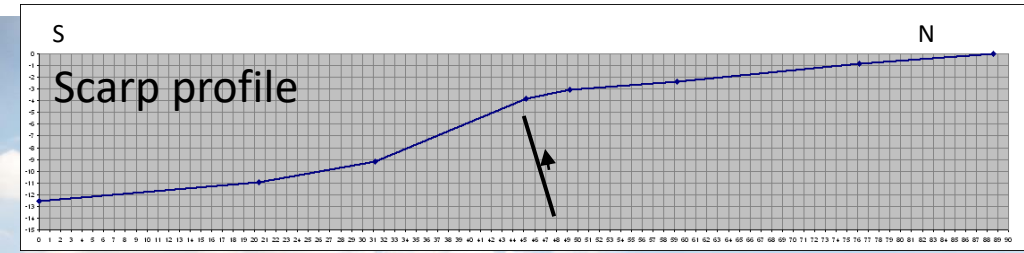


High Resolution Topography for Active Tectonics Research

Kyrgyz Institute of Seismology

Ramon Arrowsmith (Arizona State University and OpenTopography)

Christopher Crosby (UNAVCO and OpenTopography)



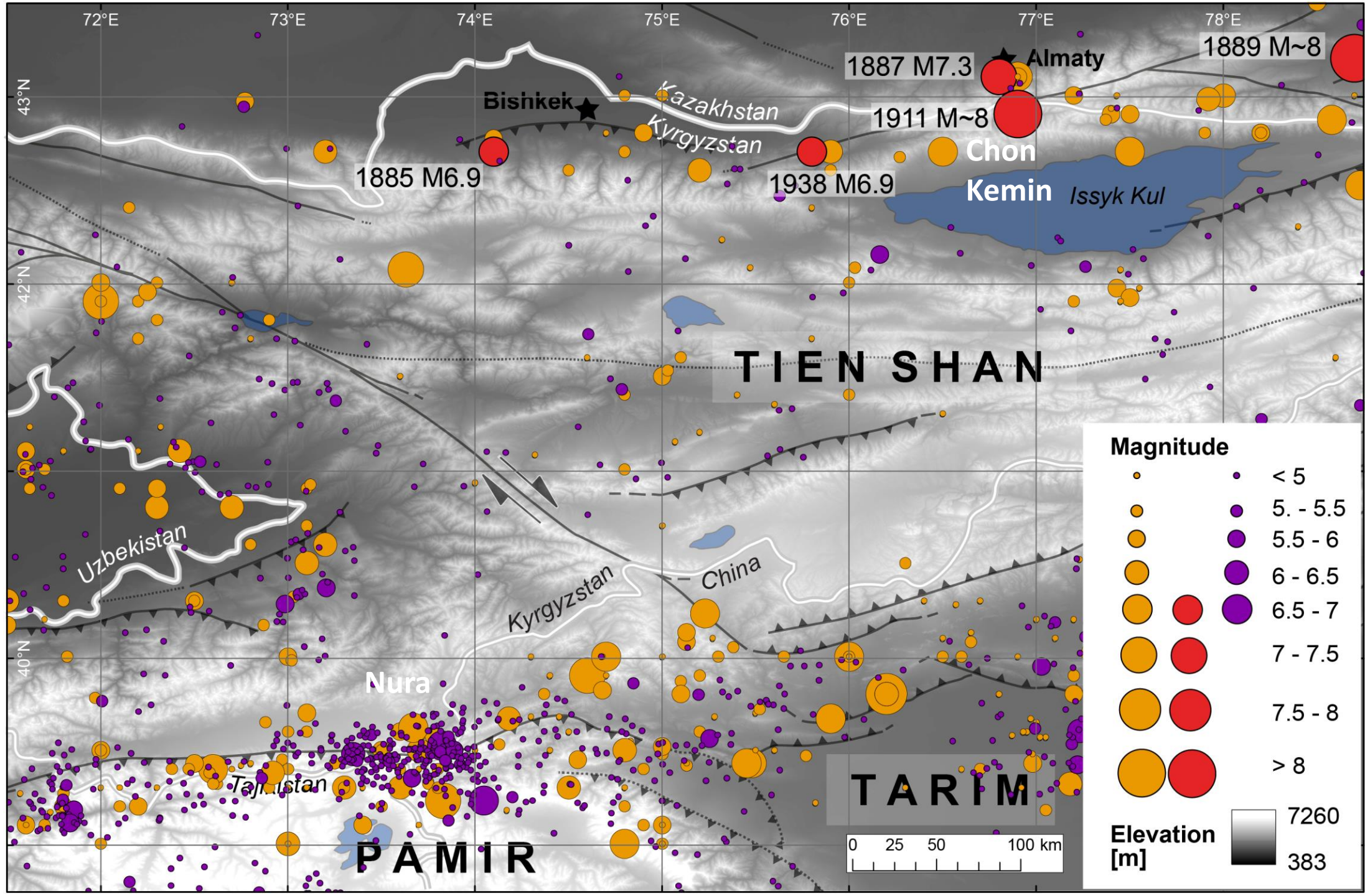
1970 June 5, M6.8 Sary-Kamysh, Kyrgyzstan source zone



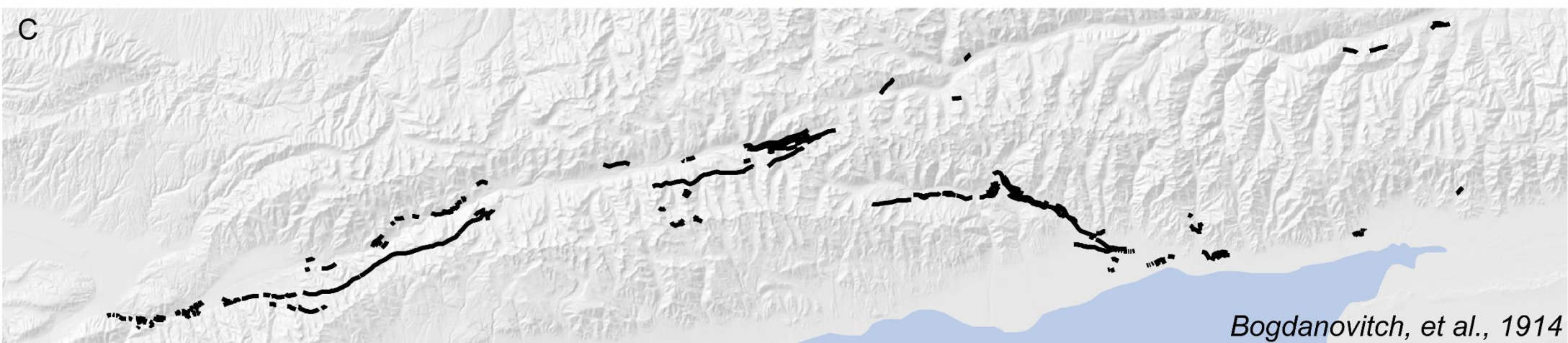
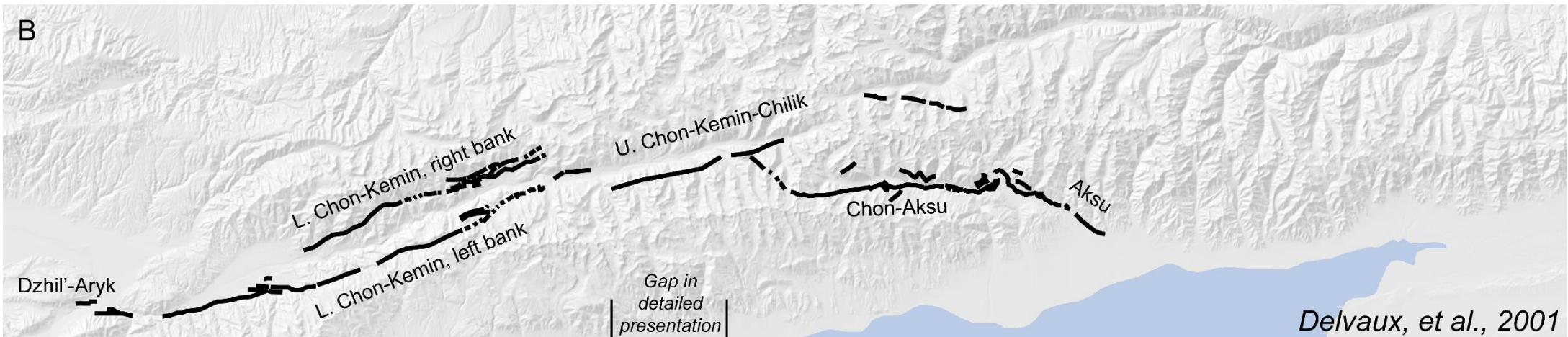
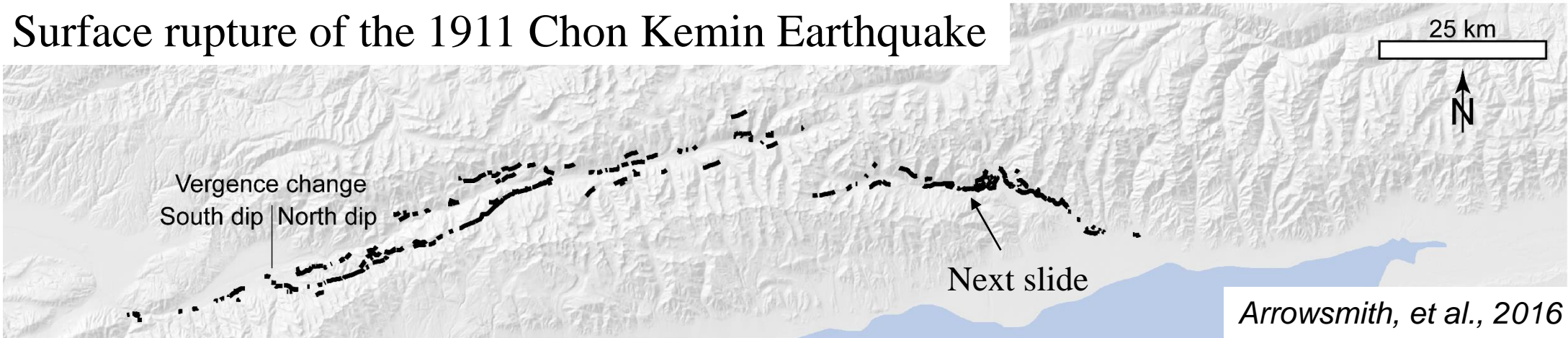
2008 October 5, M6.6 Nura, Kyrgyzstan earthquake rupture (Patyniak, et al., in prep.)

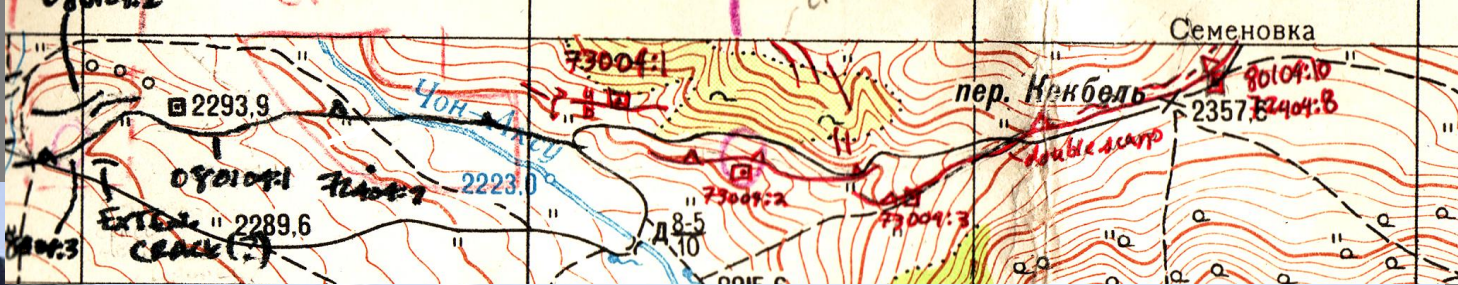
Evolving
tools to
document
earthquake
surface
rupture:
1911 Chon
Kemin (field
work 2004)

And
2008 Nura
(field work
2018)



Surface rupture of the 1911 Chon Kemin Earthquake





Chon Aksu 6 m 1911 offset

Chon Aksu river terrace offset

T3-Post 1911 incision pause(?)

Or 1911 offset (6-8 m)

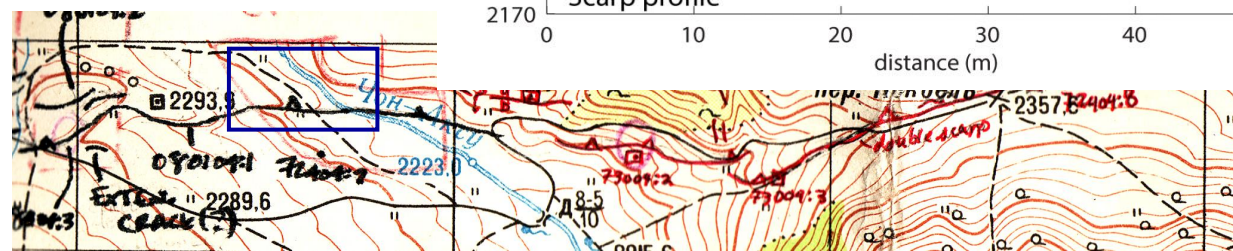
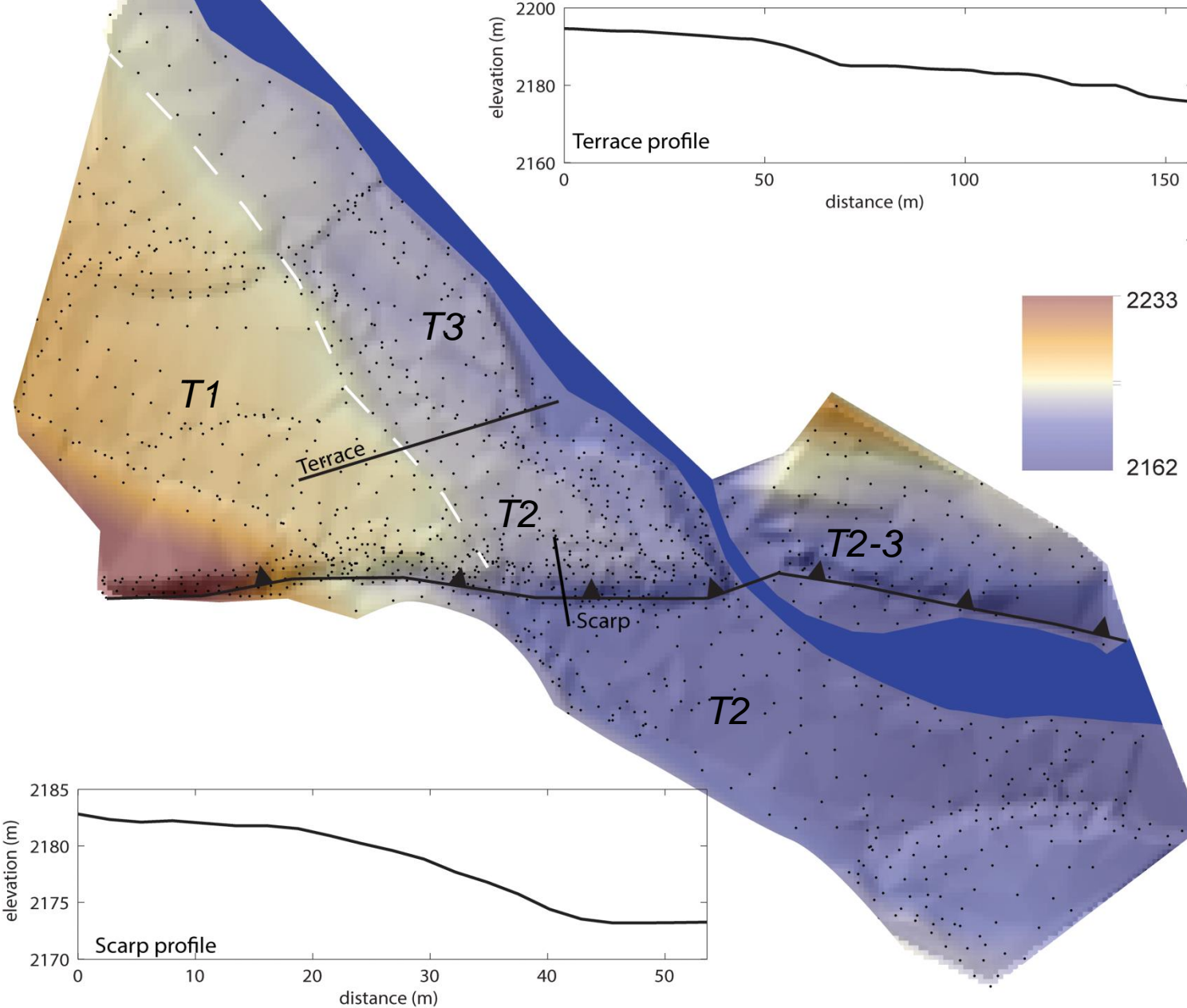
T2-1911 offset (10-12 m)

Or penultimate offset

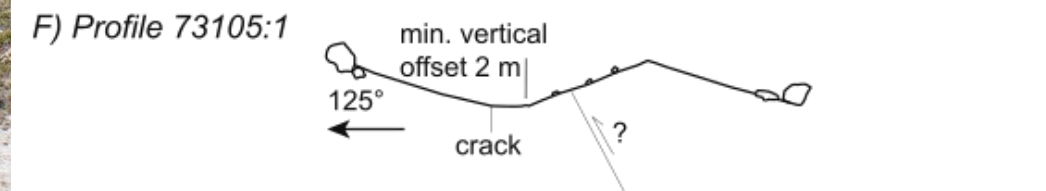
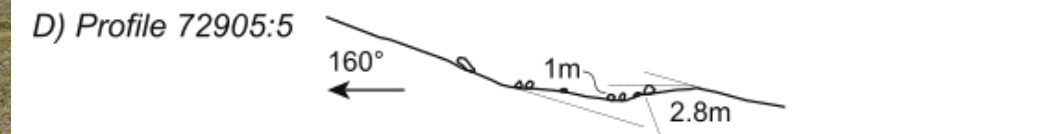
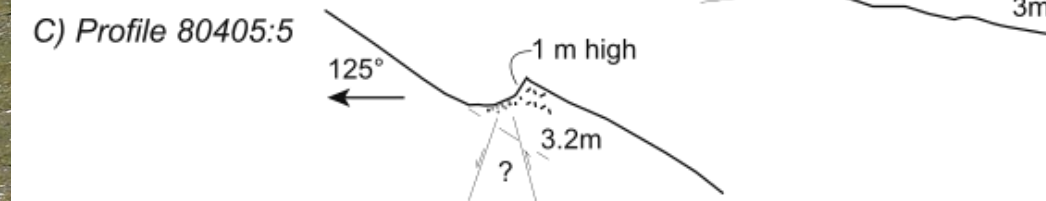
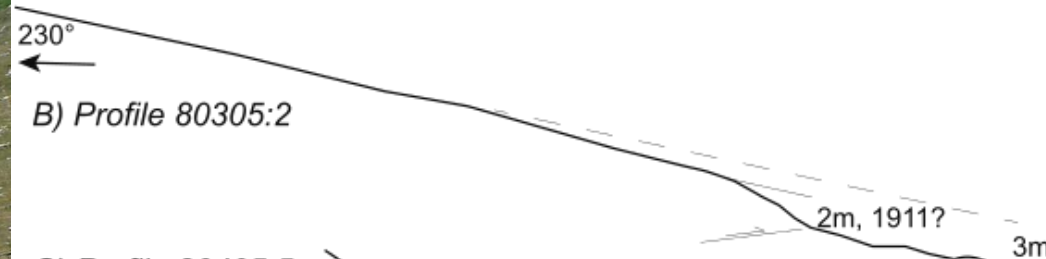
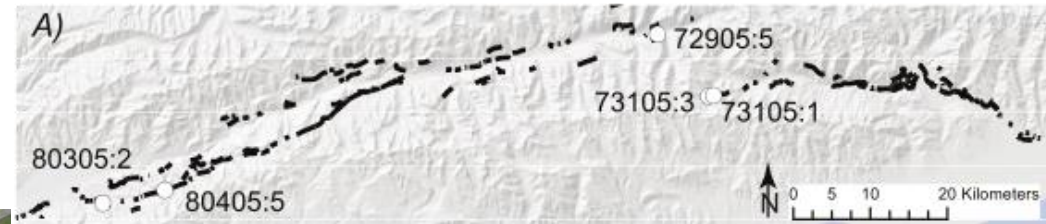
T1-Multiple offsets



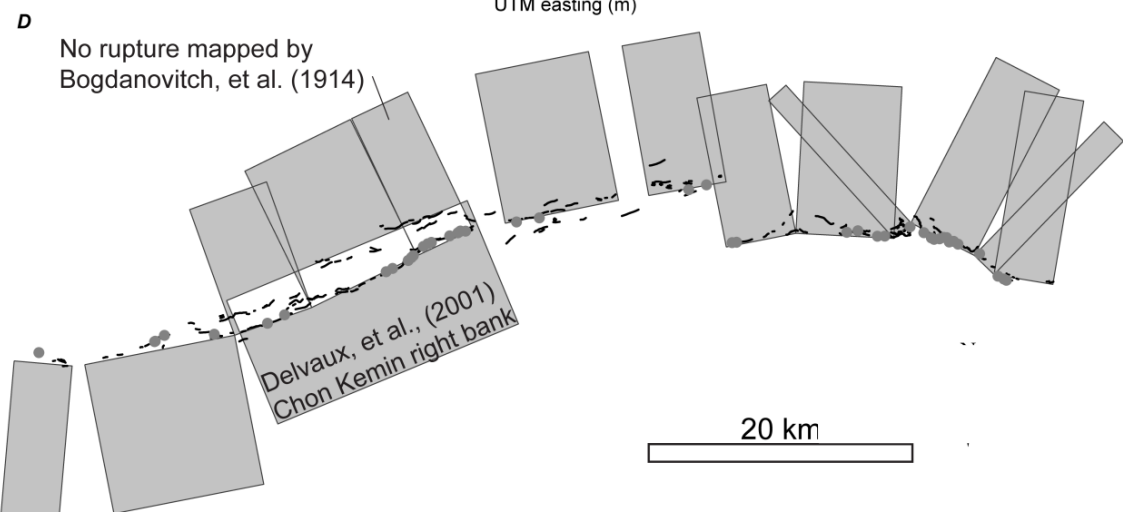
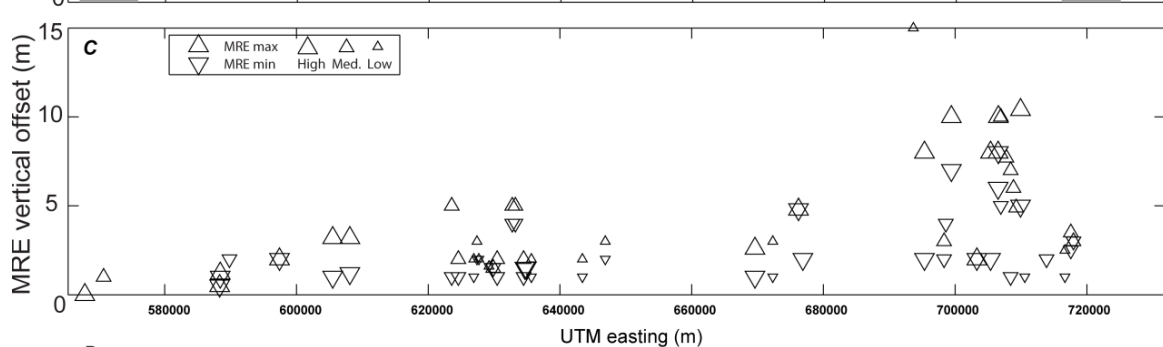
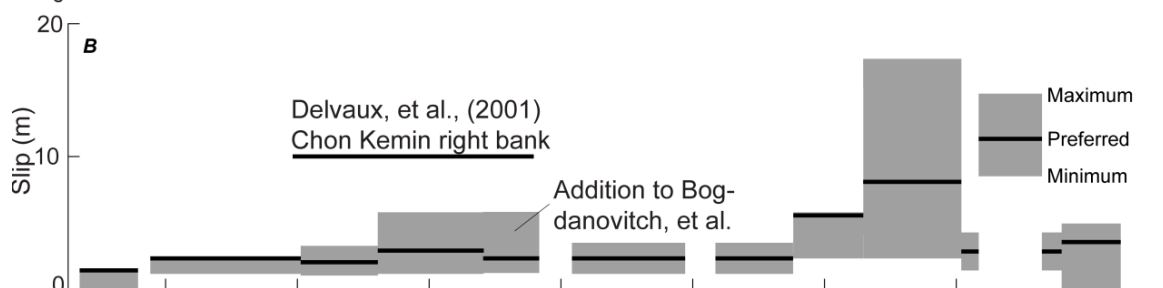
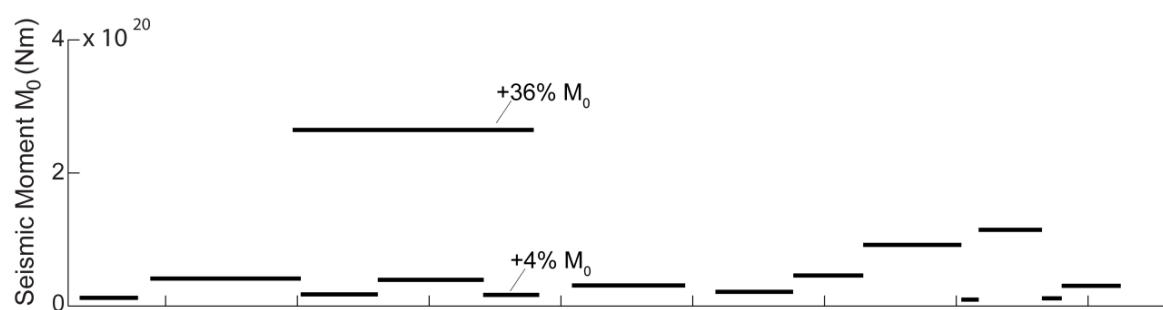
1219 points, 2 people, 2 days



Tape and compass profiles of 1911 fault scarps



5m



1911 MOMENT from surface rupture reconstruction:

Preferred:

$$M_0 = 4.80 \times 10^{20} \text{ N m}$$

$$M_w = 7.79$$

Maximum:

$$M_0 = 7.44 \times 10^{20} \text{ N m}$$

$$M_w = 7.91$$

Seismological estimates

Molnar and Ghose (2000):

$$M_0 = 7.5 \times 10^{20} \text{ N m}$$

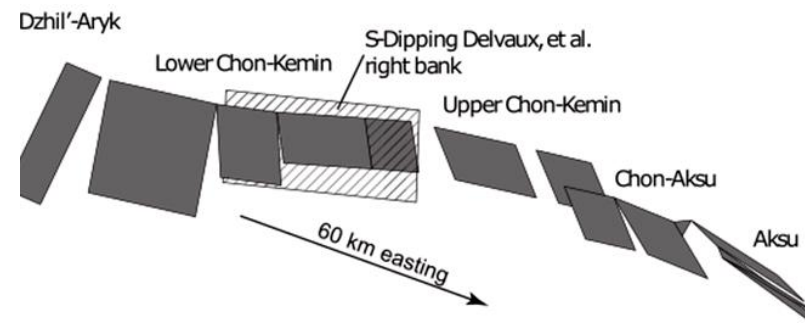
$$M_w = 7.9$$

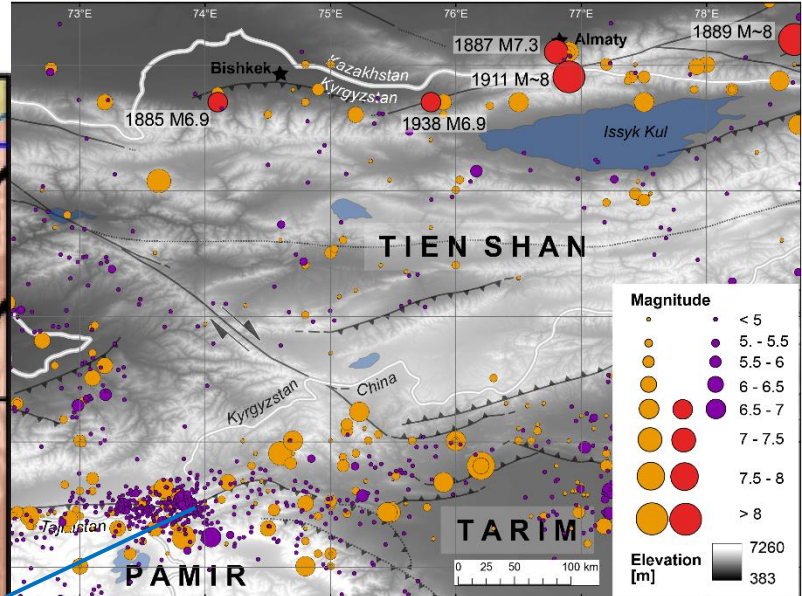
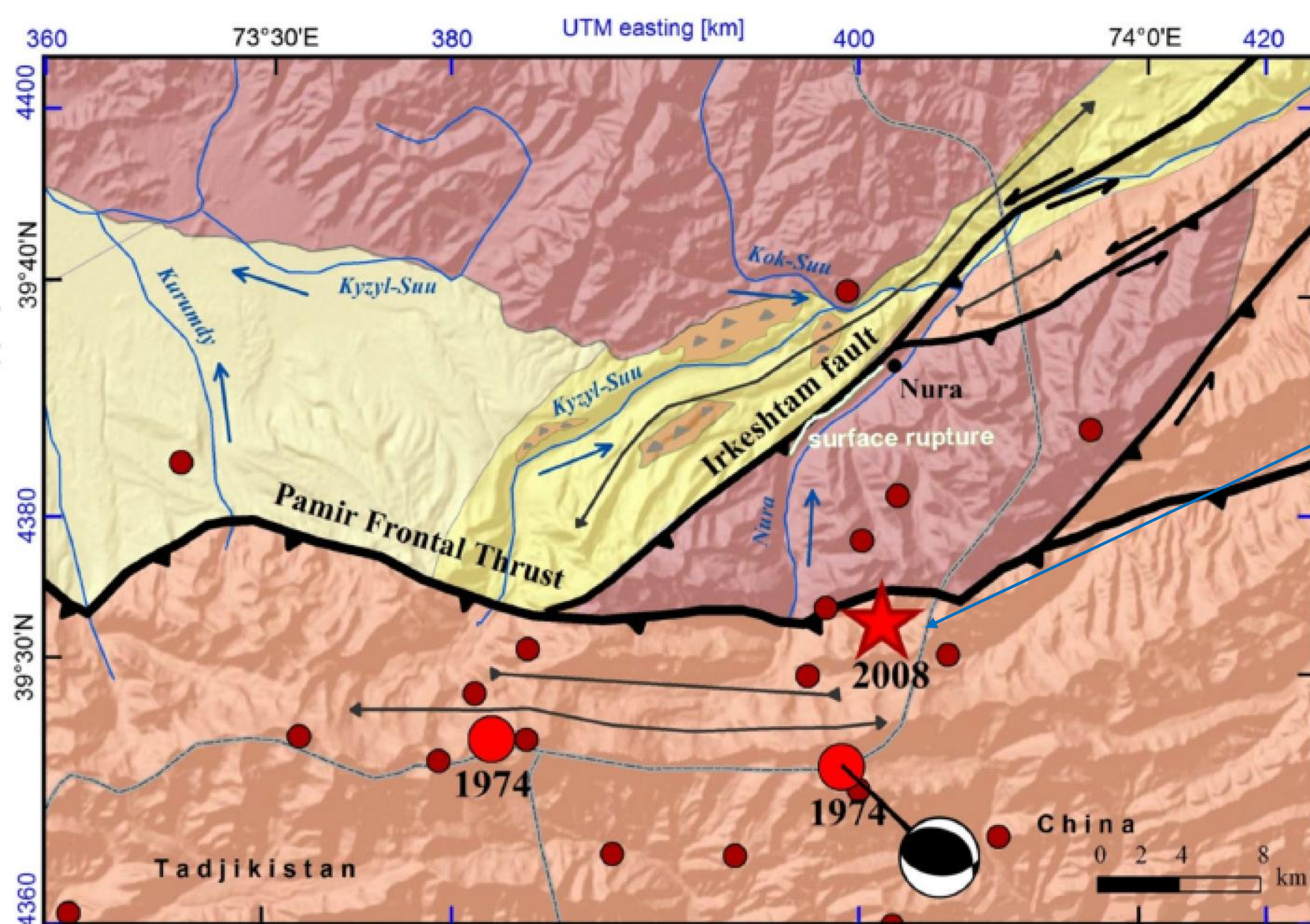
Kulikova and Krüger (2015):

$$M_0 = 1.21(\pm 0.4) \times 10^{21} \text{ Nm}$$

$$M_w = 8.02$$

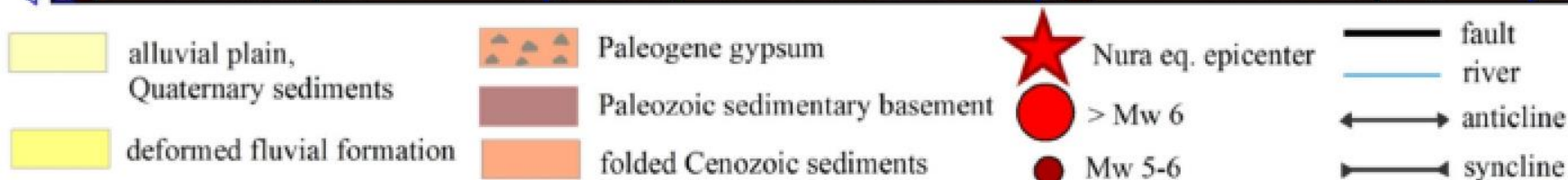
--200 km long and > 20km depth moment release





2008 October 5,
 M6.6 Nura,
 Kyrgyzstan
 earthquake
 (Teshebaeva, et al.,
 2014)

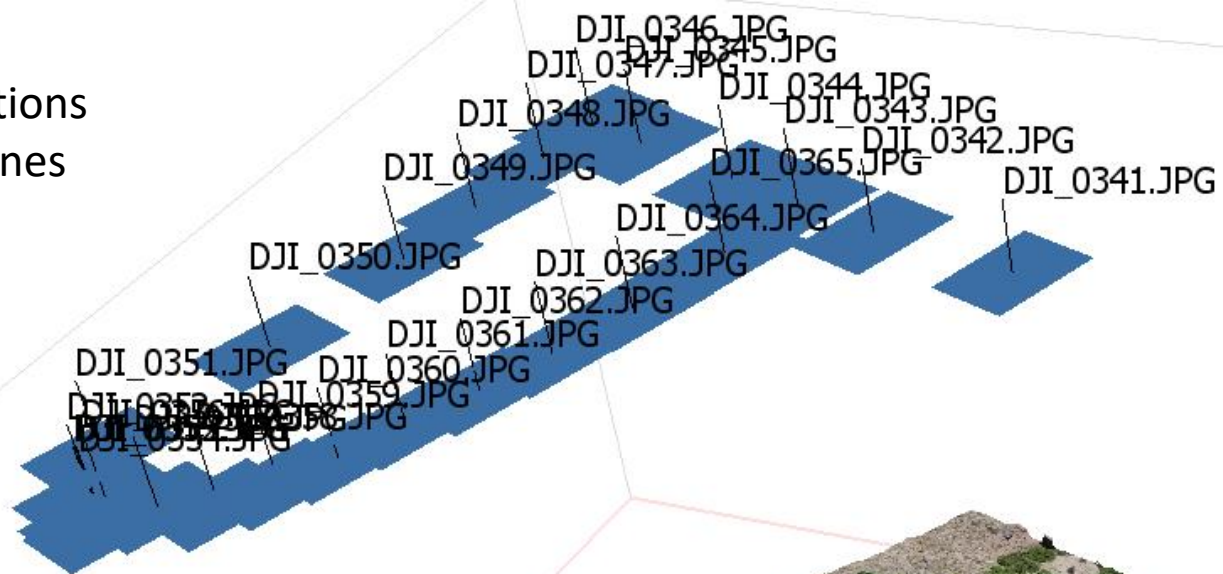
Patyniak, et al., in
 preparation



UAV video central Nura rupture



Camera positions
and focal planes



Structure from Motion (photogrammetry)

e.g., Ullman, 1979 (SfM); Lowe, 1979 (SIFT); Westoby, et al., 2012; James and Robson, et al., 2012; etc.

Agisoft Photoscan Pro
Phantom 4 Pro

Just 25 images, 16M points!

1 person, 5 min to acquire

Processing can be challenging!

