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Relative Contribution of IMS Stations to the Reviewed Event Bulletin of the IDC

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The International Monitoring System (IMS) is being developed by the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) as part of its global verification regime. The seismic component of the IMS includes 50 Primary Seismic and 120 Auxiliary Seismic stations. Continuous waveform data are sent from Primary Seismic stations, while waveform segments are retrieved from Auxiliary Seismic stations. About 70% of the stations are currently operating and sending data to the International Data Centre (IDC) in Vienna, Austria. Automatic processing is invoked upon receipt of the data at the IDC, which results in a series of bulletins, known as Standard Events Lists (SELs). The final automatic bulletin, produced 12 hours behind real time, is reviewed by analysts. The result of this review is published by the IDC in the Reviewed Event Bulletin (REB).

An observed event will appear in the automatic or reviewed bulletins only if certain criteria are satisfied, including observations from a sufficient number of stations. Events in the automatic bulletin must be observed by two or more primary stations, while events in the REB must be observed by three or more primary stations.

Due to a variety of factors, different stations are more sensitive than others to different regions of the world. Contributing factors include: near-surface geologic conditions under the station, station noise levels, station design, global distribution of seismicity, and heterogeneities within the earth. The sensitivity of stations will be illustrated by a series of global maps which show the probability of a particular station to contribute defining phases for events for each region of the globe. The maps are based on historical contribution of each station to the REB. Based on these global maps, various criteria will be applied in order to identify the relative ranking of stations contributing defining phases to the REB.

The impact of magnitude on station sensitivity will also be investigated. In some areas of the world the REB contains events of very low magnitude, due to clustering of Primary Seismic stations and regional seismicity. It is unlikely that such events will be observed outside of this cluster of stations, and consequently may bias the resulting sensitivity maps. The influence of large magnitude events will also be investigated.