ABSTRACT FINAL ID: T32C-03 **TITLE:** The complex architecture of the 2009 MW 6.1 L'Aquila normal fault system (Central Italy) as imaged by 64,000 high-resolution aftershock locations. **SESSION TYPE:** Oral **SESSION TITLE:** T32C. What Can Fault Rocks Tell Us About Earthquake Mechanics? II **AUTHORS (FIRST NAME, LAST NAME):** Luisa Valoroso[1], Lauro Chiaraluce[1], Raffaele Di Stefano[1], Davide Piccinini[1], David Paul Schaff[2], Felix Waldhauser[2]
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Title of Team: **ABSTRACT BODY:** On April 6th 2009, a MW 6.1 normal faulting earthquake struck the axial area of the Abruzzo region in Central Italy. We present high-precision hypocenter locations of an extraordinary dataset composed by 64,000 earthquakes recorded at a very dense seismic network of 60 stations operating for 9 months after the main event. Events span in magnitude (ML) between -0.9 to 5.9, reaching a completeness magnitude of 0.7. The dataset has been processed by integrating an accurate automatic picking procedure together with cross-correlation and double-difference relative location methods. The combined use of these procedures results in earthquake relative location uncertainties in the range of a few meters to tens of meters, comparable/lower than the spatial dimension of the earthquakes themselves). This data set allows us to image the complex inner geometry of individual faults from the kilometre to meter scale.
The aftershock distribution illuminates the anatomy of the en-echelon fault system composed of two major faults. The mainshock breaks the entire upper crust from 10 km depth to the surface along a 14-km long normal fault. A second segment, located north of the normal fault and activated by two Mw>5 events, shows a striking listric geometry completely blind.
We focus on the analysis of about 300 clusters of co-located events to characterize the mechanical behavior of the different portions of the fault system. The number of events in each cluster ranges from 4 to 24 events and they exhibit strongly correlated seismograms at common stations. They mostly occur where secondary structures join the main fault planes and along unfavorably oriented segments. Moreover, larger clusters nucleate on secondary faults located in the overlapping area between the two main segments, where the rate of earthquake production is very high with a long-lasting seismic decay.

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