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The contribution of NDC bulletins to quality assessments of the REB – a case study for Romania

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To make available a high quality product to state signatories, continuous quality assessments are carried out at the International Data Centre (IDC) of the Provisional Technical Secretariat (PTS) for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). One of the means of assessing the Reviewed Event Bulletin (REB) quality is to compare the bulletin with independently compiled bulletins. In particular, bulletins contributed by National Data Centres (NDCs) are of special interest because it can be expected that an NDC locates events in and near its national borders with great accuracy and that the resulting seismic bulletin is complete to lower magnitudes than the IDC's REB. Hence, the purpose of a bulletin comparison study of the REB with any NDC bulletin is (1) to evaluate the accuracy of IDC locations; (2) to assess if the IDC has missed events of considerable size; and (3) to investigate if all data from relevant IMS stations were adequately used in the IDC automatic processing and interactive analysis of the events in the corresponding region.

For this study the seismological bulletin of the Romanian NDC (ROM_NDC) for the years 2007 and 2008 has been used, this bulletin being made available to the IDC since the System-Wide Performance Test. The bulletin contains 393 (262 in 2007 and 131 in 2008) events. All events were located within or very close to the Romanian borders based on data from Romanian national network stations, with a maximum magnitude of MD = 5.6. On the other hand the IDC REB contains a total of 31 (9 in 2007 and 22 in 2008) events in the study period and region under consideration (43^oN to 49^oN; 19^oE to 31.5^oE).

From the comparison a total of 25 IDC events were found that match to corresponding ROM_NDC events. The location difference for these matched events is less than 0.3^o, except for one outlier with 0.95^o difference related to depth inconsistency. About 32% of the matched events do not have intersecting error ellipses, 56% have partially intersecting error ellipse areas, and for a minor part of the matched events (12%) the ROM_NDC error ellipse area is within the IDC error ellipse area. Considering the magnitude estimates for matched events, it is found that IDC mb magnitudes are, on average, about one magnitude unit lower than ROM_NDC duration magnitudes. The maximum magnitude for unmatched ROM_NDC events is MD=4.6. Investigation of these events showed that events with MD $\geqq$ 4.0 could be saved as REB events, hence the detection level for REB events in and near Romania could be as low as mb=3.0.