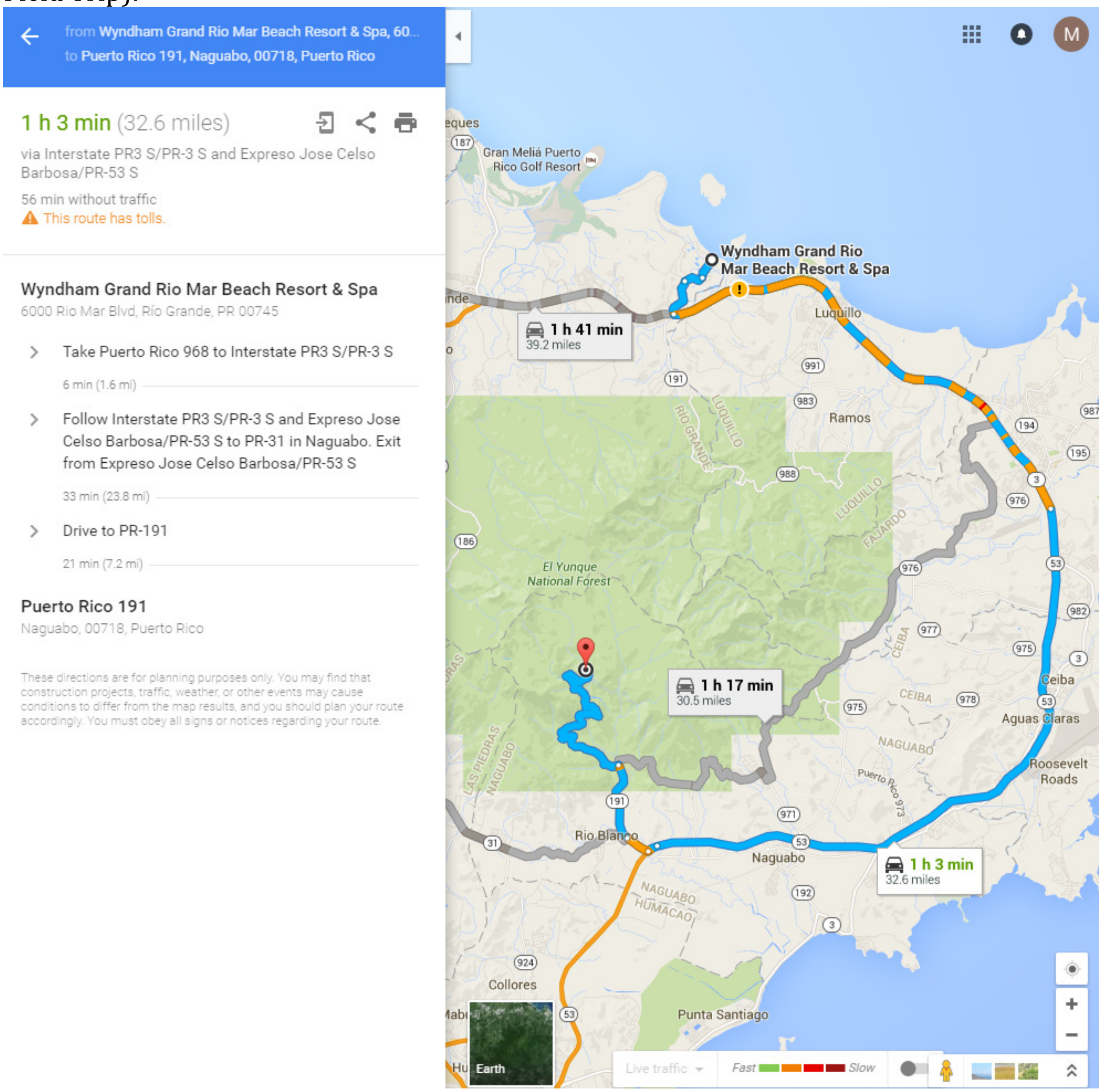
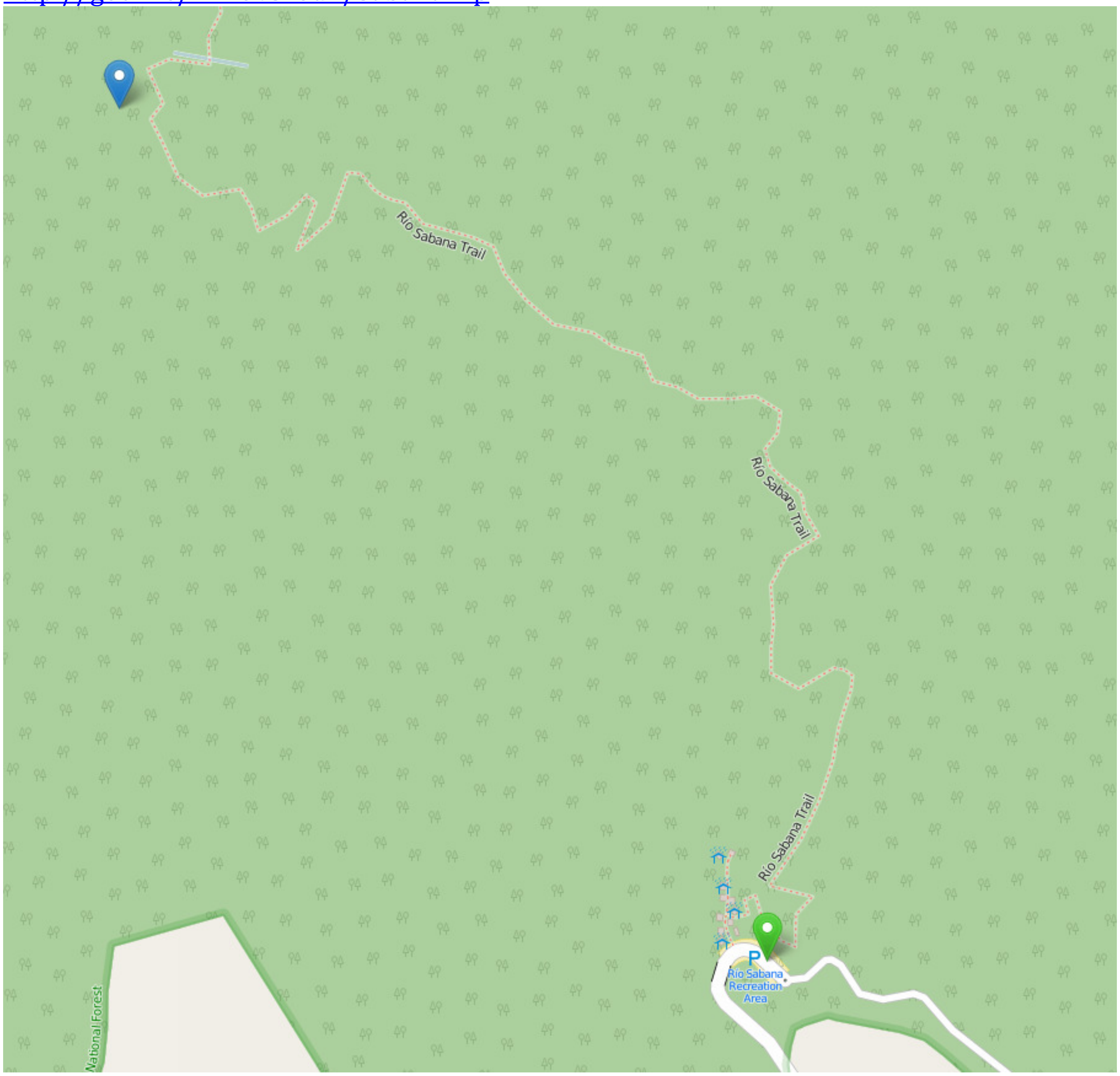
Field trip supplement:

Directions to field trip:

Wyndham Grand Rio Mar Beach Resort & Spa to Rio Sabana Recreation Area (for Field Trip):



Rio Sabana Recreation Area:
http://ge0.me/ck4OvnLy3t/Río_Sabana_Recreation_Area
Sabana Kp:
http://ge0.me/kk4Ovsz6dn/Sabana_Kp



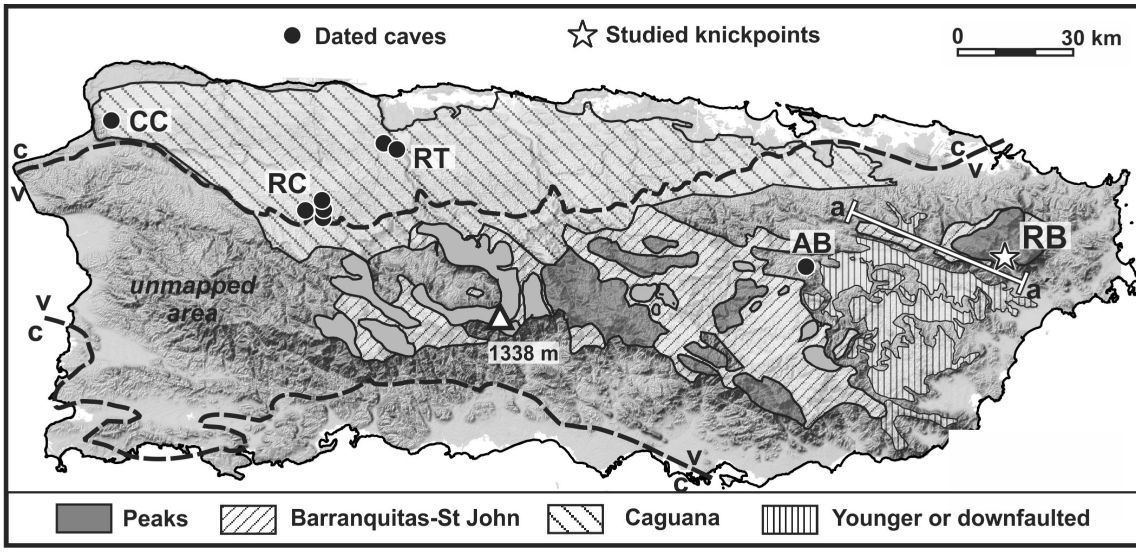


Figure 1. Main low-relief surfaces identified by Lobeck (1922), and Meyerhoff (1927), and their relationship to the Río Blanco river knickpoints (RB) and the cave groups used in this study: AB: Agua Buenas, CC: Cueva Cucaracha, RC: Río Camuy, RT: Río Tanamá. Dashed lines delimitate the northern and southern carbonate belts of Puerto Rico (v: volcanic rocks, c: carbonate rocks).Unmapped area: area where extensive dissection makes challenges the recognition of paleosurfaces. a-a': projected section of Figure 2.

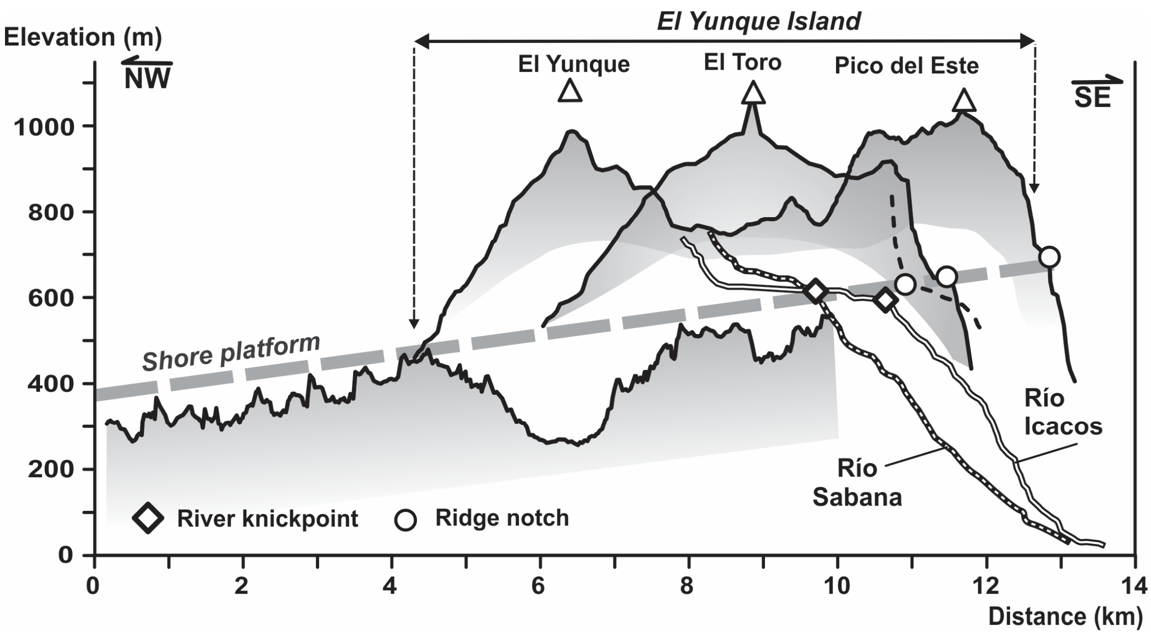


Figure 2. Projected topography of the Luquillo Mountains showing the altitudinal correlation between the tilted Barraquitas-Caguana shore platform, the protruding 'El Yunque Island', and the knickpoint lips of two tributaries of the Río Blanco: Río Sabana and Río Icacos (Brocard et al., 2015, modified). See fig.1 for location.

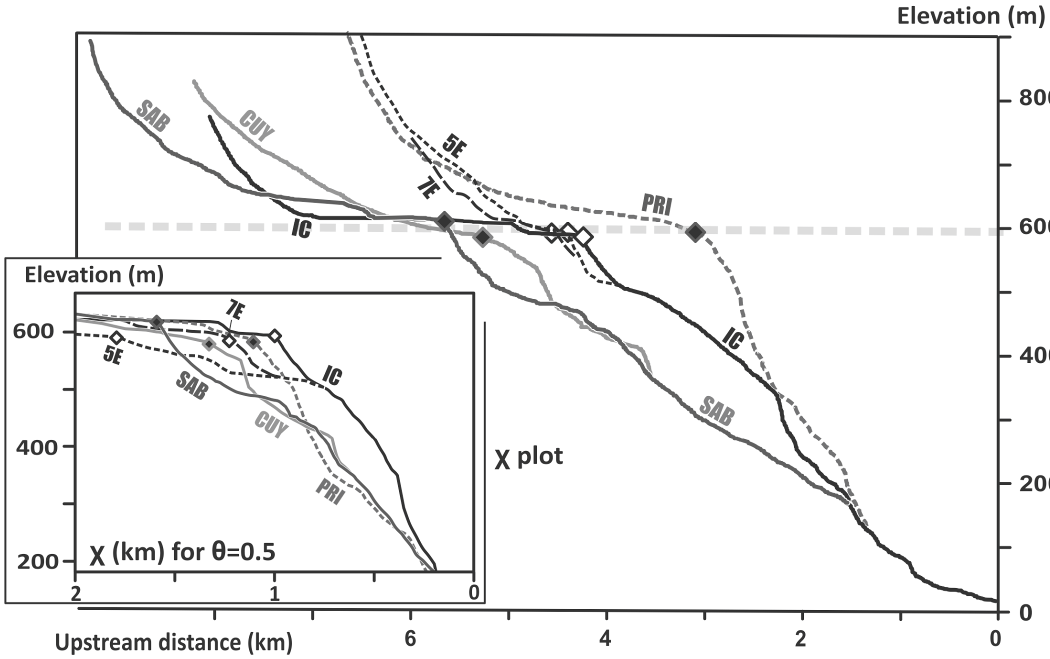


Figure 3. Long profiles of the main Río Blanco tributaries, with location of knickpoint lips (diamonds). CUY: Cubuy, IC: Icacos, PRI: Prieto, SAB: Sabana, and tributaries 5E and 7E of Río Icacos. Inset: χ graph (Perron and Royden, 2012), with χ calculated for a reference drainage area A_o of 1 km^2 and an intrinsic concavity of 0.5. The χ scale is a drainage area-weighted upstream distance representation of river profiles in which knickpoints retreating at a celerity solely controlled by drainage area on a homogeneous substrate plot at the same χ distance. This representation highlights how K_{IC} lags behind other knickpoints.

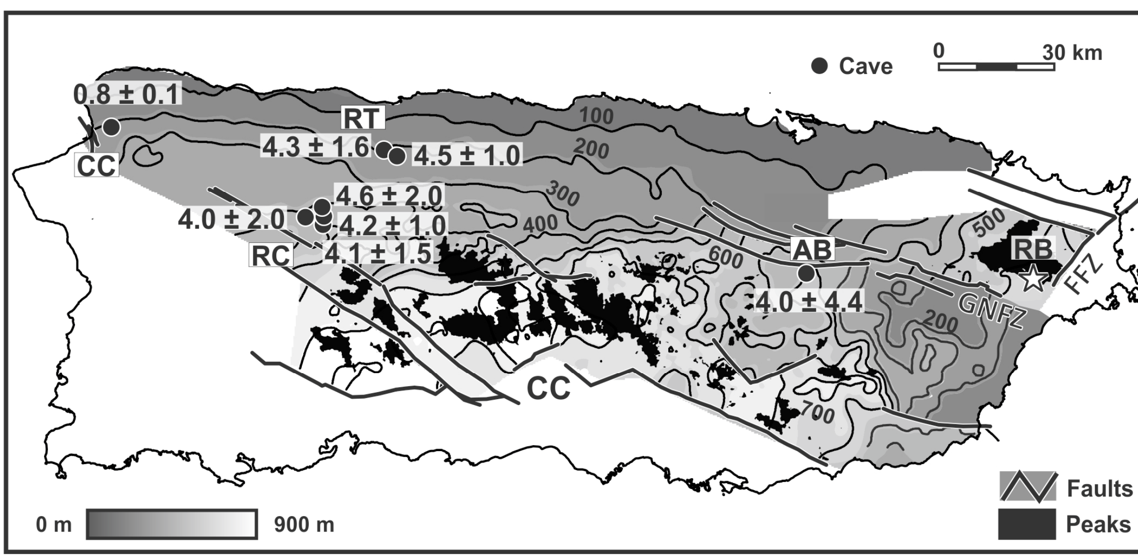


Figure 4: Uplift and age of the shore platforms. Location and age of the dated caves (groups: AB: Agua Buenas, CC: Cueva Cucaracha, RC: Río Camuy, RT: Río Tanama). Star RB: Río Blanco drainage. Surface envelope fit over the remnants of the Barranquitas and Cayaguas surfaces, with contour spacing: 100 m. Mountains protruding over the platforms displayed in black (CC: Central Cordillera). GNFZ: Great Northern Fault zone. FFZ: Fajardo fault zone. RB: Río Blanco. The envelope breaks freely across major tectonic faults, such as across the Great Northern Fault Zone (GNFZ) and the Fajardo Fault Zone (FFZ).

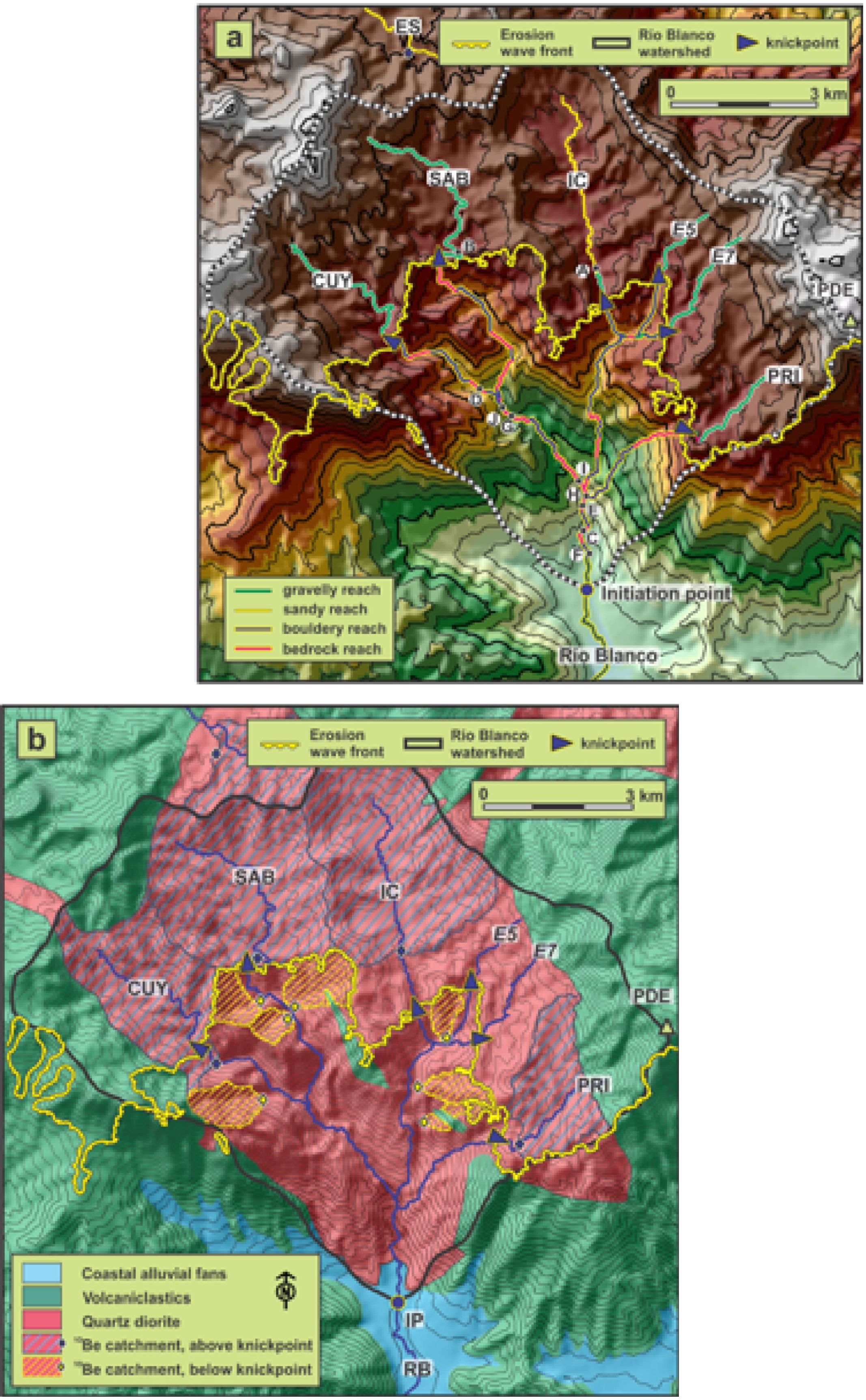


Figure 5. Topography (a) and geology (b) of the Río Blanco catchment, showing features used for modeling of knickpoint retreat such as the Cubuy (CUY), Sabana (SAB), Icacos (IC), Prieto (PRI) branches of the Río Blanco netwrok, and Icacos tributaries E5 and E7. Panel (a) shows the location (A-J) of the field photographs of Fig.9. Panel (b) shows the catchments used to measure erosion upstream and downstream of the knickpoints [*Brocard et al*., 2015]. Topographic contour spacing is 50 m (panel a), and 25 m (panel b), from 25m to 1050 m at Pico del Este (PDE).

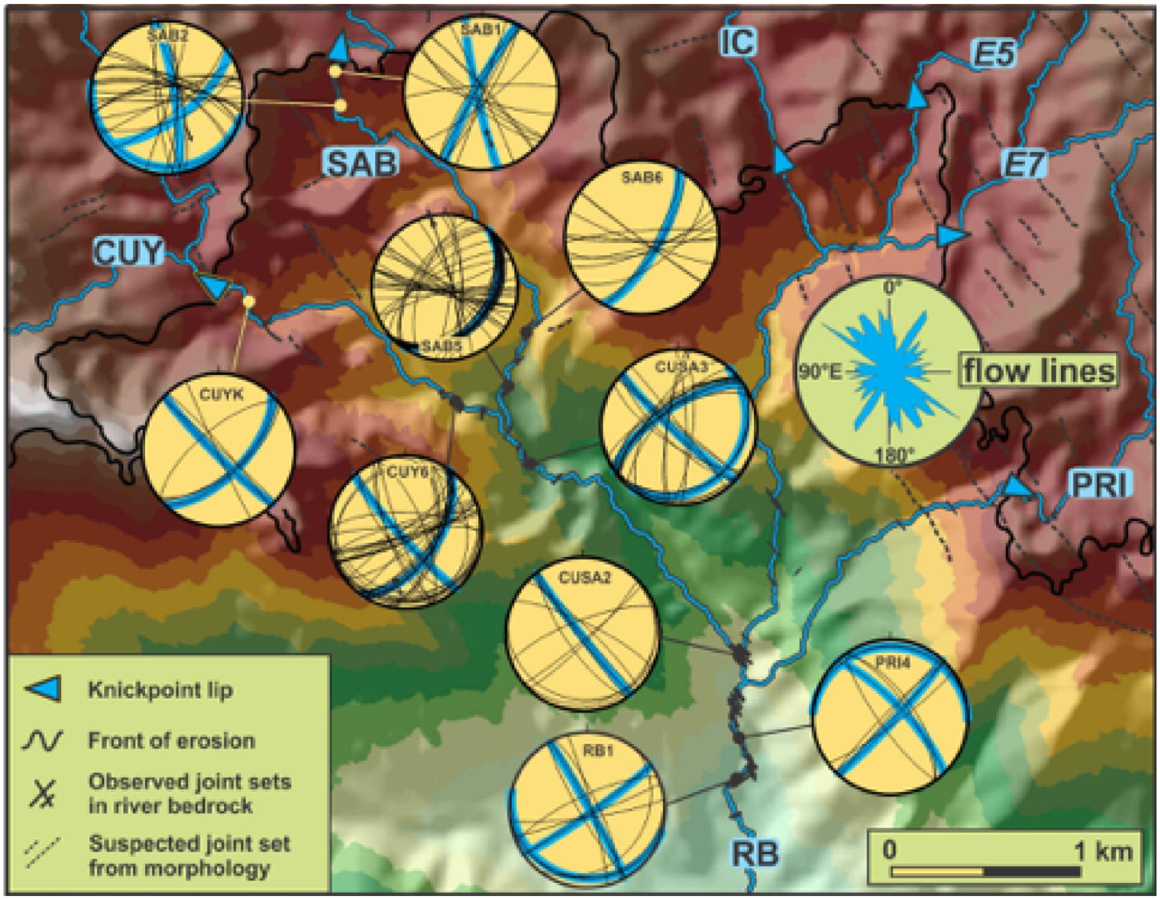


Figure 6. Joint orientations along Río Blanco, projected onto lower hemisphere Wulf stereoplots using software WinTensor 5.0.7 [*Delvaux and Sperner*, 2003]. Blue lines: planes followed by water flow at these same sites. Above the knickpoint lips, bedrock does not crop out and the fabric is inferred from topographic lineaments. The rose diagram shows the statistical orientation of flow lines along all 50 m-long reaches within the incised drainage network. It illustrates the tendency of the incised drainage to develop in a NW-SE direction.

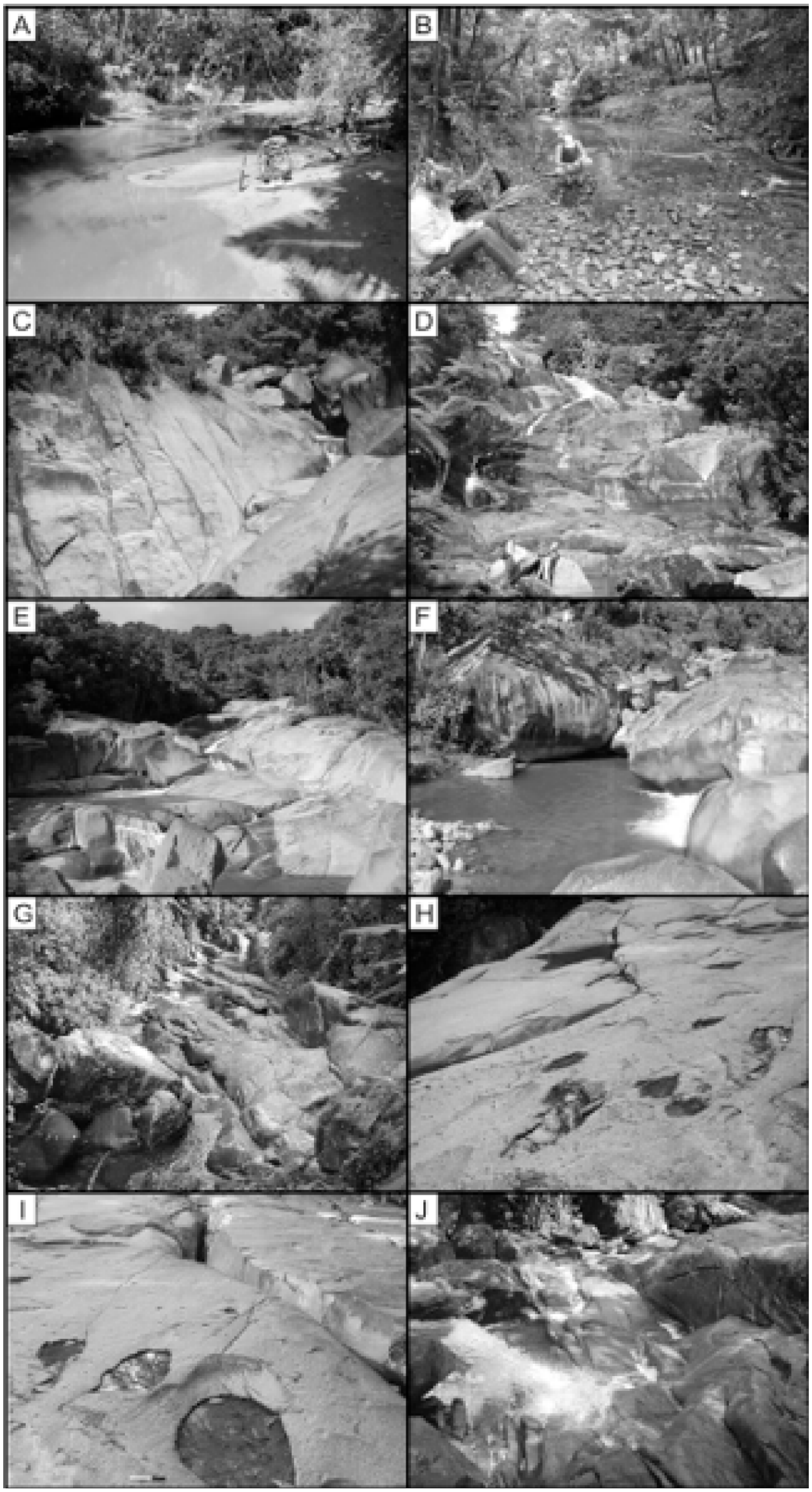


Figure 7. Field views of knickpoints (see Fig. 5 for location). A: sandy river above knickpoint (Icacos), B: gravelly river above knickpoint (Sabana), C: joint spacing in quartz diorite, D: typical waterfall face; E: boulder-free reach, F: top weathering and side abrasion on quartz diorite corestone and transiting gravel; G: sediment-starved reach, H: weathering ponds in shallow scallops; I: vertical weathering in join next to weathering ponds; J: morphology of quartz diorite weathering in active river bed.