The January 10th, 2019 Westfield earthquake and related seismicity in southern New Brunswick, Canada

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A magnitude (m_n) 3.8 earthquake occurred on January 10th, 2019, with an epicentre close to the town of Westfield in southern New Brunswick. The earthquake was recorded on seismographs in Canada and adjacent USA. The presence of a strong Rayleigh surface wave (R_g phase) on most of the seismogram traces suggests a shallow source; a depth of 2 km is listed by Earthquakes Canada. The latter agency received close to 400 felt reports on their on-line questionnaire and assigned intensities on the Modified Mercalli scale ranging from I (felt) to VI (cracks, fall of objects) for this earthquake. The event was strongly felt (sharp jolt, felt vibrations) in Grand Bay, Rothesay, Saint John, and Westfield, all within 20 km of the epicentre. An earthquake in the same area on April 14th, 1909, had a felt area corresponding to magnitude (m_b) 3.4, but this event was reportedly felt only in Lingly, Welsford, and Westfield. Other earthquakes of similar and larger magnitudes have occurred in the region stretching from Saint John to Moncton. Although no focal mechanism study was available at the time of writing this abstract, it is probable that this earthquake is similar to others in the southern part of the province and will show thrust fault movement (reverse faulting). According to the scaling laws between magnitude and fault rupture, a magnitude 3.8 earthquake represents a rupture of a few centimetres on a fault surface of 100 metres or less. The earthquake probably occurred in the crystalline basement in response to the North American slow westward drift brought about by the Mid-Atlantic ridge push, or perhaps stress perturbations due to post-glacial isostatic readjustments.

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