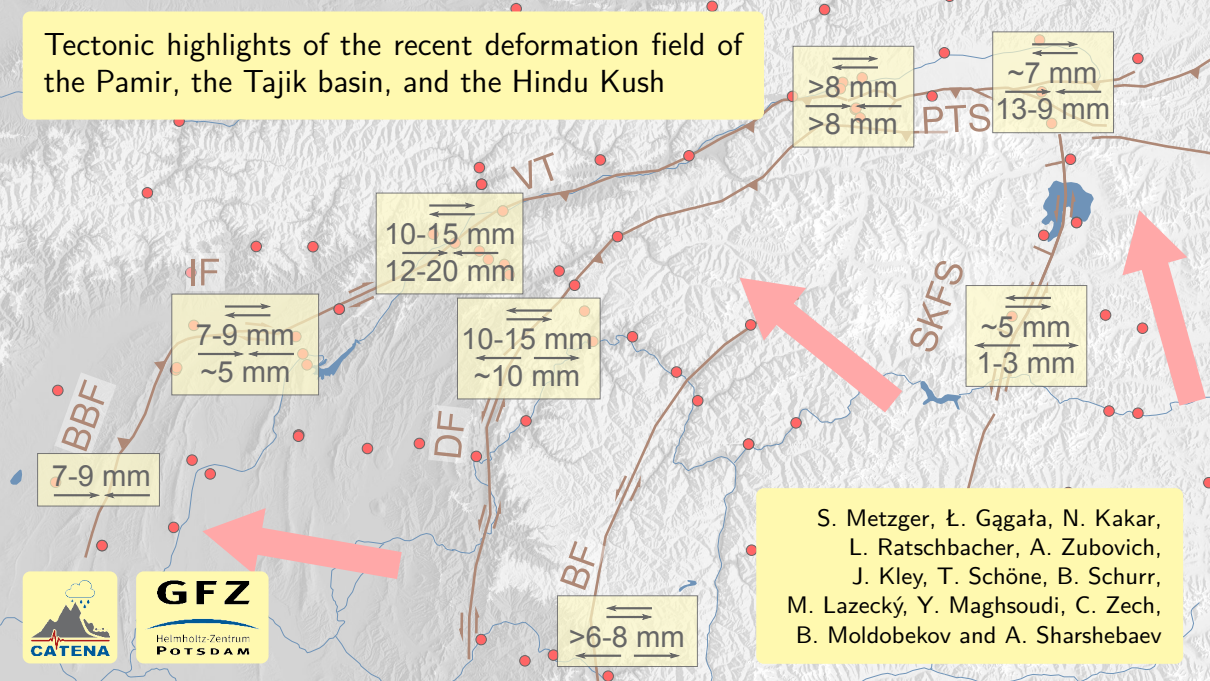
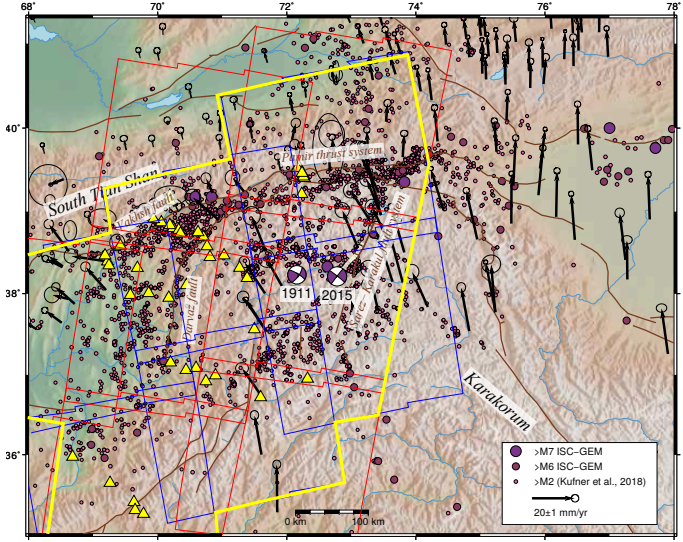

Tectonic highlights of the recent deformation field of the Pamir, the Tajik basin, and the Hindu Kush
>8 mm
>8 mm
PTS
~7 mm
13-9 mm
VT
10-15 mm
12-20 mm
IF
7-9 mm
~5 mm
10-15 mm
~10 mm
SKFS
~5 mm
1-3 mm
BBF
7-9 mm
DF
BF
>6-8 mm
S. Metzger, Ł. Gągała, N. Kakar,
L. Ratschbacher, A. Zubovich,
J. Kley, T. Schöne, B. Schurr,
M. Lazecký, Y. Maghsoudi, C. Zech,
B. Moldobekov and A. Sharshebaev
CATENA
GFZ
Helmholtz-Zentrum
Potsdam

Tectonic Setting



New data (collected since 2013/2016):

- 9 high-rate GNSS time-series
- InSAR time-series
- 40 new survey GNSS time-series

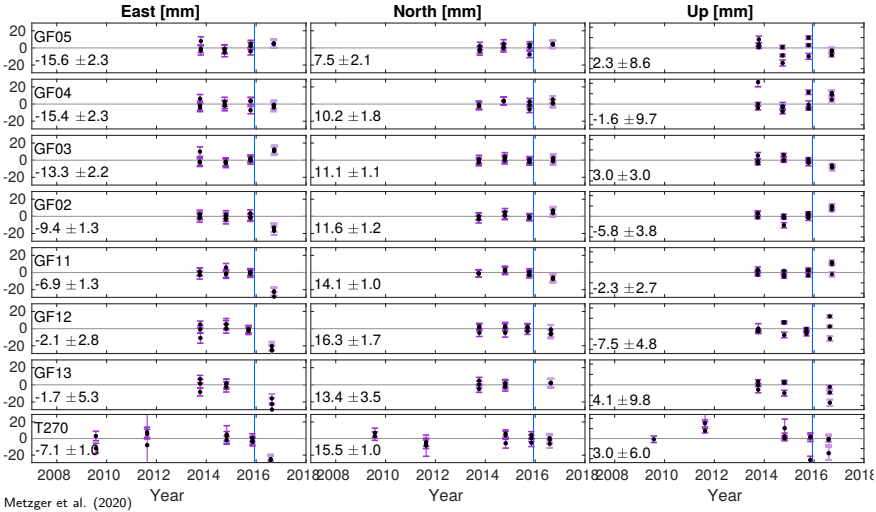
(yellow frames and triangles)

Highlights

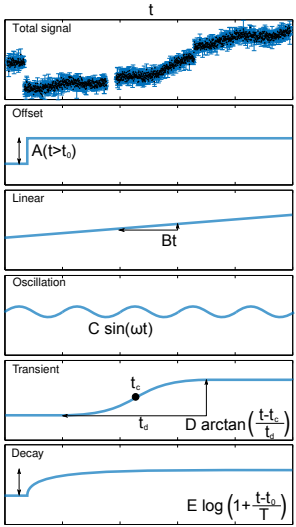
1. 2015 M_w7.2 Pamir earthquake and concurrent fault activation
2. Slip constraints at the Pamir's rim
3. Rate maps documenting basin shortening

GNSS time-series analysis

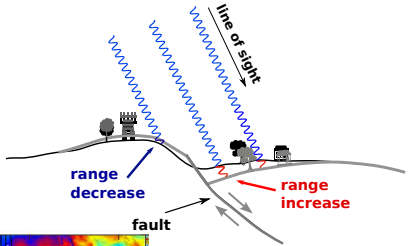
Extract rates from trajectory models



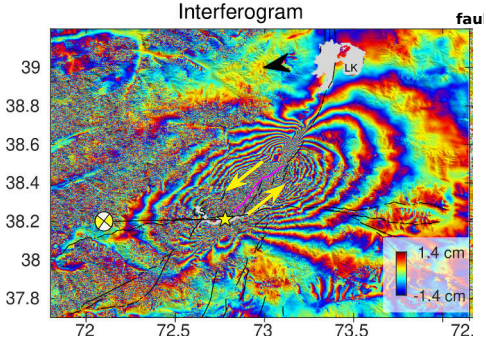
Metzger et al. (2020)

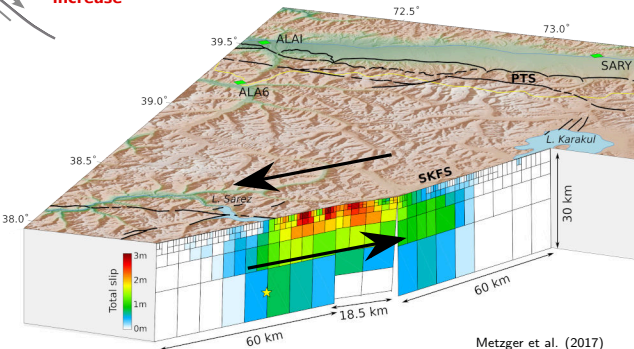


The 2015 M_w7.2 Central Pamir earthquake



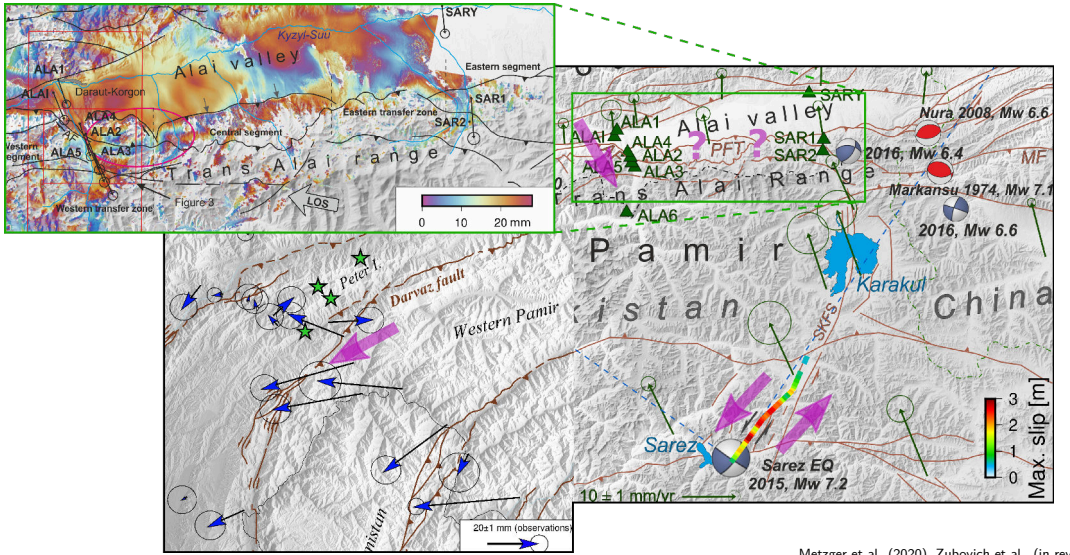
- ruptured the Sarez-Karakul fault system
- 3 m of slip
- 80 km × 20 km rupture plane
- interseismic slip ∼5 mm/yr





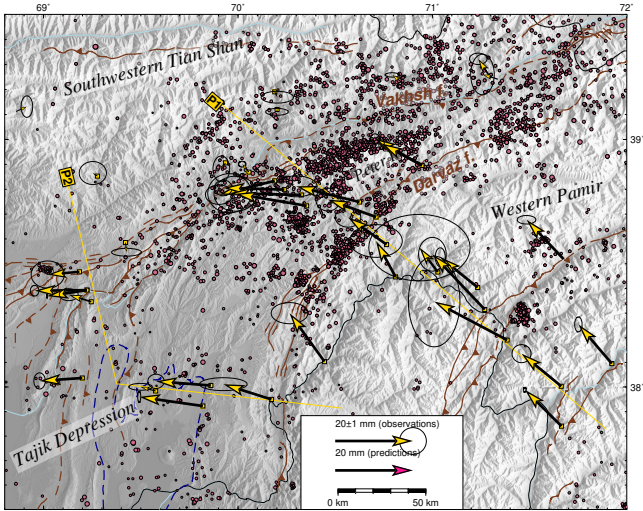
Metzger et al. (2017)

Co-seismic activation of the Pamir NW-Front

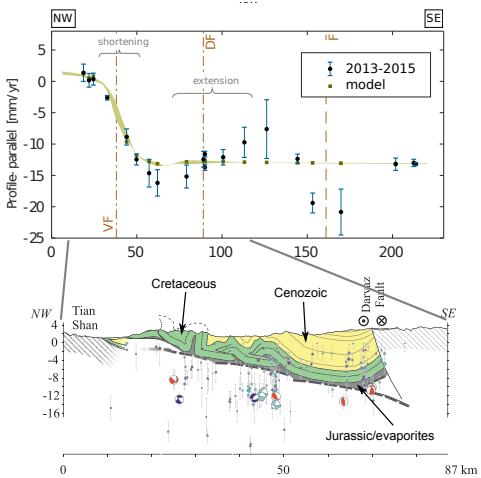


Metzger et al. (2020), Zubovich et al., (in rev.)

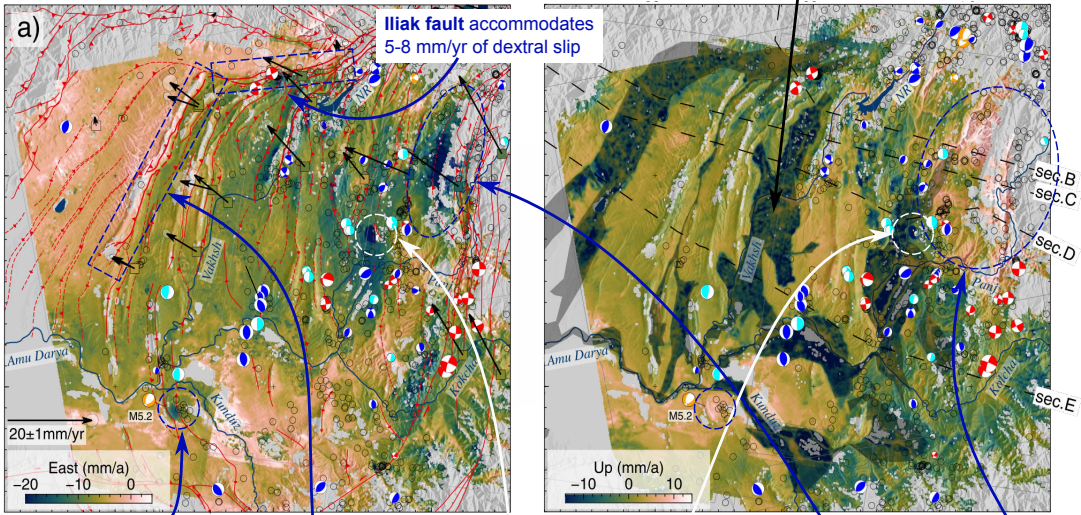
Slip on Vakhsh fault, West Pamir



Metzger et al. (2020)



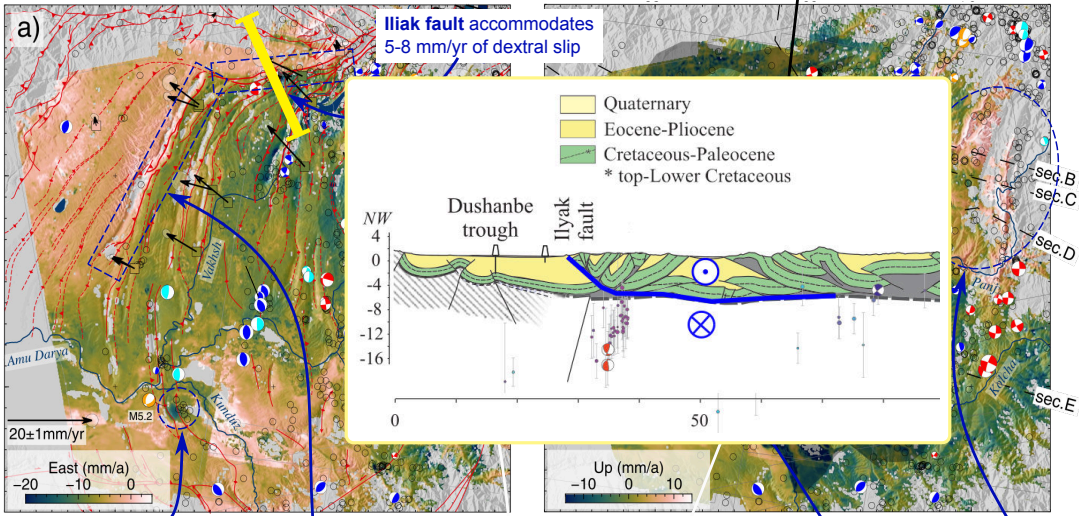
Seismicity: Kufner et al. (2018) Geology: Gagala et al. (2020)



Metzger et al. (2021)

E-W fold-thrust-belt shortening

Soil-moisture bias in rural land



M5.2 thrust event

Babadag backthrust absorbs ~6 mm/yr of E-W shortening

Hoja Mumin salt fountain exhibits highest displacement rates of >300 mm/yr

Strong westward motion and uplift at sinistral-transpressive **Darvaz fault**

Metzger et al. (2021)

Take-home messages

- The Pamir advances northward en-bloc and exhibits **westward crustal collapse**

  Metzger et al. (2022)

- The 2015 Pamir earthquake ruptured the Sarez-Karakul fault that separates the stable East- from the collapsing West Pamir

  Metzger et al. (2017)

- The Pamir's NW-rim hosts low-friction evaporites and was **co-seismically activated**

  Metzger et al. (2020), Zubovich et al. (in rev.)

- The Pamir's NW-rim exhibits **high slip (<20 mm/yr)** and shallow locking; strain accumulates "hidden" in the basement rock.

  Metzger et al. (2020, 2022)

- Pamir-Hindu Kush kinematics reflect the structure of the **Indian indenter** at depth

  Perry et al. (2018), Kufner et al. (2021)