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Ground displacement over Petrinja area caused by earthquake M6.2: interdisciplinary analysis of geodesy and geology based on analysis from SAR Sentinel-1 data

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At the very end of the year 2020, at 29th of December, hazard earthquake of M=6.2 hit near Petrinja, at NW of Croatia. Earthquake have been felt in a circumstance of a 400 kilometers, leaving in an epicenter vicinity inconceivable damage, devastated towns and obstructed lives. In order to obtain the first emergency crisis numbers over the impact of the earthquake on a ground motion, we have analyzed open satellite radar images of Copernicus Sentinel-1 along with the seismic faults. Multiple spatio-temporal Copernicus Sentinel-1 C-SAR images were used and processed for the differentiating the *before* and *after* earthquake state of the art. This presentation shows the results of the SAR conducted analysis, with the results of ground displacement in vertical up-down and horizontal east-west direction. The results show the vertical ground displacement to extent of -12 cm at southern area to +22cm at north-west part of a wide area covered by the earthquake impact regarding the epicenter. The horizontal displacement is detected in range between 30 cm towards west and 40 cm towards east is detected around the epicenter area, and +/-5cm horizontal displacement over a wider affected area indicate a spatial extent and hazardous impact the mainshock event made. The SAR results were verified by including the analysis over one station from the national positioning reference frame CROPOS. Accordingly, we obtained matching results of 5 cm easting shift and -3 cm subsidence on Sisak GNSS CROPOS station which corresponds to our SAR findings. Furthermore, geological interpretation of new findings is given based on results detecting Pokupsko and Petrinja fault.