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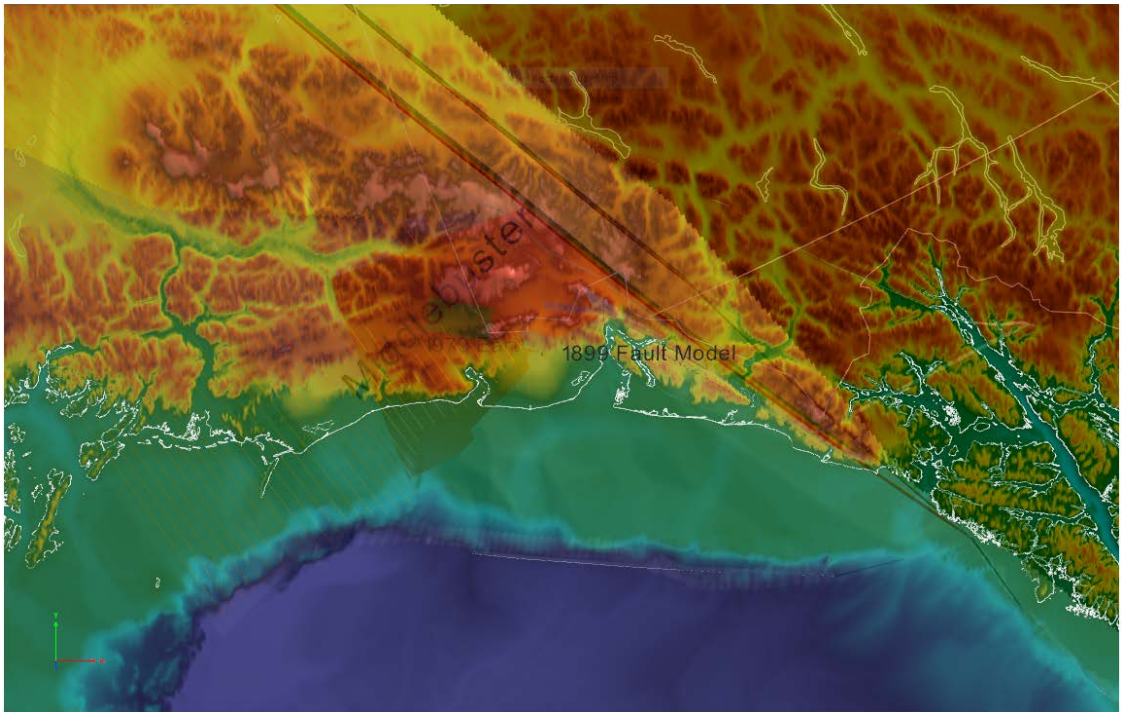


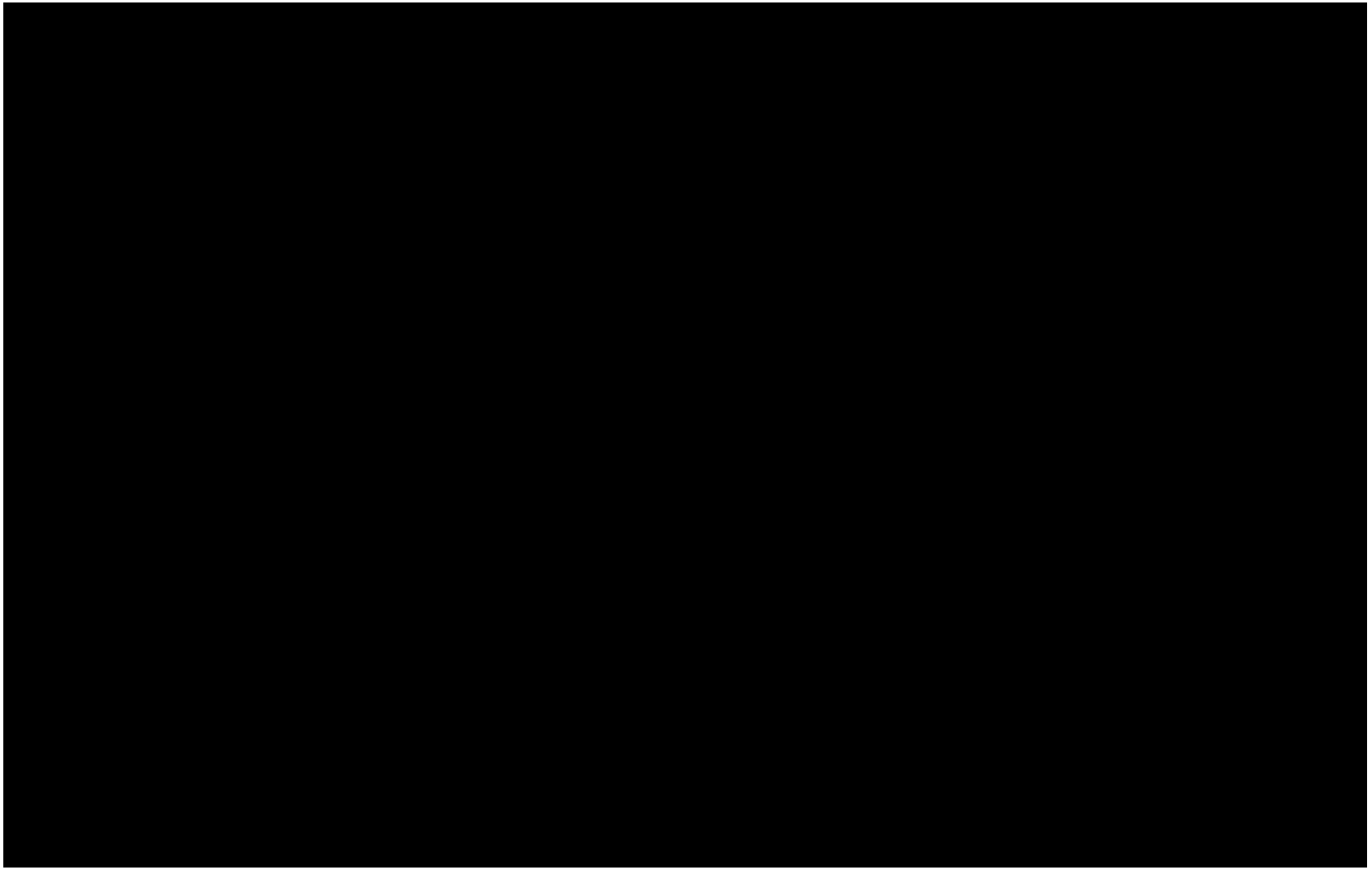
Figure 8. Elements of middlebuster model for crustal structure of the syntaxis in the vicinity of Mount St. Elias. This figure is a 3D PDF. See Figure 3 for general directions on interacting with the figure and a description of objects also found in this figure. The focus here is data used to construct the middlebuster surface. Several features in this figure have 3D labels to clarify them. Surfaces used by Plafker and Thatcher (2008) to match uplift data from the 1899 earthquakes have the tag "Thatcher and Plafker fault model." Fault planes we constructed from the fault model determined by Estabrook et al. (1992) are shown as a pair of green rectangles with a 3D label. The plow-shaped surface we constructed from these surfaces has the object tag "Middlebuster projected surface" and the 3D label "Middlebuster." In addition to the strike-slip faults from Elliott et al. (2010) with a 10 km thickness (Elliott et al., 2010; Fault Model tag), we also show a projection of the Fairweather–Queen Charlotte fault combination to a vertical depth of 30 km. The object tag is "Fairweather Fault Projected to 30 km depth." Click here for the 3D file of Figure 8. You will need Adobe Acrobat or Adobe Reader DC or later to view and rotate this file. If reading the full-text version of this paper, please download article PDF to view 3D file in these programs.

constructed from this collection of earthquake rupture surfaces can be found in the Supplemental Materials (footnote 1). Longer-term deformation is not as well understood, but recent work by Enkelmann et al. (2015a, 2015b) and Falkowski et al. (2014) supports preliminary evidence from Sisson et al. (2003) that the inferred modern-day full slip partitioning is not consistent with the long-term record indicated from exhumation. Specifically, these data indicate the region east of the Fairweather fault has experienced long-term exhumation. That implies a significant component of east-side-up displacement on the Fairweather fault system. This conclusion is not necessarily surprising given the high terrain in this region (e.g., ~5000 m Mount Fairweather) but is important here because it indicates long-term crustal shortening is occurring east of the Fairweather fault.

At the latitude of Yakutat Bay, the orogenic front takes a sharp turn from a NNW trend to a NW trend (Fig. 2). We infer that this segment marks the southern edge of the complex strain associated with the "corner." Between Yakutat Bay and the Seward Glacier outlet, the Mount Cook block (Fig. 2) represents a transpressional pop-up bounded to the north by the continuation of the Fairweather fault and to the south by a system of poorly defined thrust faults (e.g., Bruhn et al., 2004, 2012; Pavlis et al., 2004). Several significant features within the Mount Cook block demonstrate it is the nexus of deformation in the corner.

1. There is a dramatic increase in peak heights relative to the Yakutat foothills to the south. Mount Cook rises abruptly from sea level in Yakatat Bay to a height of 4196 m.
2. It is now well established that exceptionally high exhumation rates are centered on the Mount Cook block and extend across the northern extension of the Fairweather fault (Spotila and Berger, 2010; Enkelmann et al., 2015a, 2015b, 2016; Falkowski et al., 2014). The exhumation data suggest a transpressional pop-up of the Mount Cook block is a prime factor but it is also part of a broader uplift.
3. The highest peaks in the St. Elias Mountains are immediately north of the Mount Cook block (i.e., Mount Logan, Vancouver, King George, Kennedy, and Hubbard).
4. The collisional suture defined by the Chugach–St. Elias fault (CSEF; Fig. 2) carries high-grade metamorphic rocks of the Mount St. Elias massif on top of Yakutat rocks. That structure terminates on the east side of Mount St. Elias within the Mount Cook block.

Collectively, these observations indicate the Mount Cook block has experienced major uplift and exhumation. Enkelmann et al.'s (2015a, 2015b) work indicates much of the exhumation is very young. The exhumation data also



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