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Basin inversion in central Taiwan and its importance for seismic hazard

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On March 27th, 2013, a 6.2 ML earthquake occurred at 19 km depth in eastern Nantou, central Taiwan. Over a two-week period it was followed by more than 680 aftershocks that ranged up to 5 ML. Most events occurred below the c. 10 km deep detachment fault predicted for this part of the mountain belt, coinciding with other precisely located hypocenters that indicate that much of the crust in this area is seismically active. Here, we combine geological data with a 3D P-wave velocity model derived from local tomography and earthquake hypocenters to determine a model for the structure of central Taiwan. Much of the surface geology of the area comprises the uplifted Eocene-aged rocks of the Hsuehshan Basin. The 3D P-wave velocity model shows a shallowing of higher velocities across the Hsuehshan Basin and hypocenter data indicate that its western bounding fault is clearly defined by an eastward-dipping band of events that extends to > 20 km depth. The eastern bounding fault is interpreted to coincide at depth with a cluster of events between 20 km and 30 km depth. These data suggest that the pre-existing, rift-related extensional faults of the Hsuehshan Basin are currently being reactivated and the basin is being inverted. Finally, we present hypocenter data from the Nantou sequence that corroborates this interpretation and shows the importance of choosing the correct structural model when assessing seismic risk.