Geophysical Research Abstracts, Vol. 9, 04133, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04133

Making Use of Synergies between CTBT Verification Technologies: Automatic Identification of Seismic Arrivals at IMS Hydrophone Triads

F.M. Graeber

CTBTO PrepCom, Provisional Technical Secretariat, Vienna International Centre, P.O.Box 1200, A-1400 Vienna, Austria (frank.graeber@ctbto.org)

The main purpose of the IMS hydroacoustic network is to detect, locate and characterize (nuclear) explosions in the oceans, near shore lines or in the lower atmosphere above the oceans. This network features island-based high frequency seismic sensors as well as hydrophone triads and was primarily designed to record long-range hydroacoustic phases such as the so-called T phases (ground-coupled waves), or H phases (originating from in-water sources). However, compressional seismic waves are also regularly observed at hydroacoustic stations. In the case of hydrophone triads, such phases couple from ground to water at the ocean bottom underneath the floating sensors and continue to propagate the remaining short distance sub-vertically in the form of hydroacoustic waves. Azimuth and slowness estimates are computed for all types of coherent signals recorded on these triads, which can be thought of as three-element mini-arrays. The typical slowness ranges of hydroacoustic and seismic signals are very different and therefore slowness estimates are essential in identifying seismic phases. The ratio of energy estimates from different frequency bands can be used to further reduce the percentage of mis-identification, partly because the low frequencies typical for seismic waves usually do not propagate efficiently over long ranges in the SOFAR channel, which is in contrast to T and H phases. Due to the often remote location of the hydrophone triads such observations can provide added value to the International Data Centre's automatic and interactive bulletin production. The automatic processing pipeline estimates azimuth and slowness of signals using cross-correlation of triad channels in several frequency bands using a series of sliding windows of variable length. While lag-time corrections for the differences in lengths of riser cables can account for a large fraction of the observed systematic residuals of azimuth and slow-

ness estimates for seismic phases, empirical corrections may have to be established to further increase the accuracy of these measures once an adequate set of observations is collected.