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Influence of fluids on the evolution of the Ml 4.5, May 2000 Faenza seismic sequence, Northern Apennines (Italy)

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We present seismological evidence on the role of fluids in the space and time evolution of the Faenza seismic sequence (8 May 2000, MD 4.3, Ml 4.5) in the Northern Apennines of Italy. The sequence was recorded by a local seismic network deploied few days the occurrence of the main-shock. The main-shock was followed by other events of similar magnitude, and the entire sequence lasted about a month. About six hundred well-recorded, re-located aftershocks delineate a cloud of events extending in a depth range from 6 to 12 km. The aftershocks distribution and the space-time development of the earthquake sequence seem to indicate that two different fault systems were activated during the sequence, and reveal diffusive like spreading along the fault zones. The fault plane solutions of the earthquakes delineate low-angle thrust faulting. We investigated several seismic parameters and suggest that changes observed are correlated well with the crustal structure and with the presence of fluids. We searched for diffusion-related features of induced microseismicity, and we identified a triggering front with an isotropic diffusivity in a distance-versus-time (r-t) diagram. We found high P-wave to S-wave velocity (Vp/Vs) ratios in the source region. Data from some stations reveal a conversion from P to S wave within the high Vp/Vs layer. The location of the conversion interface is estimated by the observed Tps-p times. Attenuation property of the medium around the epicentral area is studied by estimating Qs by means of spectral ratio technique. The estimated Qs values at different stations are on average low, ranging from 60 to 100 indicating a strong attenuation crust beneath the entire region. Combined interpretation of these seismic properties suggests an increase pore pressure. The anomalies highlighted are discussed with regard to the spatial rela-

tionship with geological and tectonic information.