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COOPERATION WITH THE CTBTO

(*Submitted by Canada)*

Summary and purpose of document

To inform the Group of the status of the Comprehensive Nuclear-Test-Ban Treaty Organization's (CTBTO) International Monitoring System (IMS) Global Infrasound Monitoring Network and the possibility of supplementing stations to this network through the Treaty's Cooperating National Facilities mechanism. Access to this information can be useful to detect in real-time volcanic eruption not detected by other means. Meteorological applications can also be envisaged in the longer term.

Action proposed

The meeting is invited to consider the proposals presented in this document and to make recommendations.

INFRASONIC DETECTION OF VOLCANIC EXPLOSIONS BY THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY (CTBT) INTERNATIONAL MONITORING SYSTEM (IMS)

1. Introduction

A review paper on the potential use of the CTBT infrasound monitoring system for the detection of explosive volcanic eruptions has been provided at the 2nd meeting of the ICAO VAWSG[1] and a short update was provided at the 2nd ICAO/WMO Volcanic Ash Workshop[2].

The Treaty provides for a global coverage IMS for the Verification Program consisting of four technologies : Seismic, Infrasound, Hydroacoustic, and Radionuclide. The Infrasonic Network is planned with 60 sites, distributed with « uniform » detection coverage in mind. There are currently 9 fully operational stations transmitting on the CTBTO Global Communication Interface (GCI) and 25 stations in the process of being installed. Data will be collected, processed and analysed, and products will be generated in real-time at the CTBTO's International Data Centre (IDC) located in Vienna. A recent article: "Atmospheric Infrasound"[3] provides an excellent overview of this technology and its potential applications.

The Entry into Force for the Treaty is not anticipated before 2004 at which time all sites and the network will be operational. Note that the Verification systems are intended to globally detect and locate all explosions with yields of 1kt of TNT or more.

2. Operational considerations

For infrasound propagation, the network has been designed to provide for the global detection of 1kt atmospheric explosion at a range of 2500-3500 km. In some parts of the world, the sensitivity could achieve 0.2kt. Explosive eruptions of concern for the injection of volcanic ash into the high troposphere are typically in the megaton range[4]. It is expected that the average time delay between the occurrence of an explosion and the provision of an IDC infrasound product would be 2 hours.

Better response time could be achieved by adding supplementary infrasound stations in a critical region(s) from a vulcanological point of view. The Treaty provides for the possible enhancement of the IMS network through a Cooperating National Facilities mechanism (CTBT Article IV Section B). This means that a country, through an 'aviation sponsored' agency for example, could add a supplementary infrasound station to complement the IMS network as long as the station meets IMS specifications. The current costing for an infrasound station is 350K US. Supplementing the infrasound station with a seismometer would add 80K US to the overall cost but would improve source location.

There are still outstanding technical and policy issues with respect to data and products, data accessibility in real-time and confidentiality issues. Progress is being made in the discussions surrounding confidentiality issues. In August 1999, the International Association of Seismology and Physics of the Earth's Interior (IASPEI) sent a letter to the Chairman of Working Group B of the CTBTO Preparatory Commission (which is the transitional body that has been established to ensure the rapid and effective establishment of the future CTBTO at Entry Into Force of the Treaty) recommending the open access to all waveform data from the International Data Centre. At Working Group B technical

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1 Chen, P. and D. R. Christie, 1995: Infrasonic Detection of Volcanic Explosions by the CTBT International Monitoring System: Implications for Aviation Safety. Information paper, 2nd Meeting of the ICAO Volcanic Ash Warning Study Group, 2 November 1995, Montréal, Canada, 5pp.

2 P. Chen, 1998: Update on Infrasonic Detection of Volcanic Explosions by the Comprehensive (Nuclear) Test Ban Treaty (CTBT) International Monitoring Network, ICAO/WMO Volcanic Ash Workshop, May 1998, Toulouse, France, 2pp.

3 Bedard, A.J. and T.M. Georges, 2000: Atmospheric Infrasound. Physics Today, 53, 3, 32-37.

4 Elizabeth Blanc, CEA DASE, personal communication.

meetings the Canadian Delegation, supported by the United States, Australia and Japan and others, has been using IDC infrasound products as one example on how IMS data and IDC products could benefit the international community for safety and security reasons.

It has been recommended at a recent ICAO meeting held in Brisbane, Australia, that ICAO states the interest of the IAVW in the infrasound products produced by the International Data Centre for

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safety and security reasons. In addition, it might be worthwhile for IATA and IFALPA to express their respective opinions as well. It should be kept in mind that there are current discussions between the WMO and the CTBTO PrepCom to take advantage of the recently agreed upon agreement between the two organizations for the real-time exchange of data and products. In this context, infrasound products generated by the IDC could be made available to the aviation community through WMO Centres. Such interests could be directed to the WMO, and the CTBTO PrepCom. It should be noted that it is premature to build operational arrangements at this time.

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