

provided Canada's contribution to this experiment and was consistently among the top three stations in contributing to the detection of seismic events. The evaluation of the results of such technical tests constitutes an important ingredient in the development of a global seismic verification capability.

Teleseismic P Wave Attenuation

The University of Toronto team has recently completed a comprehensive seismic attenuation investigation along the paths connecting the YKA with seven active nuclear test areas. These test areas are: Pahute Mesa and Yucca Flat (both in Nevada), Shagan River and Degelen Mountain (both in Eastern Kazakhstan), Western Kazakhstan, Novaya Zemlya and French Tuamotu.

Shown in Figure 9 are YKA recordings of a magnitude 5.4 Eastern Kazakhstan nuclear explosion in 1982. The epicentral distance is about 7,500 km (see Figure 5b). The first sharp "break" (seen as an abrupt upward motion) in each of the 9-sec long record segments indicates the arrival of the direct P wave. The YKA station B₁₀ registers the P arrival the earliest and station B₁ the latest, revealing that the epicentral location is essentially due north. The signature and amplitude differences among these records, clearly visible to a trained seismic analyst, manifest the presence of station site effects, which are relatively weak by the normal standards. A University of Toronto team's study based upon more than 600 Yellowknife Seismic Array recordings of known underground nuclear explosions has documented major attenuation differences among these teleseismic paths and their attendant implications in explosion yield estimation error¹⁰.

Unmasking of Depth Phase pP

As was previously stated, the seismic phase pP is important because it provides the crucial source depth information needed to winnow out a large fraction of earthquakes at an early stage of seismic source identification process. Figure 10 shows the vertical-component seismograms obtained at the YKA station B₁₀ of five French Tuamotu nuclear explosions¹¹.

With their m_b values ranging from 5.5 to 5.7, the expected device burial depths are such that the time differences between pP and direct P should stay well below 1 sec — unless the test holes were deliberately dug, at a great cost, to depths well in excess of what were actually needed to prevent radioactive venting. We note in Figure 10 that the first "swing" in each record clearly begins with an upward motion — in accordance with theoretical prediction for an