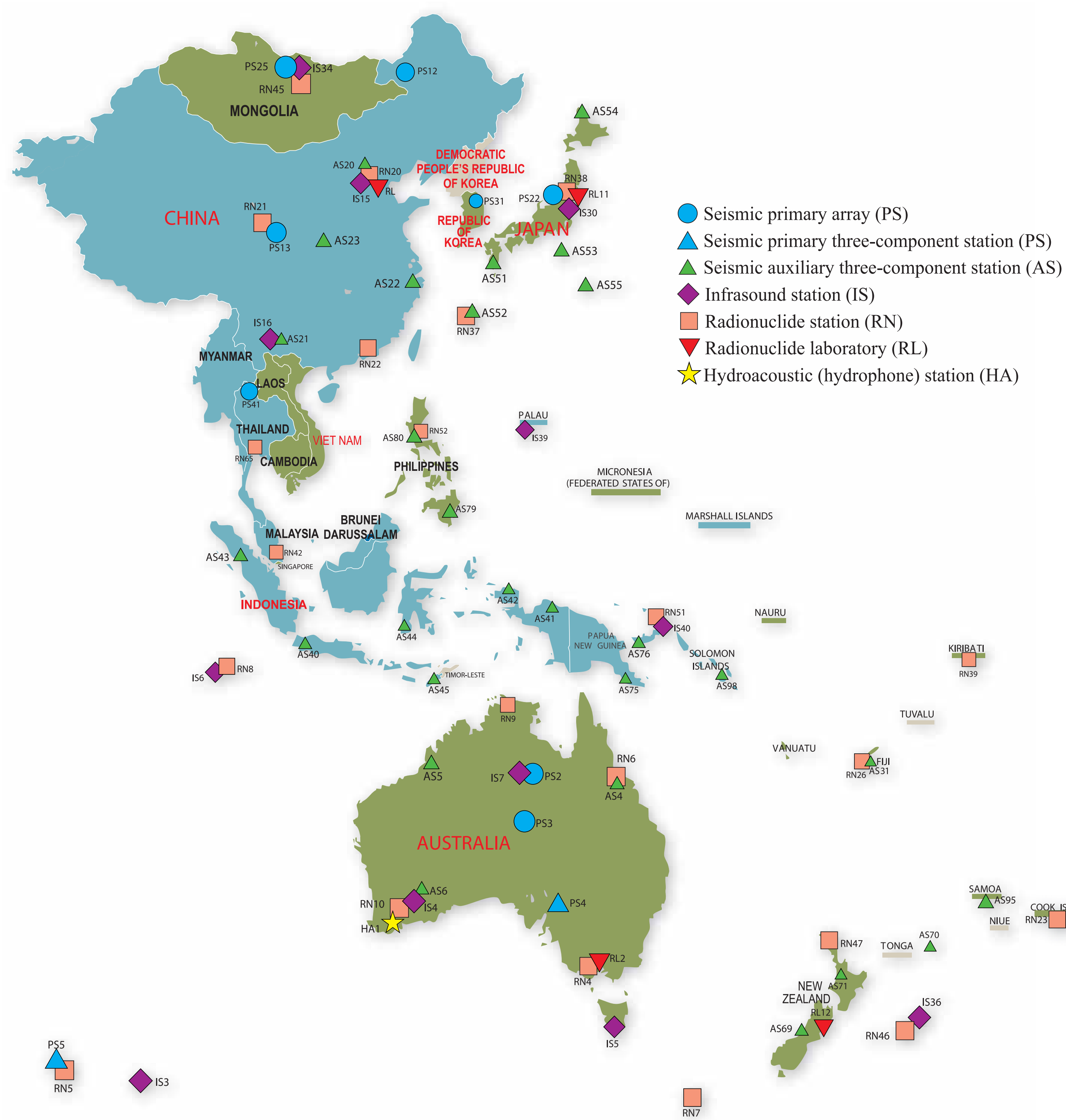
The cover article, by Gerardo Suárez, Director of the International Monitoring System (IMS) Division, describes the pioneering years of building the IMS network. With over 50% of the IMS stations certified, Mr Suárez, who will separate from the PTS at the end of July, leaves behind a legacy of which he can be very proud. I would like to use this opportunity to express my heartfelt gratitude for his work.

Some of the unique challenges IMS staff members may encounter when building new stations can be best appreciated when reading the 'Verification Highlights' article on establishing infrasound station IS39 in Palau. It shows how demanding the work of PTS staff members can be.

Tibor Tóth
Executive Secretary
Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization

South-East Asia, the Pacific and the Far East (SEAPFE)

IMS facilities as defined by the Treaty



Status of signatures and ratifications

	Signatory States	Ratifying States	Non-Signatory States
Total SEAPFE States: 32	27	17	5
Annex 2 SEAPFE States: 7	6	4	1

AS OF 17 JULY 2006

Notes & quotes

South-East Asia, the Pacific and the Far East and the CTBT

Since its inception, the Comprehensive Nuclear-Test-Ban Treaty (CTBT) has enjoyed strong support from States of the South-East Asia, the Pacific and the Far East region (SEAPFE)[1]. A State of this region, Fiji, was the first to deposit its instrument of ratification of the Treaty on 10 October 1996, a little over two weeks after it was opened for signature. Since then, 27 States out of the 32 in the region have signed the Treaty and become members of the CTBTO Preparatory Commission. Seventeen SEAPFE States have ratified it. The recent ratification by Viet Nam, which is one of the 44 States whose ratification is required for the Treaty's entry into force, highlights the continuing support the Treaty enjoys in the region.

SEAPFE States have a distinguished record in the field of nuclear disarmament and non-proliferation. The Treaty of Rarotonga (1985) established a nuclear weapon free zone in the Southern Pacific. In addition, Mongolia adopted legislation on its nuclear weapon free status in 2000. As a result, 14 States of the region adhere to regimes that complement the global test ban of the CTBT by prohibiting the testing of any nuclear explosive device. The large membership in these regimes is an encouraging indication of further support the CTBT can expect from the SEAPFE States.

The importance of the SEAPFE region for achieving universality of the Treaty is underlined by a number of factors. Seven out of the 44 States mentioned in Annex 2 to the Treaty, whose ratification is a condition for its entry into force, are located there.

[1]SEAPFE is one of the six geographical regions foreseen by Article II, paragraph 28 of the CTBT for the purpose of electing members of the Executive Council of the CTBTO once the Treaty enters into force.

Of these, all except one have signed the Treaty, but only four have ratified it. The sole nuclear weapon State in the region, China, has given positive signs regarding future ratification.

States from the SEAPFE region have frequently been elected to representative functions in the CTBTO Preparatory Commission. Japan (in 2001) and Australia (in 2005) presided over the Conference on Facilitating the Entry into Force of the CTBT (Article XIV Conference) which is convened regularly to decide on measures to accelerate the ratification process. The CTBTO Preparatory Commission was chaired by representatives from the region on three occasions: By the Republic of Korea in 1999, Indonesia in 2001 and Japan in 2004.

Since 2000, SEAPFE States have hosted several regional and sub-regional workshops and a seminar, sponsored by the Preparatory Commission to raise awareness of the Treaty and promote its signature and ratification, namely in Beijing (2000), Wellington (2001), Nadi (2003), Kuala Lumpur (2003 and 2006) and Seoul (2005). In order to further international cooperation between States in the region and the Preparatory Commission, the Commission seeks to strengthen its relations with the Association of South-East Asian Nations (ASEAN) and the Pacific Islands Forum.

The benefit of the Treaty for the region goes beyond fostering international cooperation and peace. The Commission promotes technical capacity building and exchange of information among its Member States and provides relevant training. Moreover, the tsunami of December 2004 has demonstrated the potential benefits of civil and scientific applications which the region may obtain from participating in the Treaty regime. ■

Facility Agreements with States in the SEAPFE regions

Under the CTBT, States hosting or otherwise taking responsibility for facilities of the International Monitoring System (IMS) shall conclude international agreements and arrangements known as facility agreements which regulate matters such as the establishment, upgrading, testing, certification and operation and maintenance of monitoring facilities as well as the privileges and immunities of the Organization and its staff.

The SEAPFE region comprises 32 States, six of which have concluded facility agreements with the Commission. All six agreements have entered into force and include those with Australia (2000), the Cook Islands (2000), Mongolia (2001), New Zealand (2000), Palau (2000) and the Philippines (2004). Of the six geographical regions stipulated in the CTBT, the SEAPFE region hosts the second highest number of IMS facilities. Under the monitoring regime provided for by the CTBT, a total of 78 facilities will be established in Australia, China, the Cook Islands, Fiji, Indonesia, Japan, Kiribati, Malaysia, Mongolia, New Zealand, Palau, Papua New Guinea, the Philippines, the Republic of Korea, Samoa, Solomon Islands and Thailand. Thirty-nine of these facilities have already been certified.

The SEAPFE region sets a good example in ensuring that monitoring stations are governed by the necessary legal framework. All countries in the SEAPFE region hosting monitoring stations have, with one exception, either concluded a facility agreement or an interim exchange of letters governing the conduct of activities at their respective stations. The latest entry into force of the agreement with the Philippines in 2004 marked a further important step in establishing the framework regulating the Commission's activities in the region. Negotiations for the conclusion of further facility agreements in the SEAPFE region are in progress. ■

Ratifying the CTBT – a view from Viet Nam

By Ambassador Nguyen Truong Giang

The Comprehensive Nuclear Test-Ban-Treaty (CTBT) is one of the pillars of the international regime on the non-proliferation of nuclear weapons. Once entered into force, it will constitute a solid legal basis to prevent nuclear explosions, thus contributing to the prevention of developing more advanced and more lethal types of nuclear weapons. In such ways, the Treaty reinforces efforts towards nuclear disarmament and non-proliferation which in turn helps enhance international peace and security.

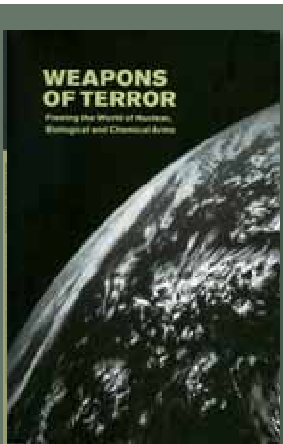
Viet Nam considers nuclear disarmament and non-proliferation as the key approach to free the world of nuclear weapons and provide for a comprehensive and complete ban of all nuclear test explosions and other types of tests designed to develop and upgrade nuclear weapons. Proceeding from this consistent position, Viet Nam fully supports the objectives and purposes of the CTBT.

Viet Nam was one of the first countries to sign the Treaty when it opened for signature on 26 September 1996 in New York. It ratified the Treaty on 23 February 2006 and deposited its instrument of ratification with the United Nations Secretary-General on 10 March 2006. With this decision, Viet Nam has become the thirty-fourth Annex 2 State to ratify the Treaty.

Convinced of the importance of achieving universal adherence to the CTBT, Viet Nam joins all others to call on those States, which have not yet ratified the Treaty, to do so soon. Viet Nam confirms its support for the commitments and concerted efforts of the international community towards achieving universal adherence to the Treaty at an early date. It commends the efforts of the Preparatory Commission for the Nuclear Test-Ban-Treaty Organization (CTBTO) in promoting the universality of the Treaty and the establishment of an effective verification regime designed to monitor compliance with the Treaty when it enters into force. In this regard, Viet Nam supports and encourages bilateral, regional and multilateral initiatives, including the organization of workshops and seminars to promote the entry into force of the Treaty.

In December 2003, Viet Nam and the Provisional Technical Secretariat (PTS) co-organized, with the assistance of Norway, a national workshop on the CTBT in Viet Nam, which played an important role in promoting the ratification process. We also encourage the PTS to continue its efforts in providing States with legal assistance, facilitating the exchange of experiences through consultation, disseminating relevant information and documentation in respect of the ratification process and the implementation measures, and encouraging cooperation with non-governmental organizations to raise awareness of the importance of the Treaty and the need for its early entry into force.

For its part, Viet Nam will continue to work hard with all other countries to enable the CTBT to achieve universal adherence, thus contributing further to the strengthening of world peace and security. ■



“ Explanations by the nuclear-haves that the weapons are indispensable to defend their sovereignty are not the best way to convince other sovereign states to renounce the option. The single most hopeful step to revitalize non-proliferation and disarmament today would be ratification of the CTBT by all states that have nuclear weapons.”

Final report of the Weapons of Mass Destruction Commission, ‘Weapons of Terror: Freeing the World of Nuclear, Biological, and Chemical Arms’, Stockholm, Sweden, 1 June 2006, page 61

Biographical note

Ambassador Nguyen Truong Giang, Permanent Representative of the Socialist Republic of Viet Nam to Austria, Slovakia, Croatia and the International Organizations in Vienna, joined the diplomatic service in 1980.

After completing the School of Diplomacy in Hanoi, he worked several years as a specialist in the Department of International Law and Treaties at the Ministry of Foreign Affairs, between 1998 and 2003 as a Deputy Director. He also served as Third Secretary at his country’s Permanent Mission to the United Nations in New York.

Ambassador Nguyen Truong Giang has completed a postgraduate research programme at the Institute of Social Studies in the Netherlands and holds a Master of Art from the Carleton University in Canada. He published extensively in the field of international law. ■

IMS: The pioneering years

continued from cover page

stations to meet the stringent specifications of the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

In the hydroacoustic technology, the IMS team worked on improving the placement of the three sensors described in the technical specifications. The final endorsement by the governing bodies to place the three sensors in a triangular array has shown its benefit in the ability to identify with an accuracy of only a few degrees the location of sources of the detected acoustic waves.

It was probably the infrasound technology that required the longest design phase. Infrasound technology had been dormant for many years and experts in the field could be counted on the fingers of one hand. In the early IMS days, many questions existed regarding the number of elements and the best geometry of an infrasound array. Thanks to the collaboration of many research institutions and with the experience of having built the first stations, the current design of a seven to eight-element station with pipe arrays to reduce incoherent noise was agreed to as being the most appropriate design needed for the difficult task of identifying and interpreting atmospheric acoustic events

The global radionuclide network was also the first one ever installed. Equipment that traditionally had operated under laboratory conditions had to be designed to survive and operate in remote and isolated locations where technical expertise is scarce. Software and hardware had to be adapted or developed to conform to CTBT specifications. A particularly difficult challenge was to design procedures for sending sensitive samples to radionuclide laboratories.

From the outset, the training of operators has been one of the backbones of the IMS. The need for well trained operators is particularly crucial to the radionuclide stations, since the radionuclide equipment requires the most knowledgeable and numerous operational staff.

The noble gas network was the only one to follow the classical path of design, test and implementation. Considering that no instrument was commercially available to meet the CTBT specifications, an International Noble Gas Experiment (INGE) was set up to develop the instruments. With the support of many institutions, four noble gas systems are now being tested at various IMS stations. (See article on page 22).

We soon learned that the difficulties of establishing the IMS network were not purely technical or logistical. The political nature of such an endeavour needed to be taken into consideration. In order to move forward with the build-up of the network, the IMS started establishing informal contacts with Working Group B delegates to initiate site surveys and start the construction of IMS stations in their countries. The Preparatory Commission requested the Provisional Technical Secretariat to sign facility agreements with all host countries of IMS stations, a very time-consuming process that normally requires parliamentary approval.

To alleviate the problem, the IMS began sending letters to some host countries requesting that they allow the installation of stations pending the signature of the facility agreement in the future. This practice was later formally accepted by the Commission and the IMS added to its tasks the procurement of letters that would authorize the build-up of stations while the facility agreement was still being negotiated. The result of an exchange of letters or the signature of a facility agreement was anxiously awaited in Vienna. Consequently, the IMS was unable to formulate an implementation plan with clearly defined goals. Stations could only be built at sites for which we had an exchange of letters or a facility agreement.

In those early days the tasks and challenges seemed to be endless. We had to build stations using a rapidly growing budget, negotiate exchanges of letters, hire staff at a breakneck pace, organize initial training programmes for every regional group, select and purchase equipment, and implement an ambitious site survey programme as the foundation of our work. The instructions of the governing bodies were to finalize the largest number of site surveys possible in order to be prepared for an accelerated implementation programme when the Treaty approached entry into force. The challenges confronting the IMS were replicated in every Division of the PTS: Everything had to be done from scratch and it had to be done fast.

It would be difficult and perhaps even unfair to single out institutions and countries that helped us in those frantic and hectic days. The IMS has benefited throughout these past nine years from the very generous support and collaboration of hundreds of institutions, both technical and political, all over the world. Based on these partnerships, a monitoring network has been built and the IMS was able to lay the foundations of its operation and maintenance concept.

The pace and expectations for the completion of the IMS were gradually tempered by political reality. Nonetheless, after nine years, Member States have a fully functioning International Data Centre that is receiving and processing data from over 180 stations. One half of the IMS stations are certified and approximately 85% of them are either certified, under testing or under construction. Plans are still firm for the completion of about 90% of the network by the end of 2007.

I believe that I can speak for most of my colleagues when I say that we in the IMS have a proud sense of accomplishment. The build-up of the IMS network, perhaps one of the more ambitious projects ever to monitor the earth, is now a reality. I can only hope that States Signatories also share this sense of pride in a project that they have so generously supported and financed. ■

GERARDO SUÁREZ, IMS DIRECTOR

Commission update

Report on the June 2006 session

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) held its Twenty-Sixth Session from 20 to 23 June 2006 in Vienna under the chairmanship of Ambassador Volodymyr Yel'chenko of Ukraine. Eighty-five Member States participated in the session. The League of Arab States attended as an observer.

The report of the Executive Secretary

Mr Tibor Tóth, Executive Secretary of the CTBTO Preparatory Commission, reported on the 2005 budget implementation, pointing out that the Provisional Technical Secretariat (PTS) achieved a 5% increase in the overall budget implementation rate for 2005 compared to 2004. He also addressed the status of the 2006 budget implementation and the proposals for the 2007 programme and budget which represent an overall decrease of US$ 150 000 compared to the 2006 budget.

The Executive Secretary expressed his concern about outstanding assessed contributions, stating that if the current trend continues a provisional cash deficit of about US$ 11 million can be expected by the PTS at the end of the year. As of 13 June 2006, the collection rates of assessed contributions for 2006 amounted to 67,8% of the US$ portion and 65,5% of the € portion. This is lower than at the same time last year, when they stood at 79% of the US$ portion and 73,6 % of the € portion.

Despite the difficult financial situation, the PTS made substantial progress in the establishment of the Treaty verification regime. In 2005, the Capital Investment Fund (CIF) implementation rate increased by 27% as compared to 2004. Since the beginning of 2006, five additional International Monitoring System (IMS) stations were certified, bringing the total number of certified IMS facilities to 167 out of 337. By connecting eleven new IMS stations to International Data Centre (IDC) operations, the number of stations in IDC operations reached the 50% mark.

The Executive Secretary reported also on governance issues, restructuring of the PTS, and human resources issues. He pointed out that the triple challenge of service limitation, restructuring and completing the build-up of the IMS network over the next two years created higher than usual levels of stress for PTS staff members. In addition, Mr Tóth informed about the scientific symposium to be held on 31 August and 1 September this year in Vienna, and about outreach efforts, training and the appointments of the new IMS Director and Chief of Internal Audit.

Plenary debate and conclusions

The plenary debate focused, *inter alia*, on budgetary issues, participation of experts from developing countries in Working Group B meetings, the restructuring of the PTS and the seven year service limit.

Member States welcomed the ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) by Antigua and Barbuda, Cameroon, Cape Verde, Haiti, Suriname and Zambia since the last session of the Preparatory Commission. States Signatories particularly welcomed the ratification of Viet Nam, an Annex 2 State.

States Signatories expressed appreciation for the capacity building, outreach and international cooperation activities undertaken by the PTS as well as for voluntary contributions from the European Union, the Czech Republic and the Netherlands to support capacity building through e-training.

Member States welcomed the plans for the scientific symposium and expressed their appreciation for the support of the event by Austria and the voluntary contribution by Hungary for an expert group meeting on civil and scientific applications of the CTBT to be held in Budapest shortly after the symposium.

The PTS was asked to prepare an options paper on a possible contribution of the Commission to tsunami warning systems and to continue efforts to build National Data Centre capacities in developing countries. ■

Profile of the Chairperson of the CTBTO Preparatory Commission

Mr Volodymyr Yel'chenko, Ambassador of Ukraine to Austria and Permanent Representative to the International Organizations in Vienna, is serving as Chairman of the CTBTO Preparatory Commission for 2006.

Ambassador Yelchenko studied International Relations and International Law at the Kyiv State University. He joined the diplomatic service in 1981 and served in various positions in the Ministry of Foreign Affairs and abroad, including as Second Secretary at the Permanent Mission of Ukraine to the United Nations in New York (1986-1992), and as Director of the Department of International Organizations (1995-1997) at the Ministry. Between 1997 and 2000, Mr Yelchenko served his country as Permanent Representative to the United Nations in New York, representing Ukraine in the Security Council in 2000 and 2001. In March 2001, he was President of the Security Council.

His assignment in New York was followed by a number of high-ranking positions in the Ministry of Foreign Affairs such as Deputy Minister of Foreign Affairs (2000-2001), Deputy Secretary of State for Foreign Affairs (2001-2003), Secretary of State for Foreign Affairs (March-May 2003) and First Deputy Minister of Foreign Affairs (May 2003-February 2005).

From May 2004 to April 2005, Mr Yelchenko chaired the National Commission of Ukraine for UNESCO and also worked as a Member of the UNESCO Executive Board. He took up his present post in Vienna in April 2005. ■

In the spotlight

Hon Phil Goff, Minister for Disarmament and Arms Control of New Zealand

Q: *New Zealand is a small country, yet it has been able to exert influence and win respect for the role it plays in promoting nuclear non-proliferation and disarmament in the world. As Prime Minister Rt Hon Helen Clark vividly expressed it: "New Zealand's goal is to see the complete, verifiable, and irreversible elimination of weapons of mass destruction. This is a deeply held, long term and consistent foreign policy priority."* [1]

How did New Zealand's stance on nuclear disarmament develop historically?

A: New Zealand has had a long and consistent history of speaking out strongly against nuclear weapons and nuclear testing. In 1958, at the United Nations, we called for the negotiation of a multilateral treaty to ban nuclear testing and in 1963 New Zealand was among the first signatories of the Partial Nuclear Test Ban Treaty.

From the 1960s to the 1980s, New Zealand advocated strongly against nuclear testing in the Pacific including taking this up with the International Court of Justice (ICJ) when we sought an end to atmospheric testing in 1973. We also welcomed the ICJ's advisory opinion that the threat or use of nuclear weapons was generally illegal, and that there exists an obligation "to pursue in good faith, and to bring to a conclusion, negotiations leading to nuclear disarmament in all its aspects under strict and effective international control".

New Zealand was one of the first countries to sign and ratify the Nuclear Non-Proliferation Treaty on 1 June 1968. New Zealand's ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 1999 further signalled our commitment to the end of nuclear weapon testing as part of our longstanding and active efforts to see the total elimination of nuclear weapons. In 1987, the New Zealand Nuclear Free Zone Disarmament and Arms Control Act 1987 established in New Zealand a nuclear free zone and also implemented in New Zealand the South Pacific Nuclear Free Zone (the Treaty of Rarotonga).

> "The entire international community stands to benefit from full endorsement of an international regime that has as its fundamental obligation the prohibition of nuclear weapons testing."

The actions we have taken internationally and domestically reflect the high level of public and broad political support that our long-standing anti-nuclear stance continues to enjoy.

Q: *The United Nations Secretary-General, Kofi Annan, once called the New Zealanders 'model international citizens'.*

What is the driving force behind New Zealand's engagement in nuclear disarmament?

A: The main driving force behind New Zealand's engagement in nuclear disarmament was the knowledge of the catastrophic consequences of the use of nuclear weapons. Conflict has always been a human weakness but for the first time mankind had the potential to destroy itself.

Our own region, the Asia-Pacific, was a major testing zone for the nuclear weapon States and more significantly, is the only region which has experienced the use of nuclear weapons. Hiroshima and Nagasaki continue to be symbols of determination to prevent the human suffering, loss of life and massive destruction from the use of nuclear weapons. That must never happen again.

The history of nuclear testing in our region, the Pacific, brought the cold reality of nuclear weapons close to our shores. The irreparable damage caused by nuclear explosions can be catastrophic for any country but especially for small island States. Nuclear testing in our region served to highlight the fragility of communities in the South Pacific that rely heavily on the environment for their economic livelihoods. This strengthened our resolve to work for progress towards nuclear disarmament.

The total elimination of nuclear weapons represents the ultimate goal for New Zealand. New Zealand's priority has always been and remains, a nuclear weapons free world. New Zealand will continue to speak out against nuclear weapons, seeking an end to their development, testing and use under any circumstances.

Q: *New Zealand was, together with Australia, instrumental in proposing and setting up a nuclear weapon free zone in the South Pacific, encompassing Australia, New Zealand and the Pacific Island countries south of the equator, also called the Rarotonga Treaty.*

How did the Treaty so far contribute to regional security? What other regional

[1] The Prime Minister's address to the Parliamentary Network for Nuclear Disarmament, 8 December 2004

initiatives is New Zealand envisaging to further the nuclear disarmament cause?

A: New Zealand remains committed to working with like-minded countries, including as part of the New Agenda Coalition, for a world free of nuclear weapons. This includes pressing for greater progress on commitments made under the Nuclear Non-Proliferation Treaty, in particular the unequivocal undertaking on nuclear disarmament given by the nuclear weapon States, encouraging universalisation of the CTBT, particularly by Annex 2 States, and promoting the establishment of the Southern Hemisphere Nuclear Weapons Free Zone.

The widespread support for the South Pacific Nuclear Free Zone demonstrates how countries can further the nuclear disarmament cause within regions.

From a global perspective all nuclear weapon free zones are complementary and mutually reinforcing of each other. All are united in their renunciation of nuclear weapons. Such zones represent a fundamental reaffirmation of regional solidarity against nuclear weapons and we support proposals for the establishment of new nuclear weapon free zones in Central Asia, South Asia and the Middle East. New Zealand also works with Brazil on an annual resolution at the United Nations General Assembly to promote an initiative to create a Southern Hemisphere free of nuclear weapons.

Q: *New Zealand hosts seven International Monitoring System stations and has been a strong supporter of the CTBT. This was also expressed in a press release of March this year by your Office on the occasion of Viet Nam's ratification of the Treaty: "The entry into force of the CTBT is a priority for New Zealand. … Viet Nam's ratification has now brought us one step closer to having the ban on nuclear explosions in force under international law."*

What regional and global measures has New Zealand undertaken to encourage other States to sign and/or ratify the Treaty?

A: New Zealand remains fully committed to encouraging the universalisation of the CTBT. For New Zealand it is important that we back our political support for the Treaty by assisting the CTBT in its efforts to encourage States that have not yet done so to ratify the Treaty. Our emphasis has typically been on our own region, the Pacific, although where appropriate we have made bilateral representations encouraging those countries that have not done so to ratify the CTBT. While ratification by Annex 2 States is a requirement for the Treaty ultimately entering into force, all ratifications are important and add to the universality of the Treaty.

In the United Nations General Assembly New Zealand continues to play a lead role along with Mexico and Australia in coordinating an annual CTBT resolution which has achieved near consensus support. In addition, as part of a group of ten countries based in Vienna (G10), New Zealand co-authored a paper on the CTBT at the NPT Review Conference last year. This paper noted that the CTBT "constitutes an effective measure of nuclear disarmament and nuclear non-proliferation in all its aspects and is vital to the NPT".

Q: *In your view, what are the main benefits of joining the CTBT?*

A: The entire international community stands to benefit from full endorsement of an international regime that has as its fundamental obligation the prohibition of nuclear weapons testing. Although the CTBT has yet to enter into force, the near universality of the CTBT sends a strong signal about the legitimacy of nuclear weapons testing and development.

The build up of the International Monitoring System (IMS) has real value in supporting global stability. IMS technologies also have civil applications and, for example, might contribute to a tsunami warning system. The Provisional Technical Secretariat (PTS) is doing good work in this regard but we can not afford to be complacent. Maintaining its momentum is a key priority for New Zealand. Only upon entry into force will this Treaty and its global verification regime be fully operational. A fully operational CTBT would be the first line of defence against nuclear testing, and, as such, a fundamental contribution towards nuclear disarmament. ■

Biographical note

Since first entering parliament in 1981, Phil Goff has held numerous portfolios including Foreign Affairs and Trade, Justice, Education and Housing.

During the period 1990 to 1993, he lectured in Political Studies at the Auckland Institute of Studies and undertook a Foreign and Commonwealth Office Scholarship to Nuffield College, University of Oxford in 1992.

His interest and experience in international affairs sees him currently hold the portfolios of Minister of Trade, Minister of Defence, Minister for Trade Negotiations, Minister of Pacific Island Affairs, Minister for Disarmament and Arms Control and Associate Minister of Finance. ■

Perspectives

Japan’s contribution to the CTBT

By Ambassador Yukiya Amano

Following World War II, Japan made disarmament and non-proliferation one of the major items on its foreign policy agenda. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) in particular has a special significance for Japan and the Japanese people, and it is the fervent wish of the Japanese to see its entry into force. This sentiment derives from reactions to the tragedies in Hiroshima and Nagasaki in 1945, as well as an incident involving the exposure of a Japanese fishing boat and its crew to radioactive fallout from a U.S. hydrogen bomb test at Bikini Atoll in 1954.

CTBT and Japan

Japan’s support of the CTBT also stems from its consideration for ensuring national security. Northeast Asia is one of the most unstable regions in the world. Japan itself is surrounded by countries with nuclear weapons, namely, China, Russia and the USA; and, last year, the Democratic People’s Republic of Korea publicly announced its possession of nuclear weapons. It should be stressed that any form of nuclear testing conducted by a country would severely damage efforts to deter nuclear testing in general, thereby undermining security.

The CTBT is also important for international security. The Treaty on the Non-proliferation of Nuclear Weapons (NPT) is the central pillar of the nuclear non-proliferation regime and one of the important cornerstones underpinning global security. For it to function successfully, confidence needs to be maintained and strengthened in its three pillars: nuclear disarmament, nuclear non-proliferation, and the peaceful use of nuclear energy. Given the symbolic significance of the CTBT for nuclear disarmament in general, the wider the support for it is, the greater the confidence in the NPT, thereby leading to a strengthening of international security.

Japan has consistently made it a priority to support the conclusion and entry into force of the CTBT because of its importance to Japan and the world as a whole. When Japan joined the United Nations (UN) in 1956, the Foreign Minister, Mamoru Shigemitsu, called for the early conclusion of the CTBT in his first speech made to the General Assembly.

> “Japan has consistently made it a priority to support the conclusion and entry into force of the CTBT because of its importance to Japan and the world as a whole.”

CTBT negotiations

When negotiations for the Treaty did not start due to a lack of support from major countries, the late Dr Shigeji Suyehiro, Director-General of the Japan Meteorological Agency, played a key role in the work of the Group of Scientific Experts, which was formed in 1976 to prepare the ground for CTBT negotiations. As a country located in an earthquake-prone zone, Japan’s knowledge and experience were useful in defining the technology required to detect underground nuclear testing.

When finally in 1993 countries agreed to start negotiations, Yoshitomo Tanaka, Ambassador of Japan to the Conference on Disarmament, chaired the Ad Hoc Committee on a Nuclear Test Ban and played an important part in working to reach an agreement on its mandate.

I, personally, participated in negotiations from 1994 to 1997 while fulfilling my assignment at the Delegation of Japan to the Conference on Disarmament in Geneva. Japan opposed the authorisation of low yield tests and nuclear explosions for peaceful purposes and this was reflected in the final version of the Treaty.

Dr. Suyehiro also played an important role in the development of the IMS network.

What I regret most to this day are the specific conditions set forth in the Treaty’s ‘entry into force’ clause. Japan proposed a simple majority of ratifications and was opposed to Article XIV as it stands today. At the final stage of negotiations, the late Foreign Minister, Yukihiko Ikeda, came to Geneva in an attempt to persuade countries to relax the conditions required for entry into force of the Treaty, but the present formula was ultimately preserved.

Japan’s contribution to the CTBT

Japan’s contribution to the CTBT since it was adopted by the UN General

Assembly in 1996 can be divided into three areas: the Preparatory Commission's activities, the promotion of the entry into force of the Treaty, and civil and scientific application. Ever since the Preparatory Commission was established in November 1996, Japan has contributed about 20% of its total annual budget, and we are now the *de facto* largest contributor to the Commission.

As part of our efforts to support the build-up of the verification regime, Japan has been offering training courses on seismological observation to experts from developing countries since 1995. In 2003, Japan hosted the Ninth On-Site Inspection Workshop in Hiroshima.

We have chaired, and actively participated in, Article XIV Conferences and have co-organized CTBT Ministerial meetings in order to promote the early entry into force of the Treaty. In addition, we have used every opportunity in our bilateral consultations with countries concerned to encourage ratification.

Japan is an active supporter of the use of CTBT verification technologies, including the provision of IMS seismic data for use in tsunami early warning systems. Although civil and scientific applications are not one of the Treaty's prime objectives, it would be excellent if CTBT technologies could be used to save lives, thanks to the flexibility of Member States.

On a separate issue, it is surprising to note that there are only four Japanese staff members working for the Provisional Technical Secretariat (PTS), 2.29% of the total staff. This extremely low percentage is unfortunate in view of Japan's considerable financial, technical, and political contributions to the CTBT. However, the good news is that many highly qualified Japanese are currently applying for posts in the PTS and I feel sure they will join the Organization in the near future and make a valuable contribution to the CTBTO Preparatory Commission.

Importance of the CTBT and its entry into force

Looking ahead, there seems little prospect of the CTBT coming into force in the near future, bearing in mind the strict conditions set forth in the Treaty. In fact, ten of the 44 countries required to ratify before the Treaty can come into force have still not done so. Nevertheless, as of 17 July 2006, 176 countries have signed and 134 have ratified. This fact carries a politically and morally significant weight. Furthermore, 60% of IMS stations are now transmitting data to the IDC allowing us to detect nuclear tests with a considerably high degree of certainty. All of these factors considered, conducting nuclear tests has now become politically and morally very difficult despite the fact that the CTBT has as yet not come into force.

It is regrettable that India and Pakistan conducted eleven nuclear tests in 1998, but since then no further tests have been carried out. The five nuclear powers as well as India and Pakistan have all declared a moratorium on nuclear testing. This is a clear indication of progress brought about by the CTBT, especially when one considers that more than 2,000 tests were conducted before the adoption of the Treaty.

In conclusion, what we, as supporters of the CTBT, can and should do for the moment is to encourage signature and ratification by as many countries as possible and work for the early completion of the CTBT verification regime. ■

Biographical note

Mr Yukiya Amano is Ambassador Extraordinary and Plenipotentiary and Resident Representative of Japan to the International Organizations in Vienna. He is currently the chairperson of the Board of Governors of the International Atomic Energy Agency.

Mr Amano joined the diplomatic service in 1972 and has held increasingly senior positions, including Director of the Science Division, Director of the Nuclear Energy Division, and Director-General of the Disarmament, Non-proliferation and Science Department. He has also held academic posts at the Japan Institute of International Affairs, the Weatherhead Center for International Affairs at Harvard University, the Monterey Institute of International Studies, and Sophia University.

Mr Amano participated in negotiations such as the NPT Review and Extension, the CTBT, the BTWC verification protocol, and the amendment of CCW. He represented Japan as a Governmental Expert on the UN Panel on Missiles in 2001 and in the UN Expert Group on Disarmament and Non-proliferation Education in the same year. ■

Verification highlights

The main activity of the CTBTO Preparatory Commission is the establishment of a global verification regime, capable of detecting nuclear explosions underground, underwater and in the atmosphere. As defined in the Treaty, this regime consists of an International Monitoring System supported by an International Data Centre, consultation and clarification mechanisms, on-site inspections and confidence-building measures, all of which must be operational at the Treaty's entry into force.

IMS network status

The establishment of the International Monitoring System (IMS) network has continued in all four technologies – seismic, hydroacoustic, infrasound and radionuclide. The complete network includes 321 stations and 16 laboratories in 89 countries.

As of 1 January 2006, 156 stations have been certified, including six radionuclide laboratories, 63 stations were installed and substantially met specifications. In addition, 62 stations were either already under construction or under contract negotiation, and 95 stations as well as four radionuclide laboratories had contracts for operation and maintenance. During the last six months, five additional stations have been certified. Furthermore, approximately 182 stations were configured in the International Data Centre (IDC) operational system.

As the IMS network approaches completion, the focus shifts from the building of stations towards their sustainable maintenance. By the end of 2007, the PTS expects that approximately 90 per cent of the IMS network will be installed. ■

Challenges of establishing infrasound station IS39 in Palau

PALAUAN WORKERS CONSTRUCTING THE REPEATER SITE OF INFRASOUND STATION IS39, PALAU

When establishing International Monitoring System (IMS) stations, staff members of the Provisional Technical Secretariat (PTS) are not only confronted with logistical and engineering hurdles, but need to handle carefully the political, social and cultural sensitivities in the host country.

A particularly good example of this multi-faceted approach to IMS station building is infrasound station IS39 in Palau. From the political negotiations to obtain permission to use land for IMS station purposes in 2001 through identifying suitable sites for the infrasound arrays and the actual station construction, to the final certification visit in 2005, the station establishment process was filled with challenges that are specific to the social, political and environmental contexts of Palau.

ON THE WAY TO THE INFRASOUND ARRAY SITE

The Republic of Palau is located about 800 kilometres east of the Philippines and 800 kilometres north of Papua New Guinea in the North Pacific Ocean. It consists of over 200 islands, of which only nine are continuously inhabited. The Palau archipelago stretches almost 650 kilometres in a north-south direction with a total land area of nearly 460 square kilometres and an exclusive economic zone of 600,900 square kilometres.

Palau's topography varies from the mountainous island of Babeldoab with its dense rainforest, where IS39 is located, to coral atolls typically fringed by large barrier reefs. Palau is considered one of the most biologically diverse countries on earth. Its abundant marine life makes it one of the world's top scuba-diving destinations.

With a population just under 20,000, the small island nation's economy is based on tourism. Government is currently the major provider of infrastructure, services and employment. Agroforestry is the traditional

agricultural practice in the country. It accounts for one percent of national output and income, the same as manufacturing.

In 1994, Palau became independent in free association with the United States, with a constitutional government and a market-based democracy. Palau`s society is a complex blend of old traditions and western concepts. The system of government has three interdependent authorities – national, state and traditional. The traditional culture is based on clans and chiefdoms, which still operate both within and outside constitutional government. There is a strong matrilineal tradition in Palau and women remain powerful in family life, particularly through their influence in land matters.[1]

'AIRAI BAI', TRADITIONAL MEETING HOUSE FOR THE GOVERNING ELDERS, KOROR, PALAU

Land played a major role in the unfortunate colonial history of Palau. Germans began taking land from Palauans in 1899 and the Japanese brought large portions of Palauan land under their control after they succeeded the Germans in 1914. Between 1947 and 1994, Palau was part of the United Nations Trust Territory of the Pacific Islands, administered by the United States. The Americans began to return land to dispossessed Palauans. There is, however, a fundamental difference in the Anglo-American concept of ownership and the traditional Palauan understanding of land rights. Today, land ownership is one of the main issues in Palau. Foreign ownership of land is prohibited by the Constitution. The Land Claims Reorganization Act of 1996 determines ownership of all land. Land once owned by individuals, clans or lineages will have to be returned to them, which led to the situation that thousands of Palauans are involved in an estimated 30,000 cases of real estate litigation.

CENTRAL POWER SITE WITH SOLAR PANELS, IS39, PALAU

It is against this background that a senior PTS manager convinced the Palauan authorities to have an IMS station built on Palauan land. To achieve this, he needed to navigate carefully between local traditional and state authorities, as well as the Ministry of Foreign Affairs. Key players in this context were Mr John B. Skebong, Governor of the State of Ngaremlengui[2], where IS39 is located, and Mr Isaac Soaladaob, Chief, Division of Foreign Relations, in the Ministry of Foreign Affairs.

Besides the land issue, the small island nation is highly sensitized about nuclear issues. In 1979, the people of Palau voted overwhelmingly for a Constitution which prohibited the use, testing, storage or disposal of nuclear, chemical and biological weapons, and the entry into State territory of both nuclear-power and nuclear-armed ships and aircraft. Consequently, when voting for the Compact of Free Association

[1] Palauan women were also at the forefront of the grassroots movement to keep Palau nuclear-free.
[2] Palau consists of 16 states. Each of them has its own Constitution and independent government headed by an elected governor. His responsibilities include land use planning, environmental protection and health and welfare.

Verification highlights

Challenges of establishing infrasound station IS39 in Palau

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CERTIFICATION TEAM USING U-BEAM TO ACCESS INFRASOUND SITE WHILE BRIDGE IS BEING RECONSTRUCTED, PALAU, JUNE 2005

with the United States, they did not approve the second question in the referendum that would have allowed nuclear materials in its territory. The struggle of upholding the constitutional right of Palau to be nuclear-free nearly split the closely-knit society of the island State. Ten referenda were held on either the Compact or the Constitution. None yielded the 75% majority required to change the Constitution. The Palau Supreme Court finally ruled that the three-quarters majority needed to amend the Constitution could be replaced by a simple majority (51%). In 1993, the Palauans voted to suspend the anti-nuclear provisions of the Constitution and the Compact was finally approved in 1994.

CERTIFICATION TESTS AT INFRASOUND ARRAY ELEMENT H5 OF IS39, PALAU, JUNE 2005

The awareness created by the political struggle for a nuclear-free Palau made it easier for the PTS negotiator to convince the Palauan authorities that the goals of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) are consistent with their own goals. The next step was to identify a suitable site for the IMS station close to the Treaty location coordinates on a rocky outcrop on the western shoreline of the Babeldoab Island. It turned out that the area was insufficient for an infrasound array. Hence, an area further east, in the interior of the Babeldoab Island, was identified.

The terrain on the Babeldoab Island is characterized by small hills and knolls with steep gullies in between which are covered with thick jungle forest vegetation. Creeks often run at the bottom of the gullies. The height of the trees increases with the depth in the gully and can reach more than 15 metres. The low-lying flat areas are covered with coarse, one and a half metres high grass, whereas the tops of the hills are frequently covered wit thick ferns of the same height. During rain seasons, low-lying areas are subject to flooding and the whole terrain becomes very muddy and slippery.

During a three weeks site survey mission in 2001, three PTS staff members and Dr Milton Garces from the Infrasound Laboratory of the University of Hawaii, United States, with the assistance from the Palauan Bureau of Foreign Affairs, tried to determine a suitable location for the seven elements infrasonic pipe array. They were confronted with exceptional challenges in difficult environmental conditions, such as carrying heavy equipment up- and downhill on muddy and slippery jungle ground, finding a path in the dense rainforest without GPS and no good maps, having to use machetes to slash a way through the thick vegetation of lacerating grasses and stinging trees. One can easily imagine that in a climate with nearly 100 percent humidity and a temperature of 32˚C even the simplest tasks require great effort.

In the following narrative, Mr Milton Garces describes a typical field day in Palau, when the installation team had to check the array site area for unexploded ordnances (UXOs). Hundreds of these dangerous remains from the Pacific War were buried by the Japanese in the jungle of the island.

"The fresh colours of dawn clash against the blast of humidity that greets us when we open the hotel door. After yesterday's downpour, the air is finally cleared of the volcanic ash from the eruption of Anathan volcano in the Marianas, located about 1500 kilometres away from Palau. In the dim twilight, we wave to the friendly neighbours sitting on the side of the road by our hotel. We load our mud-crusted shoes and equipment in the four-wheel-drive car, and take off to the car rental company to change it for the third time. The 4WD on the

first car did not really work, as we learned before the excavator pulled us off the swamp. This second car did not have any threads on the tires, which prevented us from going uphill in the mud, a distressing realization to make after going downhill. Fortunately, we had enough flat ground to get a running start, and after a few slippery tries we made it back up the hill. Today the car rental agent greets us with the anticipated relish of another good story to laugh about. He congenially gives us car number three, which has some tire threads and a functional 4WD, but no air conditioner.

On our way to the array site with our vehicle upgrade, the service engine light goes on. We ignore it, as this is a permanent feature of almost every rental. We take the dirt track that leads to the central array site, where we meet our unexploded ordnance (UXO) consultant at the gate, who will help us look for potentially explosive surprises in the jungle.

Past the gate, we descend through the taro farms to find yesterday's rains have swept off our access bridge to the array site. We park the car a safe distance from the river bank and cross the river by foot, washing yesterday's mud off our boots. The sun is now approaching the zenith, and we are completely soaked from the steam and evaporation of yesterday's rain.

We enter the forest with our metal detectors and survey tape, invariably taking a few slips until we remember the sensitive walking style required in dark, muddy, mossy, vine tangled tropical jungles. There is no GPS reception under the deep canopy, so we navigate using small but recognizable signs in the forest ecosystem, light cues, topographic changes, and massive amounts of flagging tape. We find rifle shells, some sake bottle shards, but no large munitions, so we leave the central array site.

The last, and most challenging sensor vault is at the bottom of a steep incline held together primarily by tree roots. After one of our engineers rolled down the hill, coming to an abrupt and painful stop by straddling a tree, we deployed a descending rope system to assist in the lowering of personnel and material. We slowly make our descent into the forest, slipping in the soaked ground and hanging on to the rope for dear life. At the bottom of the incline we survey a deep horizontal tunnel dug into the mud by Japanese troops. We find no UXO's. We release

PTS RENTAL CAR BEING TOWED OUT OF THE MUD BY EXCAVATOR, PALAU

accumulated stress with a volley of dark humour, and privately heave a sigh of relief at having kept our limbs.

As we begin driving back to town under the waning light of dusk, the clouds burst open with heavy, impenetrable rain. The road is now a river of mud. Our windows are mostly up, but since we have no air conditioner, we need to have them partly down to prevent complete fogging of the windshield. Driving at a crawl, we watch as all light is extinguished, leaving us in a dark and slippery obstacle course. As rapidly as the rain came, it dissipates.

We cruise into our hotel, waving from our mud-encrusted vehicle to the same friendly neighbours, who are (still?) sitting by the side of the road, but now surrounded by children.

Tired from another challenging day in the field, we dine on local fish and vegetables and go to bed with hopes that our shoes dry a bit better tonight."

LEFT-OVER AIRPLANE FRAGMENT FROM WORLD WAR II FOUND LYING NEAR THE INFRASOUND SITE, PALAU

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Verification highlights

Preparations for the Integrated Field Exercise in 2008

In February 2006, Working Group B endorsed the planning for the preparation and conduct of the 2008 On-Site Inspection (OSI) Integrated Field Exercise (IFE08) which will be held in the second half of 2008. The planning phase started in early 2006 and the exercise will be concluded with the final debriefing in 2009.

According to the OSI Strategic Plan, integrated field exercises are considered a pre-eminent activity of the first development cycle of the OSI regime. The IFE08 aims at integrating the many techniques and activities identified by the Comprehensive Nuclear-Test-Ban Treaty (CTBT) throughout the various phases of an OSI. It also aims at integrating the efforts of the various units of the Provisional Technical Secretariat (PTS) which will contribute to the preparation, conduct or support of an OSI. There will be a need to coordinate areas such as training, human resources, finance, logistics, communications and infrastructure.

A two-level managerial approach has been set up for addressing the challenges raised by the preparation of the IFE08: The first level foresees a project coordinator, who organizes and prepares meetings of an 'Expert Advisory Group' (EAG) and a 'PTS-wide Coordination Group'.

BOARDING M18 HELICOPTER FOR VISUAL OBSERVATION AND GAMMA SURVEY, 2005 DIRECTED EXERCISE (DE05), KAZAKHSTAN.

ENVIRONMENTAL SAMPLING, 2005 DIRECTED EXERCISE (DE05), KAZAKHSTAN

The EAG, consisting of national experts in their personal capacity, meets with PTS staff members to consider issues requiring particular attention and expertise. Initial discussions so far included general design, scenario and equipment issues. PTS staff members, representing their units, constitute the PTS-wide Coordination Group that meets as required to consider issues that need enhanced coordination. Specialized sub-groups have been identified for areas such as communications and infrastructure. They focus on specific issues and report to the main group.

The second level comprises a project manager and a task force that includes consultants, national experts and PTS staff members. Building on the recommendations of the EAG and the PTS-wide Coordination Group as well as on the decisions by the OSI Director, the project manager will arrange for the detailed preparation and support of the IFE08. In coordination with the host country, the project manager will make sure that equipment, already in PTS custody or lent by Member States, could be transported, utilized and maintained in the field. He will ensure that participants, who should have received prior training, as well as members of the control team or the evaluation team will benefit from logistical and administrative support. Another important task is to set up the whole exercise, including the preparation of a suitable inspection area and the development of a detailed test-scenario. This should allow for the implementation of the provisions in the 'test manual', which were developed by Working Group B to support the IFE08. Furthermore, additional documentation such as standard operating procedures and guidelines are currently under development.

Both the project coordinator and the manager are working under the supervision of the OSI Director, who is responsible for decisions regarding the Integrated Field Exercise and for reporting about the status of preparations to the Executive Secretary and the Preparatory Commission.

These arrangements for the preparation of the IFE should allow the PTS to maximize the benefits from the unprecedented interest and the financial efforts made by the Commission for an activity of this kind. ■

The role of National Data Centres in the System-wide Performance Test

National Data Centres (NDCs) are the main recipients of data, products and services provided by the Provisional Technical Secretariat (PTS). As such, NDCs have a valuable role to play in many aspects of the evaluation of the first System-wide Performance Test (SPT1). This was also recognized by Working Group B, when preparing for the performance testing phase which took place from April to June 2005. To ensure that the development of the verification regime would benefit fully from the cooperation efforts of the NDCs, the PTS set up guidelines and indicated specific areas where NDCs then chose to focus their work. The evaluation was based on the comparison of results obtained independently from the International Data Centre (IDC) and from the NDCs.

For this purpose, the IDC received relevant contributions from several NDCs:

- two NDCs provided seismoacoustic detection lists,
- nine NDCs shared seismological bulletins, and
- four NDCs submitted radionuclide analysis reports.

The comparisons between the IDC Reviewed Event Bulletin (REB) and NDC bulletins focused on assessing the IDC detection capability and event locations accuracy within corresponding national networks. As a result, it turned out that in many regions detection thresholds are at magnitude four or below, as inferred from the magnitude of missed events and in general fitting into the theoretical model of monitoring thresholds produced by the IDC. Contributions from NDCs can be a valuable source of events whose location and origin time were measured with high accuracy. These data are very important for assessing the IDC's location accuracy. Within SPT1, some 20 events in Scandinavia and the Baltic Sea – and additional ones from former years – were obtained for further assessment of IDC location procedure.

Another important field of cooperation within the SPT1 was the assessment of analysis capabilities in the radionuclide technologies. During the April - May 2005 phase, the SPT1 focused on the analysis of the IDC radionuclide products through comparison with results of analyses carried out at NDCs. In a specific test case conducted in June 2005, the PTS released a set of 100 artificially spiked radionuclide spectra to perform benchmarks on the capability of the various analysis software modules available at the IDC and the NDCs in finding the corresponding signals.

A total of twelve NDCs participated in the implementation of specific test case scenarios that included testing of:

- the PTS's capability to incorporate, upon an NDC request, data from the prototype Cooperating National Facilities into IDC analysis of specified events;
- the capacity of the IDC request system to provide the NDCs with quick access to a large amount of data; and
- the capability of automatic and interactive data processing at the IDC and radionuclide laboratories by analyzing a set of hundred artificial radionuclide spectra.

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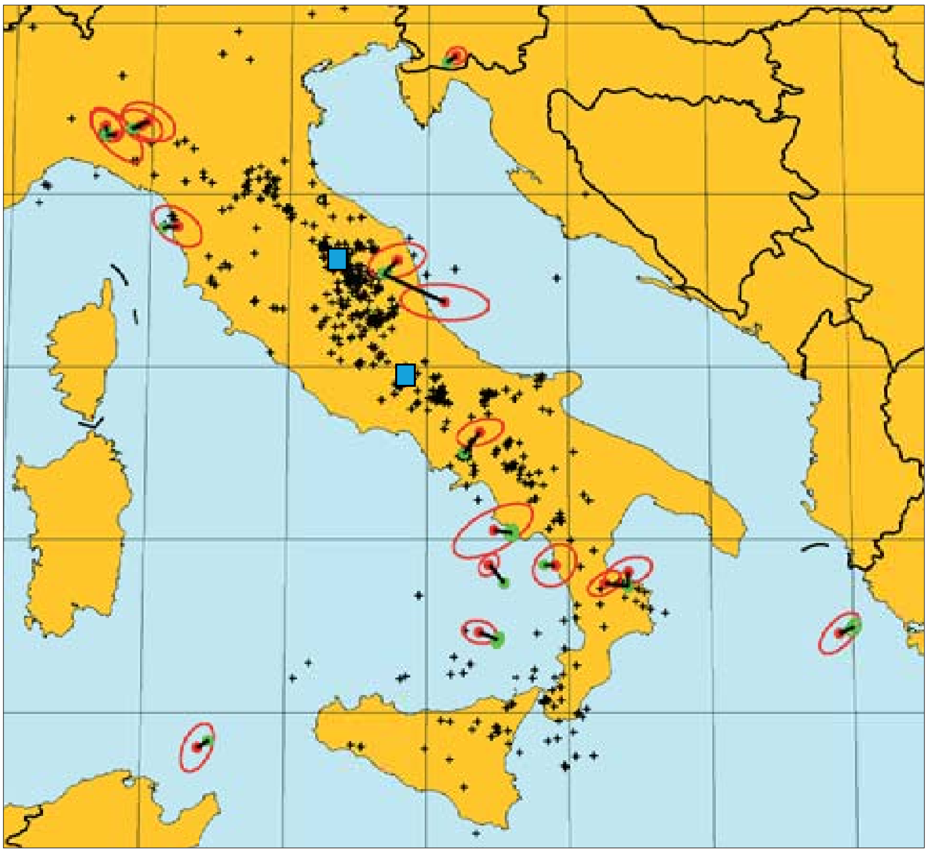


MAP OF 801 EVENTS DETECTED BY THE ITALIAN NDC WITHIN OR CLOSE TO THE NATIONAL NETWORK (BLACK CROSSES). EIGHTEEN EVENTS WERE LOCATED BY BOTH IDC AND NDC (MAGNITUDE ML =3.0-4.1), WHICH ARE DEPICTED BY RED AND GREEN CIRCLES THAT CORRESPOND WITH ERROR ESTIMATES. THE LOCATIONS OF THE TWO LARGEST EVENTS FROM THE NDC BULLETIN (MAGNITUDE ML =3.5-3.6) NOT FOUND IN THE REB ARE DEPICTED BY BLUE SQUARES.

Verification highlights

Potential contributions of IMS stations to an Indonesian Tsunami Warning System

More than one and a half years after a massive earthquake off the coast of Sumatra sparked a tsunami that killed or left missing 216 000 people, the countries of the region are working hard to establish efficient tsunami warning systems.

Indonesia, which bore the brunt of the devastating December 26 tsunami, plans to spend US$ 125 million on setting up its own tsunami detection system. The unique geography of the country with nearly 18,000 islands, extending more than 5,000 kilometres from east to west and nearly 2,000 kilometres from north to south, makes this a challenging task.

Under the terms of the Treaty, Indonesia[1] hosts six International Monitoring System (IMS) auxiliary seismic stations which are located in such a way that they can capture any major disturbance on the Indonesian territory. Data from the IMS stations can be sent in real time to Jakarta using satellite communication. In combination with other resources, such as early-warning buoys and the local seismic stations, data from the IMS stations can contribute to decrease substantially the time span needed for issuing a timely tsunami warning.

NANOMETRICS ENGINEER INSTRUCTING LOCAL STATION OPERATOR, AS43, PARAPAT, INDONESIA, JAN. 2004

[1] Indonesia is one of the 44 States mentioned in Annex 2 of the Treaty, whose ratification is a condition for its entry into force.

The six IMS stations use the most advanced technology that is available on the market and is compatible with the equipment employed in the Indonesian Tsunami Warning System. Furthermore, they are part of the IMS seismic network that receives data from around the globe which are also distributed to other countries of the region for tsunami warning purposes.

DIGGING A TRENCH FROM THE SENSORS TO THE CENTRAL RECORDING FACILITY, AUXILIARY SEISMIC STATION AS44, KAPPANG, INDONESIA

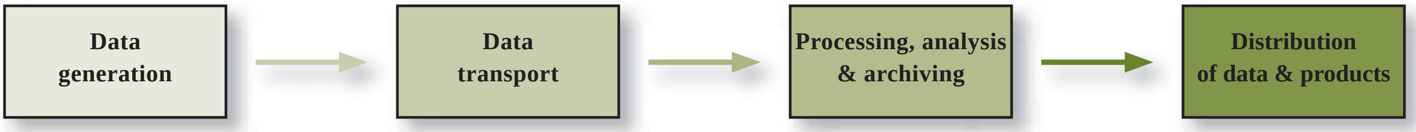
So far, one auxiliary seismic station, AS43, located on Sumatra, has been certified. Two more stations, AS44 on Sulawesi and AS45 on Timor, are expected to be certified in the course of this year. For the rest of the stations, the Provisional Technical Secretariat (PTS) is in negotiations with the Indonesian authorities. Construction work for AS40 located on Java and AS41 and AS42 on Irian Jaya is scheduled to start in the course of this year.

Once all six stations are fully operational, the seismic data sent to Jakarta could make a significant contribution to the Indonesian Tsunami Warning System. Furthermore, the Indonesian scientific community would be in a position to benefit from the exchange of information on the latest seismic and satellite communication technologies, from data produced by the entire IMS network as well as from technical capacity building and training offered by the CTBTO Preparatory Commission.

Other States in the region are utilizing IMS data in support of their national tsunami warning efforts. For example, data from several IMS stations are being forwarded to Malaysia for this purpose. Other efforts towards enhancing tsunami warning capability include the forwarding of IMS data from the International Data Centre (IDC) in Vienna to recognized international tsunami warning centres on a test basis, under a decision of the Preparatory Commission dated 4 March 2005. The Northwest Pacific Tsunami Information Centre in Japan has reported that such data forwarded from the IDC provides more timely and reliable IMS data than they obtain by other data receiving methods. ■

INSTALLATION OF GCI ANTENNA, AS44, KAPPANG, INDONESIA, NOVEMBER 2002

State of health monitoring of the International Monitoring System



THE HANDLING OF IMS DATA

According to the Treaty, the main elements of the International Monitoring System (IMS) are the stations where data are generated, the Global Communication Infrastructure (GCI) through which the data are transported to Vienna, and the International Data Centre (IDC) where data are received, archived, processed and analyzed, and from where the data and resulting products are redistributed to States Signatories.

The Provisional Technical Secretariat (PTS) is responsible for monitoring, assessing and reporting on the operational status of all parts of this system as these functions are performed. The PTS manages the detection and resolution of any 'incident' that affects the availability, timeliness or quality of the data or the resulting products, wherever it may occur.

In order to monitor the data effectively, the PTS relies on an Operations Centre, a system-wide incident tracking tool, and state of health (SOH) monitoring.

The Operations Centre provides centralized monitoring as well as supervision of incident detection and resolution. The PTS Operations Centre continuously monitors the data from all IMS stations and ensures its readiness for processing at the IDC. When no data are being received in Vienna, an incident 'outage alarm' is generated. This triggers a process of troubleshooting which, depending on the complexity of the problem, requires actions from one or several responsible parties inside or outside the PTS. The ultimate goal is to restore data acquisition in the minimum possible time. The incidents are logged and tracked with the system-wide incident tracking tool.

SOH monitoring provides permanent surveillance of the operational status, or 'health', of all IMS elements. Its main functions are the collection of SOH information using specially designed software, the rapid display of this information for operators, the detection of incidents, the initiation of alarms when an incident occurs, and the storing of previous SOH information for later examination.

The PTS currently uses several SOH monitoring tools. Waveform and

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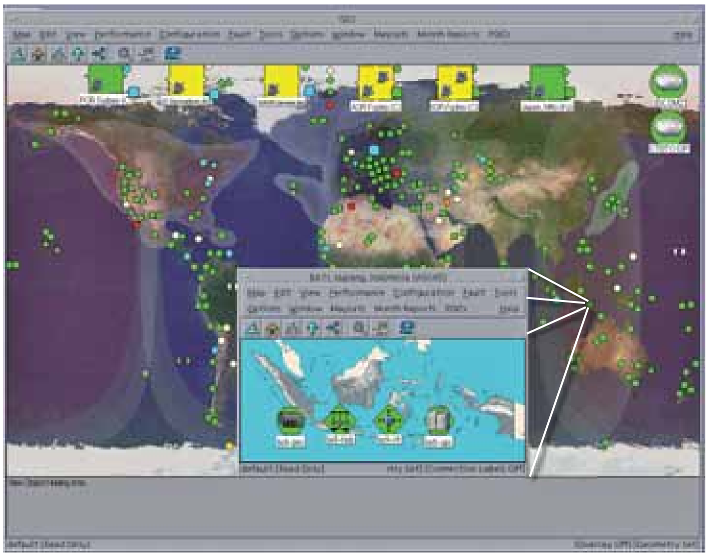
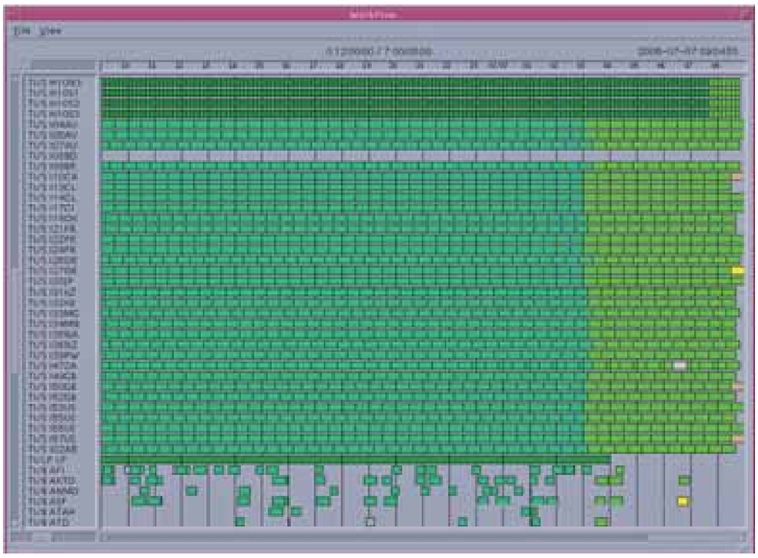


SCREENSHOT OF GCI NETWORK MANAGEMENT SYSTEM DISPLAYING REAL TIME STATUS OF GCI LINKS



SCREENSHOT OF PROCESSING WORKFLOW SOFTWARE SHOWING IMS DATA ACQUISITION STATUS AT THE OPERATIONS CENTRE

Potential civil and scientific applications

Monitoring volcanic eruptions with the IMS infrasound network

The International Monitoring System uses seismic, hydroacoustic, infrasound and radionuclide technologies to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. These technologies, together with the data and the products of the International Data Centre, have potential civil and scientific applications which may benefit States and the scientific community.

VOLCANIC ACTIVITY AT TAVURVUR VOLCANO, PAPUA NEW GUINEA, 2001. THE VOLCANO HAD A MAJOR ERUPTION IN 1994.

Nearly ten years ago, none of the 60 infrasound stations belonging to the International Monitoring System (IMS) network existed. Since then, a significant effort has been made to establish the infrasound network. Quite a few of these stations are located in some of the most remote areas of the globe. To build them, logistical and engineering challenges needed to be mastered. The first infrasound station was installed in 1999 and the data flow to Vienna commenced in May 1999. Currently, 36 stations are in operation, 33 of them have been certified.

The fact that 60% of the IMS infrasound network is operational has contributed to trigger again the interest around the world for infrasound, a science that reached the peak of interest during the Fifties and since then lost progressively its importance.

EXPLOSIVE ERUPTION AT SOUFRIÈRE HILLS VOLCANO, MONTSERRAT, WEST INDIES, 1995

Besides its mandate, to monitor the potential occurrence of nuclear tests and verify compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT) together with the other verification technologies, the IMS infrasound network has the potential to provide a significant contribution to the monitoring of volcanic eruptions around the world.

Volcanic hazard represents a serious threat towards human settlements located in the vicinity of a volcano. A significant number of casualties and serious damage to cities, villages and the environment has been caused by erupting volcanoes such as Pinatubo in the Philippines (1991), Soufrière Hills in Monserrat, West Indies (1995 and 2004), Tavurvur and Manam in Papua New Guinea (1994 and 2005), and Mount St. Helens in Washington State, United States (1980, 2005).

Can the IMS infrasound network help reduce volcanic hazard?

Since the majority of the energy of a volcanic eruption is released in the atmosphere, the infrasound technology can be a very useful tool for monitoring volcanic activity. The infrasound waves generated by a volcanic eruption can have a wide frequency content and can be recorded not only by infrasound stations close to the volcano, but also from distant ones (hundreds or thousands of kilometers far from the source). The range of detection of a volcanic eruption depends on the yield of the eruption and on the wind conditions in the lower and upper atmosphere.

In recent years, the PTS has registered a significant number of detections of volcanic eruptions by one or more stations of the IMS infrasound network. As shown in Figure 1, IS56 in Newport, United States, clearly detected the eruption of Mount St. Helens which occurred on 9 March 2005 at 01:25 Universal Time (UT).

The information available on volcanic eruptions, in particular the beginning of an outbreak, is often very limited. There are several reasons to that: at times, the local weather conditions do not permit a clear

view of the volcano from the satellites. In other cases, a local monitoring network is not available to record an increase of seismic and/or gas emission activity in the neighborhood of the volcano.

The presence of an infrasound station relatively close to the volcano can be extremely useful to monitor the start of an eruption and can be used both as a unique monitoring tool in case other monitoring systems are not available (or cannot be used), and as a complementary tool to other, already existing, monitoring systems.

Volcanic eruptions can also be extremely dangerous for civil aviation. The ash cloud produced by a sudden eruption can block an aircraft engine. So far several such incidents have occurred, but loss of human lives could be avoided thanks to the excellent performance of the pilots.

Can the IMS infrasound network contribute to air safety?

The monitoring of volcanic activity can significantly help civil aviation to mitigate the risk of future accidents. In fact, any warning system capable of distributing promptly updated bulletins of volcanic activity can help pilots to avoid entering an ash plume intersecting the route of their aircrafts. In this respect, the contribution of infrasound technology could play a relevant role in monitoring volcanic activity and trigger a warning system whenever, as previously mentioned, other monitoring systems (like satellite imagery, seismic or gas emission stations), are either not available or cannot be used. An integration of the existing monitoring tools supporting civil aviation with information coming from the IMS infrasound network might play an important role for the future of air safety.

The interest for infrasound technology restarted just in 1996, at the time of the adoption of the Comprehensive Nuclear-Test-Ban Treaty. Since then, several studies have been carried out or are still ongoing regarding the potential applications of this technology. It will be a great achievement if the IMS infrasound network will, in the future, be able to mitigate the risk of loss of lives due to volcanic eruptions. ■

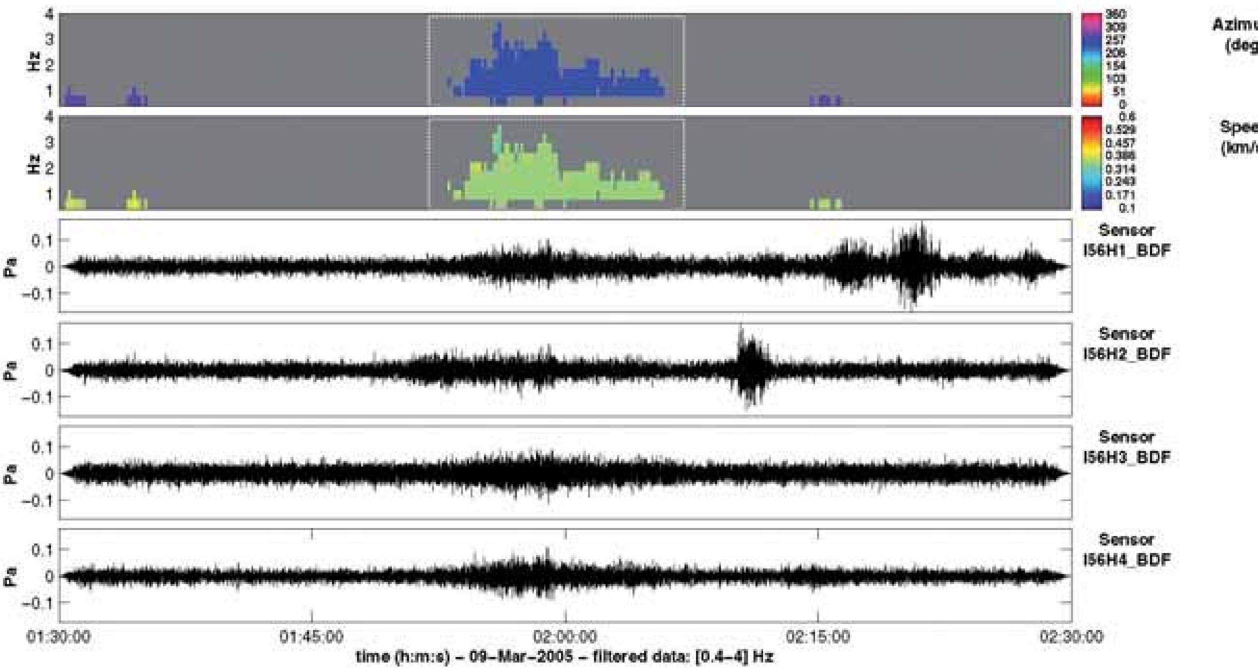


FIGURE 1. IS56 DETECTING THE VOLCANIC ERUPTION AT MOUNT ST. HELENS ON 9 MARCH 2005. THE LOWER WINDOW SHOWS THE ANALYZED DATA WHICH HAS BEEN FILTERED BETWEEN 0.4 AND 4HZ. THE NEXT WINDOW DEPICTS, USING A COLOR SCALE, THE SPEED OF THE INCOMING WAVES. THE SPEED VALUE FITS WELL WITH THE EXPECTED SPEED FOR INFRASOUND WAVES. THE UPPER WINDOW SHOWS, USING A COLOR SCALE, THE DIRECTION (IN DEGREES) FROM WHICH THE SIGNAL REACHED THE INFRASOUND STATION: THE DIRECTION FITS VERY WELL WITH THE POSITION OF THE VOLCANO WITH RESPECT TO THE STATION.

The CTBT noble gas verification component

The International Monitoring System (IMS) and the International Data Centre were designed to be fully capable of monitoring compliance with the Treaty. New research and improved communication technologies continuously refine the detection capabilities of the IMS. This column introduces some of the latest developments in verification science.

The noble gas component of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) verification apparatus is at the same time the oldest and the most novel long range detection technology applied for the nuclear weapons complex. Already during World War II, Douglas A-26 Invader bombers descended over suspected atomic sites in Germany to collect air samples that were taken to a laboratory for analysis. The idea was to look for the radioactive isotope xenon-133, which would have been extensively produced in a plutonium production reactor, had there been one.

CTBT verification requires monitoring both particles and gases

Even though noble gas surveillance flights did continue through the half century of nuclear weapons testing, the technology was not advanced enough and did not provide the required sensitivity to be directly employed in the CTBT verification system. To help solve this, four countries, France, Russian Federation, Sweden and the United States have worked consistently during the last decade to develop reliable and sensitive new systems, which are fielded and tested primarily at noble gas designated International Monitoring System (IMS) stations. This endeavour is known as the International Noble Gas Experiment (INGE).

Nuclear explosions produce radioactive debris that is carried by the wind and can be collected far away. As the absolute majority of radionuclides that are formed in an explosion stick to microscopic particles, the “classical” method for long range detection of atmospheric nuclear explosions has always been to collect these particles by forcing air through a suitable filter medium.

The subsequent analyses of the filters then provide something like an open book for those who can read it. One can see whether an atom bomb or a thermonuclear bomb was tested, in what environment it was tested, what fissionable material it utilized and exactly when it was tested. Within the CTBT verification regime such analyses are planned at 80 stations to cover the atmospheric environment.

The CTBT, however, in addition requires a wider focus since it also has to cover the situation of a potential Treaty violator trying to do everything possible to evade detection. The explosion can for example take place in a rainstorm or in a big block of ice on a boat at sea with the intention to have most radionuclides washed out and deposited locally.

The comparatively few noble gas radionuclides, however, are not affected by washout because of their inherent quality, their nobleness, not to attach to other materials or atoms. For the same reason they are hard to contain in an underground explosion as they tend to be pushed out early on from the cavity by overpressure or sucked out later from cracks and faults in the ground by passing thunderstorms and low pressure weather systems. Half of the 80 radionuclide stations are therefore to be supplied with special equipment for sampling and analysis of noble gases, notably xenon.

Noble gas radionuclides of CTBT interest

The noble gases that can be found in nature are helium, neon, argon, krypton, xenon and radon. Among these, xenon provides the ultimate set of radioactive bomb products for long distance detection.

Most of these xenon isotopes are produced abundantly in the fission part of the explosion and have suitable half-lives; long-lived enough to allow for collection and analysis, but also short-lived enough to avoid building up a disturbing background reservoir in the atmosphere.

Many krypton isotopes are also abundantly produced, but they decay away within minutes or a few hours. One of them, however, krypton-85, is so long-lived that we are all currently exposed to about one Becquerel per cubic metre of it from past testing and reprocessing activities.

Argon has one isotope of interest, argon-37, that might be produced in the rocks surrounding an underground nuclear explosion. It has a life time of nearly two months, but is quite difficult and expensive to measure at low concentrations and is therefore not suitable for continuous surveillance. It can, however, be of great interest during an on-site inspection where higher levels can be anticipated and where the time scale of the operation quite well matches the life time of the isotope.

The xenon isotopes of interest are xenon-131m, xenon-133m, xenon-133

and xenon-135 with average life times of seventeen, three, eight and 0.5 days. Radionuclides decay to reach lower energy levels by emitting photons and/or material particles. Our xenon quartet does it with X rays, gamma rays and with electrons. These emissions can be measured in different ways and the amounts of the nuclides in a sample can thereby be determined.

New xenon analyzers

The four systems developed by France, Russia, Sweden and the United States utilize different parts of the radiations like X and gamma rays only or combinations of these with electrons where the detector systems make sure that the radiations were emitted at exactly the same time and therefore from the same individual nucleus.

The four systems also use somewhat different processes to extract the xenon fraction from the sampled air. All systems let the air pass through some cleaning stages before the xenon is slowed down and trapped in a column of activated charcoal. In two of the systems this charcoal is kept at a temperature of some -100 to -200 °C while the other two manage the process at room temperature. One system also makes use of a special membrane to initially enrich the xenon in the sample.

Understanding the xenon signatures

Several stations have already accumulated data on the background of the xenon isotopes. A special non-IMS station in Ottawa, Canada, has provided valuable benchmark signals of all four isotopes from a nearby plant for medical radionuclide production. Other stations have contributed to a general picture of xenon-133 backgrounds in central Europe, Scandinavia and in the Arctic. In broad terms we can say that central Europe displays a few mBq/m3 of xenon-133, and that that level is reduced a factor of ten into mid Scandinavia and further a factor of ten

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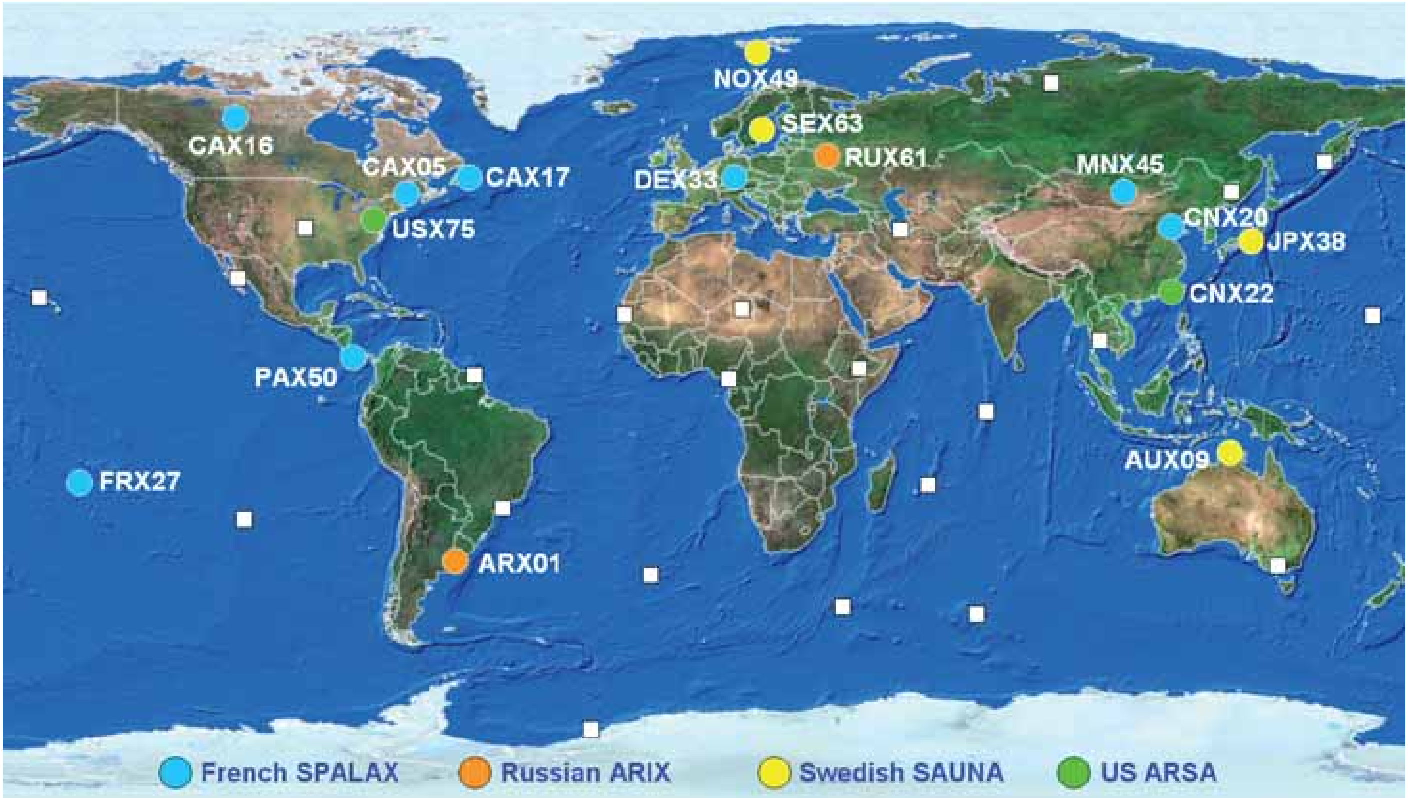

THE COLOURED CIRCLES MARK NOBLE GAS STATIONS THAT ARE EXPECTED TO DELIVER DATA BY THE END OF THIS YEAR. THE WHITE SQUARES INDICATE STATIONS THAT THEN REMAIN TO BE ESTABLISHED TO COMPLETE THE 40 STATION NETWORK (ONE STILL TO BE DETERMINED). THE STATION CAX05 IN OTTAWA, CANADA, IS A NON-IMS NATIONAL CONTRIBUTION.

Outreach activities

The Provisional Technical Secretariat (PTS) conducts a variety of activities focusing on enhancing the Treaty understanding of decision-makers and the general public. It generates political support, encourages international cooperation and builds national technical capacities through training.

International cooperation

The Provisional Technical Secretariat (PTS) continues its international cooperation and outreach activities aimed at enhancing the understanding of the Treaty and the work of the Preparatory Commission, promoting technical cooperation among Member States and providing legal and technical assistance for national capacity building.

The most recent international cooperation workshop took place from 31 May to 2 June 2006 in Kuala Lumpur, Malaysia. Some 30 participants from nine South-East Asian States, including representatives from ministries of foreign affairs, policy makers and scientific experts as well as a UNESCO representative, attended the workshop which was opened by H.E. Dr Jamaluddin Jarjis, Malaysian Minister of Science, Technology and Innovation, and addressed by Tibor Tóth, Executive Secretary of the Preparatory Commission.

The workshop aimed at enhancing the understanding of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), facilitating the earliest possible completion of the establishment of the International Monitoring System (IMS) and promoting ratification of the Treaty. During the three-day workshop, representatives of participating States gave their perspectives on the CTBT and on national implementation measures. They discussed the prospects of increased regional and sub-regional cooperation with the aim of developing effective networks in the region, particularly focusing on IMS station installation and National Data Centre operation. Special attention was also given to the potential civil and scientific applications of the CTBT verification technologies such as natural disaster management.

Mr Tóth, who also met with H.E. Datuk Seri Syed Hamid Albar, Foreign Minister of Malaysia, on the sidelines of the Non-Aligned Movement (NAM) Coordinating Bureau Ministerial Meeting, stressed the significance of the ratification by Malaysia when talking to the press: “The ratification of Malaysia will be an extremely important symbolic act in the regional context because Malaysia is the coordinator of NAM in the wider sense, as well as an important example to those countries which have yet to ratify the CTBT.” ■

PARTICIPANTS AT THE WORKSHOP IN KUALA LUMPUR, MALAYSIA, 31 MAY - 2 JUNE 2006

External Relations

The role of the External Relations Section in promoting the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is being attained by pursuing a two-pronged approach: There are bilateral contacts with individual States through their capitals and Permanent Missions on one hand and outreach activities on the margins of multilateral forums and meetings of intergovernmental organizations on the other. All efforts are reflected in a five-pillar strategy:

- Providing support to the Executive Secretary, the Special Representative in the Article XIV Conference

process, the chairperson of the Preparatory Commission as well as bureaus of geographical and political groups, with a view to advancing the cause of the Treaty in those Annex 2 States that have yet to ratify the Treaty;

- Promoting the universality of the Treaty, as an effective instrument for international peace and security, providing assistance to States to move forward with the signature/ratification process as well as supporting States which, after ratification, need assistance in implementing the Treaty;

- Cooperating and creating synergies with international organizations by establishing cooperation frameworks with relevant international organizations. Furthermore, forging linkages with other international and sub/regional instruments, in order to ensure more visibility of the Treaty in the concerned organizations and their relevant programmes;

- Featuring the potential benefits of the verification technologies as a distinctive asset of the CTBT verification regime in external relations activities and;

- Supporting and assisting Member States to promote the Treaty in a specific country or group of countries. ■

Training

In order to assist Member States to fulfil their verification responsibilities under the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and to enable them to benefit fully from participating in the work of the Treaty regime the CTBTO Preparatory Commission has emphasized the importance of training and capacity building since its establishment.

In order to complement traditional training methods, the Provisional Technical Secretariat (PTS) has developed an e-learning project, which will provide electronic, interactive access to training courses and technical workshops to authorised users as well as continuous access to training modules.

The e-learning project will include training for national officials involved in the development and operation of verification system elements of the CTBT, International Monitoring System (IMS) technologies and station installation processes; for station managers and operators on the function and operation of station equipment and the interaction with the International Data Centre (IDC) on the function of the IDC and the analysis of IMS data; for national data centre staff on the utlization of and access to IMS data and IDC products and services; and for on-site inspection (OSI) experts and potential future OSI inspectors.

The e-learning project, which will be implemented in two phases over a period of approximately 15 months, will be financed by a Joint Action of the European Union in the magnitude of 1,133 million Euros. A pilot phase is currently in progress and is being financed by the Netherlands and the Czech Republic in the amounts of € 180,000 and € 15,263.55, respectively. ■

The CTBT noble gas …

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into the Arctic. The main sources of this are nuclear power plants in Europe.

As the quartet of xenon isotopes is also produced and disseminated by civilian applications it is very important for CTBT verification purposes to be able to provide data that enables States to interpret the signatures as indicative of either a nuclear explosion or of some other event. It is therefore necessary to understand very well the dynamics of civilian sources like reactors and the two major radioxenon plants (Chalk River in Canada and Fleurus in Belgium). As the composition of the quartet varies in the emissions from different sources, forming ratios between the four relevant isotopes can provide insight into the origin of a given sample. Research is zealously pursued to improve the understanding of these relations.

Xenon and the waveform technologies

The waveform networks (seismic, hydroacoustics and infrasound) are able to geo-locate suspicious events, but they cannot provide evidence of the 'smoking gun' of a nuclear event. With the radionuclide technologies it is quite the opposite. They are informative on the character of the event but cannot pinpoint the location with a corresponding exactness. The answer to this is data fusion; first, a meteorological analysis to conclude from what areas of the globe radionuclides could possibly emanate and second, a comparison with waveform detections from the same area and time. It is possible, however, that in a well designed evasive scenario a nuclear event is solely detected by the noble gas system. The noble gas component is therefore of very special importance to the CTBT verification regime. ■

Secretariat snapshots

Scientific symposium – CTBT: Synergies With Science, 1996-2006 and Beyond

by Ola Dahlman

POSTER OF THE SCIENTIFIC SYMPOSIUM, 2006

Science and scientists played a key role in the many years of preparation and negotiation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). World famous scientists and engineers have used cutting edge technologies in the implementation of the most extensive and complex international verification system ever created. Over the years, a number of cooperative projects have been conducted between the Provisional Technical Secretariat (PTS) and scientific institutions. It is essential to develop this cooperation further. Like any other system in our society, the verification system has to be gradually modernized using new scientific results and emerging technologies.

Establishing cost-efficient analysis of a growing flow of data and delivering products of high quality to States Signatories are issues crucial to the PTS. Many of these issues are also at the top of the agenda of scientific institutions around the globe. A closer cooperation between the PTS and scientific institutions would thus be of great mutual benefit. Increased cooperation would also strengthen the network between experts at the PTS and scientific institutions globally. Such knowledge recapitalization is essential to keep up the vitality of the Organization and to make it attractive to new generations of scientists. Close relations between the PTS and scientific institutions will facilitate the recruitment of qualified PTS staff in the future. It might create new career opportunities for experts that are leaving the PTS.

To maintain and develop the CTBT as a global Treaty is also a question of capacity building in States Signatories. We have so far successfully connected stations and instruments around the world. Now it is time to connect people and their institutions. Through international cooperation on a regional and global scale we have to develop the knowledge base and the facilities needed for States to participate fully in the implementation and monitoring of the Treaty. Such cooperation will also enable States to benefit from the technologies involved in the verification system and the data produced for civil and scientific applications.

This symposium is a first step in a long-term effort to increase interaction between the scientific community worldwide, States Signatories and the PTS. The symposium covers the afternoon of 31 August and the whole day of 1 September. In the afternoon of 31 August the symposium will be opened with welcome addresses by H.E. Dr Ursula Plassnik, Austrian Federal Minister for Foreign Affairs, and Dr Michael Häupl, Mayor of Vienna. Keynote addresses on global capacity building will be given by Dr Mohammed ElBaradei, Director General IAEA, Mr Nobuaki Tanaka, United Nations Under-Secretary-General for Disarmament, and Mr Claude Allègre, former French Minister of Education. The Treaty and the development of the verification regime will be presented by the current and the former Executive Secretaries and illustrated by a multimedia show.

Kick-off presentations on the three themes of the symposium will be given by Prof Paul Richards, Colombia University, *Imaging the Earth*; Prof Helga Kromp-Kolb, University of Natural Resources and Applied Life Sciences, Vienna, *Imaging the Atmosphere;* Dr Usama Fayyad, Senior Vice President of Research and Strategic Data Solutions at Yahoo!, *Modern Data Analysis Techniques*; and Michael T. Jones, Chief Technologist of Google Earth, *Connecting the Earth*. On 1 September we will have three consecutive seminars on these issues chaired by the kick-off speakers. The symposium will conclude by a discussion on how to proceed with global capacity building in the field of science and technology. ■

Biographical note

Ola Dahlman has chaired Working Group B since the Preparatory Commission for the CTBTO was established nearly ten years ago. In March 2006, he left the chair. During the negotiations for the CTBT, Mr Dahlman chaired for some 15 years the Scientific Expert Group at the Conference on Disarmament in Geneva.

His research has focused on verification and global security issues. Mr Dahlman has managed several research laboratories and retired a few years ago as the Deputy Director General of the Swedish Defence Research Agency. He is a member of the Royal Swedish Academy of Defence Sciences and the Swedish Institute of International Affairs. ■

Challenges of establishing infrasound station IS39 in Palau

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FIXATING 11 METRE HIGH PLASTIC TUBE WITH ANTENNA ON TOP FOR DIFFERENTIAL GPS MEASUREMENTS

Every day in the construction phase of IS39 had a scent of adventure and presented its own unique challenges. This is also true of the certification visit, which took place from 31 May to 9 June 2005. The certification team, consisting of two PTS staff members and two infrasound experts from the University of Hawaii, discovered that the only bridge leading to the central array and the central power site was removed because it needed to be rebuilt. Instead of crossing the bridge comfortably and securely with their 4WD-vehicle, they had to carry the equipment on their backs, crossing the creek on a 30 centimetres-wide U-beam several times a day.

When checking the primary summing point[3] of the infrasound station, the certification team was unable to receive a signal through the dense canopy of the rainforest. This procedure, which is necessary for station certification, requires the antenna to be positioned exactly above the primary summing point with only one metre of divergence. Luckily, both of the infrasound experts from the University of Hawaii had experience in Alpine climbing. In a creative outburst, plastic tubes, initially foreseen for plumbing, were stuck together to create an eleven metres high plastic tube 'tunnel'. On top of it the antenna was taped to the plastic tubes and attached with ropes to the trees on three levels. With this creative solution, the certification team was able to measure four out of seven primary summing points and provide the necessary documentation for the certification of the station.

IS39 was certified on 14 September 2005 and is now continuously sending data to the International Data Centre in Vienna. Without the help of the Palauan people, both at the local and the government levels, the station would not exist. They keep a watchful eye over what goes on in their territory and ensure that the array site is protected from vandalism and theft. There is a Palauan station operator, Mr Swenny Ongidobel, and technical services are provided by a Palauan construction company. Last but not least, the Palauan Government perceives the IMS station as a sign of prestige and international recognition, as their contribution to a safer nuclear-free world. ■

[3] The primary summing point corresponds to the location of the central element of the infrasound array. All the relative distances of the other array elements are computed taking as a reference the position of the primary summing point.

State of health monitoring of the International Monitoring System

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radionuclide data acquisition and processing are monitored by a software product called WorkFlow. A separate tool has been implemented to monitor the computer infrastructure. A third system, the GCI Network Management System (NMS) monitors the status of the GCI communications links.

The NMS of the GCI is the principal tool used within the PTS and by the GCI contractor to benchmark the performance of the GCI, to identify and to diagnose network problems.

SOH is currently composed of matured products such as the GCI NMS and other software tools under development. With about sixty percent of the IMS network in place, the development and testing of an integrated SOH monitoring system is essential to ensure effective and efficient operations.

A prototype integrated SOH software tool is being developed. Based on a variety of SOH software modules and a centralized database, it will provide an integrated view of the status of IMS stations, telecommunication links, data acquisition and processing. Moreover, such information is not intended only to be viewed by the PTS Operations Centre. Those outside the PTS, who are responsible for parts of the system such as station operators, also need to see how the SOH information affects their responsibilities. ■

Treaty Status

Signatures	176
Ratifications	134
Annex 2 Ratifications	34

AS OF 17 JULY 2006

Calendar of Meetings 2006

Preparatory Commission:

26th Session	20 – 23 June 2006
27th Session	13 – 17 November 2006

Working Group A:

29th Session	29 May – 2 June 2006
30th Session	2 – 6 October 2006

Working Group B:

26th Session	13 Feb. – 3 March 2006
27th Session I	15 – 26 May 2006
27th Session II	28 August – 8 Sept. 2006

Advisory Group:

26th Session I	24 – 28 April 2006
26th Session II	15 – 19 May 2006
27th Session	11 – 15 September 2006

The role of National Data Centres...

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NDCs also contributed to the evaluation phase of the system-wide performance test. Many interesting results were reported during the NDC Evaluation Workshop which was held in Rome, Italy, from 17 to 21 October 2005. More than 25 NDCs and station operators participated and provided feedback during the workshop (see also CTBTO Spectrum No.7, page 5)

The cooperation between the PTS and NDCs is a very important factor in the build-up and fine-tuning of the verification regime. Based on the feedback received from the NDCs, the IDC is improving its systems within the guidelines of the draft International Monitoring System and International Data Centre Operational Manuals. ■

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