Potential civil and scientific applications

The International Monitoring System uses seismic, hydroacoustic, infrasound and radionuclide monitoring technologies capable of detecting evidence of nuclear explosions in underground, in water and in the atmosphere in order to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. These verification technologies, together with the data, technologies and products of the International Data Centre, have potential civil and scientific applications which can provide significant benefits to States and the international scientific community.

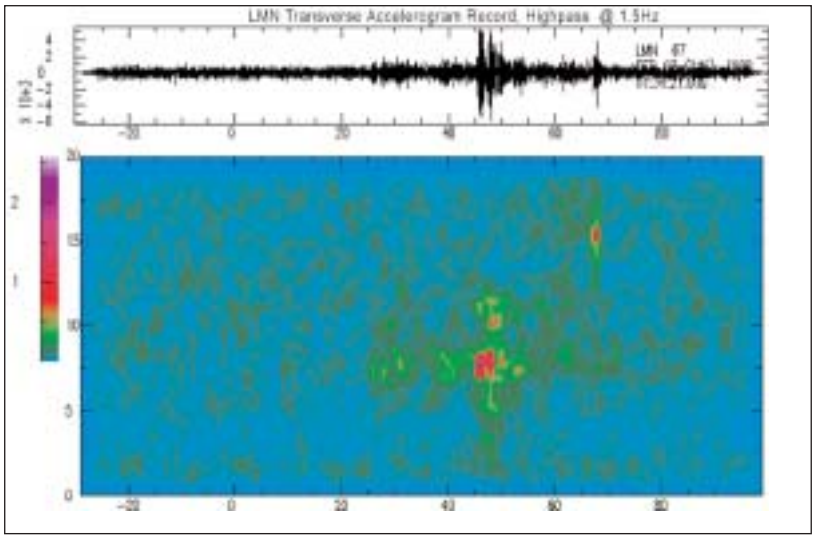

FIGURE 5. SIGNALS GENERATED BY THE SWISSAIR MD11 CRASH AND ASSOCIATED SPECTROGRAM FROM THE SEISMIC STATION OF THE CANADIAN NATIONAL NETWORK (LMN)

Using seismic data...

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Such understanding was critical to the analysis of seismic data from the impact of another large passenger aircraft in 1998. A Swiss Air MD11 crashed in shallow water at Peggy's Cove near Halifax, Canada, following an onboard fire (Figure 4). No onboard data were recovered for the last few minutes of the flight, and the crash occurred in an area of poor radar coverage. Although the location of the crash was quickly established from eyewitnesses and wreckage, seismic data provided the only accurate means of timing the crash. In addition, analysis of the signals from a nearby broadband seismic station (Figure 5) of the type used throughout the IMS rapidly suggested that the impact velocity was very high. This was confirmed many months later by engineering analysis of the aircraft engines.

FIGURE 4. PEGGY'S COVE SWISSAIR CRASH LOCATION

Seismic signals associated even with high-speed impacts of the heaviest aircraft types are small, typically equivalent to those from magnitude 2 earthquakes or even smaller, which means they are generally detectible only within a few hundred kilometers of the crash site even by the most sensitive equipment under optimal conditions. However, with the growing numbers of seismic stations around the world, both as part of the IMS and in other scientific networks which transmit data in real time, it is becoming increasingly possible to detect such seismic signals when these unfortunate events occur, and to provide the information to crash investigators in a timely fashion. ■

Biographical note

David McCormack is based in Ottawa where he currently heads the nuclear explosion monitoring programme of the Geological Survey of Canada. Originally from Northern Ireland, he has degrees in physics and seismology. Dr McCormack has held several research positions related to nuclear treaty monitoring in the United Kingdom and Canada. Since 1997, he has acted as a senior technical adviser to the Canadian delegation to the CTBTO Preparatory Commission. ■