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The 03 April 2017 Botswana M6.5 Earthquake: Preliminary Results

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Abstract

An earthquake of magnitude M_w 6.5 occurred on the evening of 3 April 2017 in Central Botswana, southern Africa. The event was well recorded by the regional seismic networks and the location by the Council for Geoscience (CGS) placed it near the Central Kgalagadi Game Reserve. Its effects were felt widely in southern Africa and were especially pronounced for residents of Gauteng and the North West Province in South Africa. In response to this event, the CGS, together with the Botswana Geoscience Institute (BGI), embarked on two scientific projects. The first project involved a macroseismic survey to study the extent and nature of the effects of the event in southern Africa. This involved CGS and BGI scientists soliciting information from members of the public through questionnaire surveys. More information was collected through questionnaires submitted online by the public. In total 181 questionnaires were obtained through interviews and 151 online from South Africa, Zimbabwe and Namibia through collaboration between the CGS, the Meteorological Services Department of Zimbabwe and the Geological Survey of Namibia. All collected data were analysed to produce 79 intensity data points (IDPs) located all over the region, with maximum intensity values of VI (according to the Modified Mercalli Intensity scale) observed near the epicentre. This is quite a low value of maximum intensity for such a large event, but was expected given that the epicentral region is in a national park which is sparsely populated. The second scientific project involved the rapid installation of a temporary network of six seismograph stations in and around the location of the main event with the purpose of detecting and recording its aftershocks over a period of three months. Data recorded in the first month of April 2017 were collected and delivered to both the CGS and BGI for processing. More than 500 aftershock events of magnitude $M_L \geq 0.8$ were recorded and analysed for this period. All the events are located at the eastern edge of the Central Kgalagadi Park near the location of the main event in two clear clusters. The observed clusters imply that a segmented fault is the source of these earthquakes and is oriented in a NW-SE direction, similar to the direction inferred from the fault plane solution of the main event.

Keywords: Botswana, earthquake, seismograph stations, aftershocks, intensity, macroseismic.