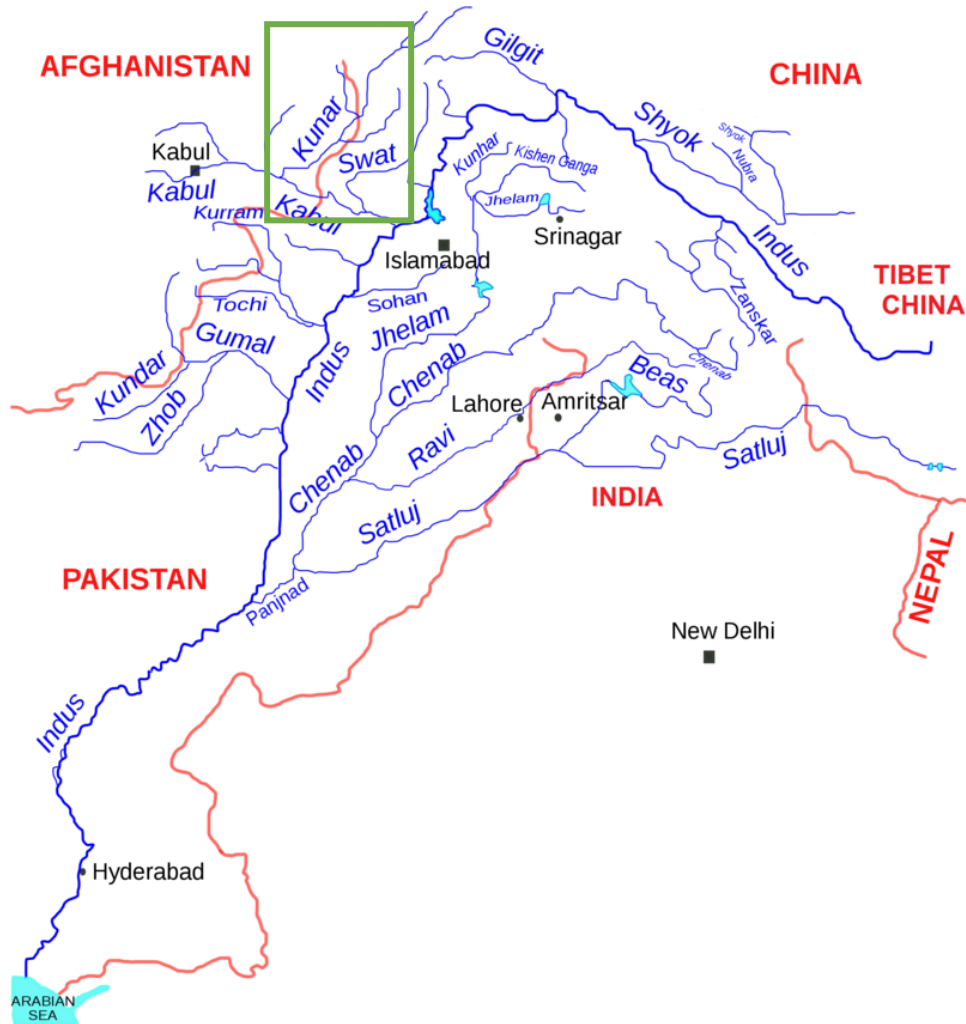


A person wearing a light-colored, long-sleeved traditional garment and a blue head covering is walking away from the camera across a vast, arid landscape. The ground is parched and cracked into a complex, irregular pattern of polygonal shapes. Sparse, dry vegetation is scattered across the horizon under a clear, pale sky. The overall scene conveys a sense of extreme drought and environmental hardship.

Increasing Drought Risks amidst Projected Flood Intensification in the Kabul River Basin Evidence from Tree Rings

Nasrullah Khan, [Hung Nguyen](#), Stefano Galelli, and Paolo Cherubini

The Future is Uncertain



Record floods in 2010 and 2022

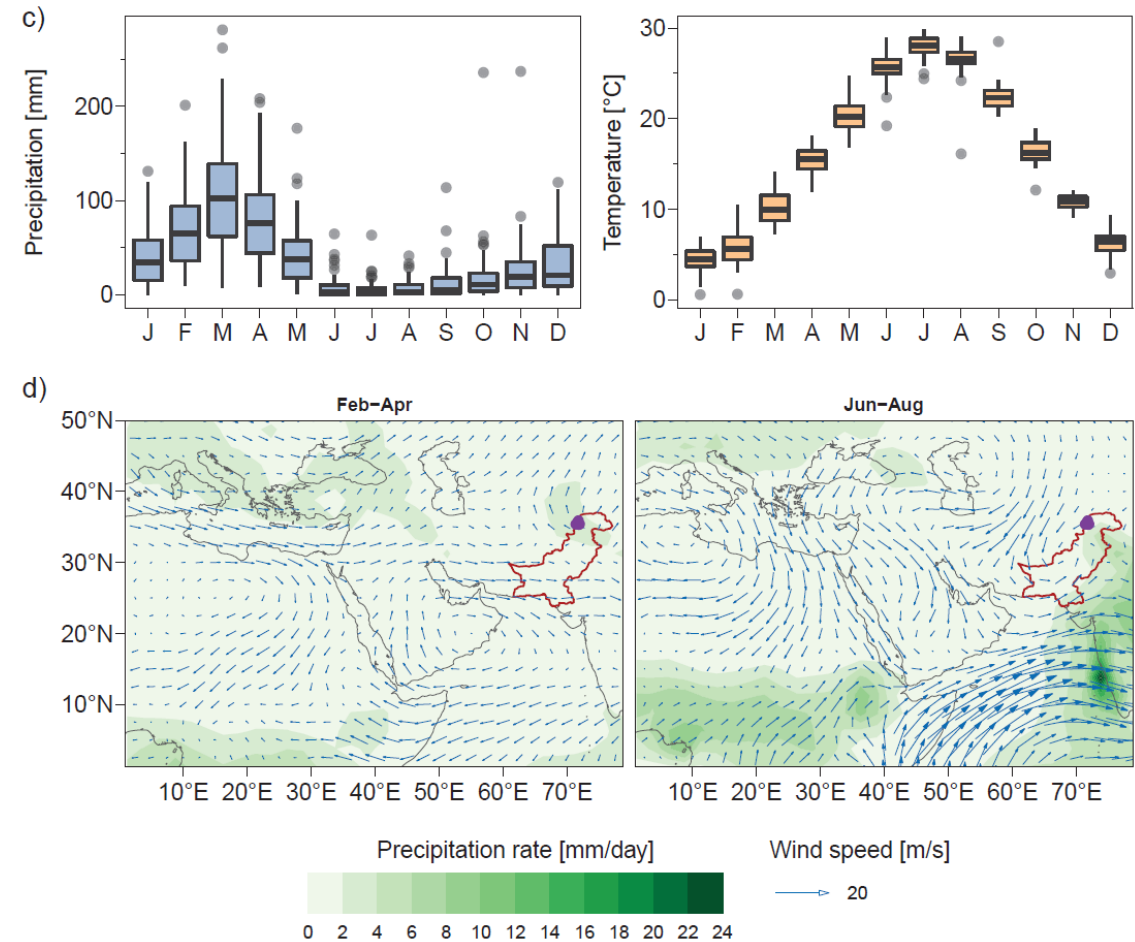
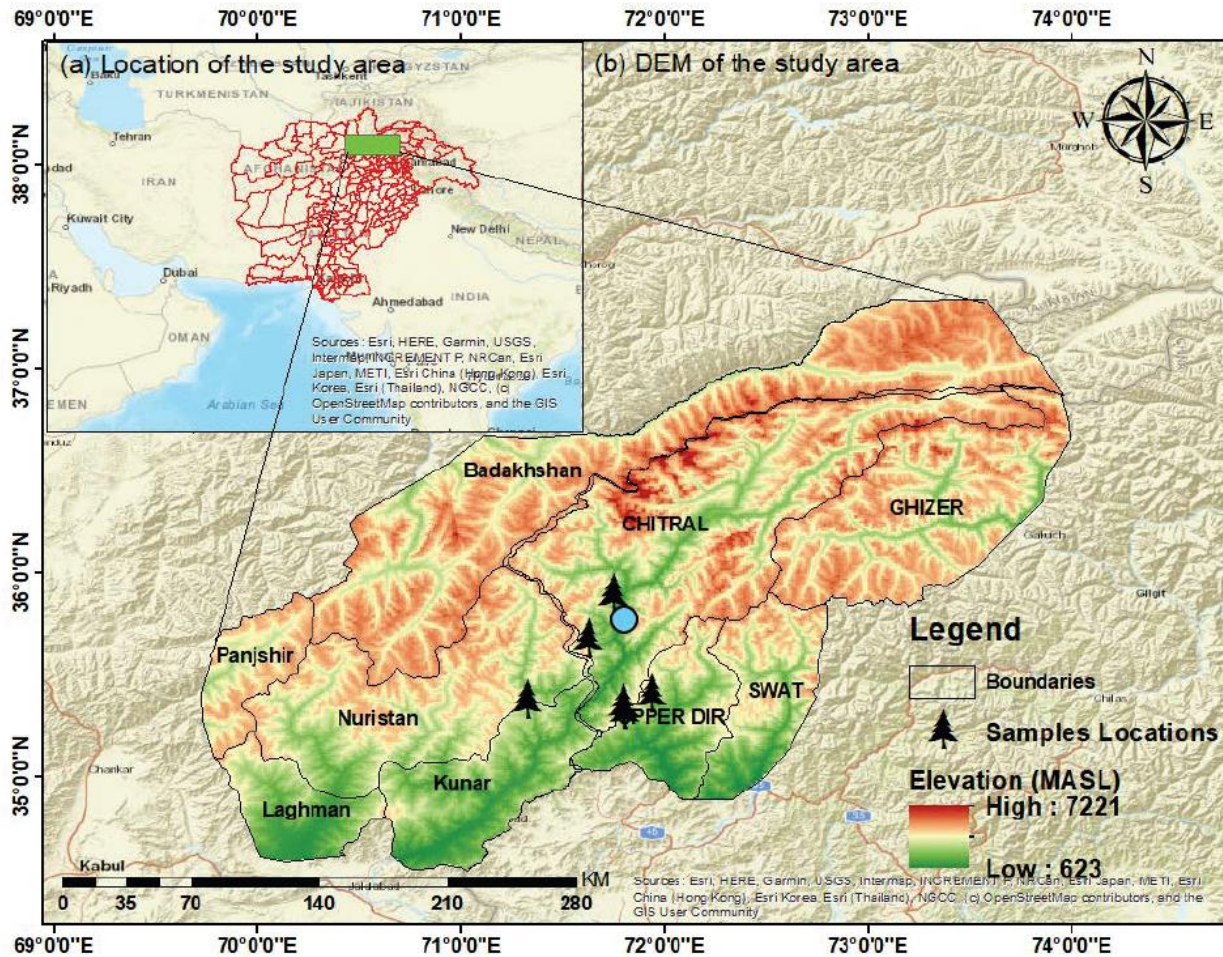
Projections:

- Warming and drying trends in the Indus Basin, but with considerable **uncertainties** (Shakir et al., 2010; Z. Ahmad et al., 2012; Wi et al., 2015)
- Increase in precipitation in the Kabul River (Iqbal et al., 2018)

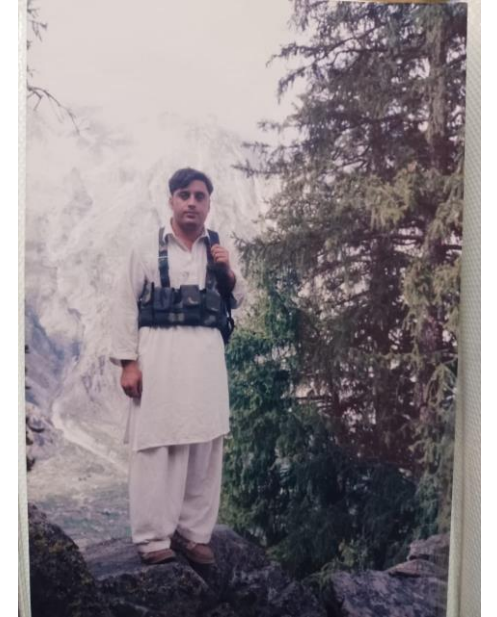
Transboundary water conflicts

- Dams and irrigation projects in both Pakistan and Afghanistan

A monsoon-shadow area

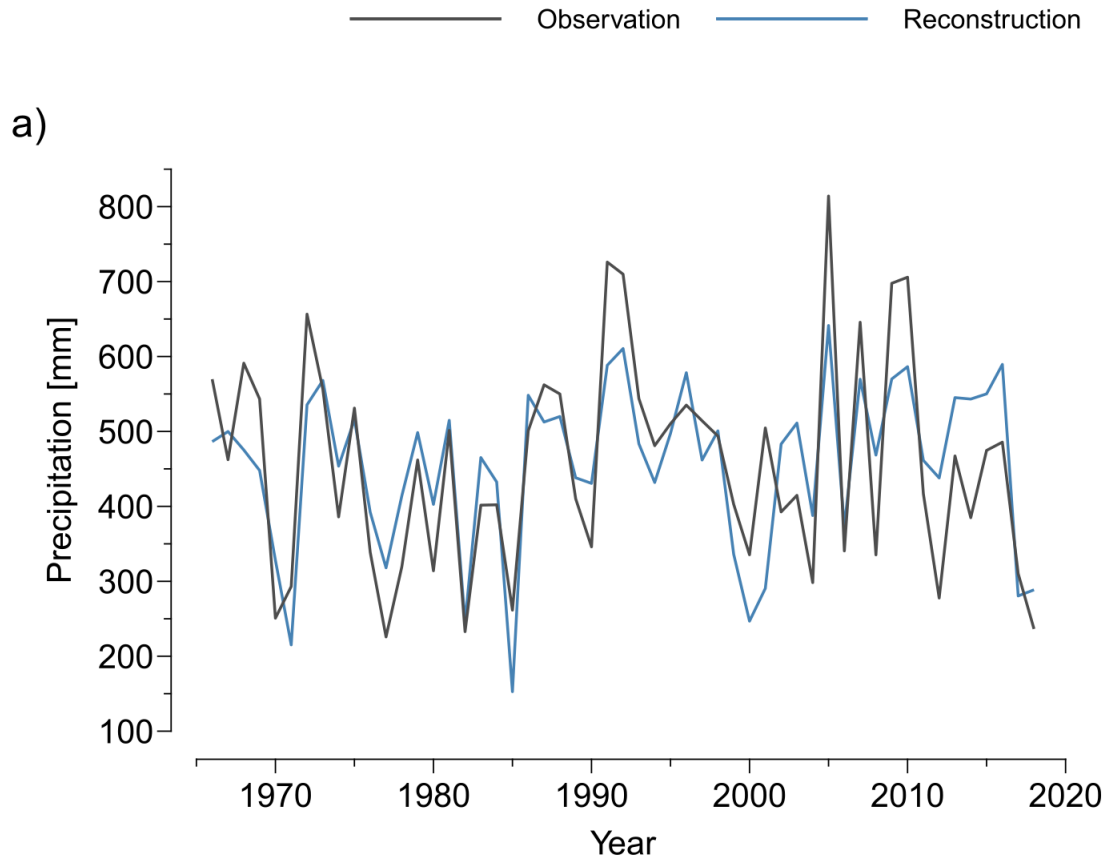


Building a tree-ring time machine



Thanks to: Jonathan Palmer, Ed Cook, Moinuddin Ahmed, Mohammad Wahab,
and others

Reconstruction captures well precipitation variability

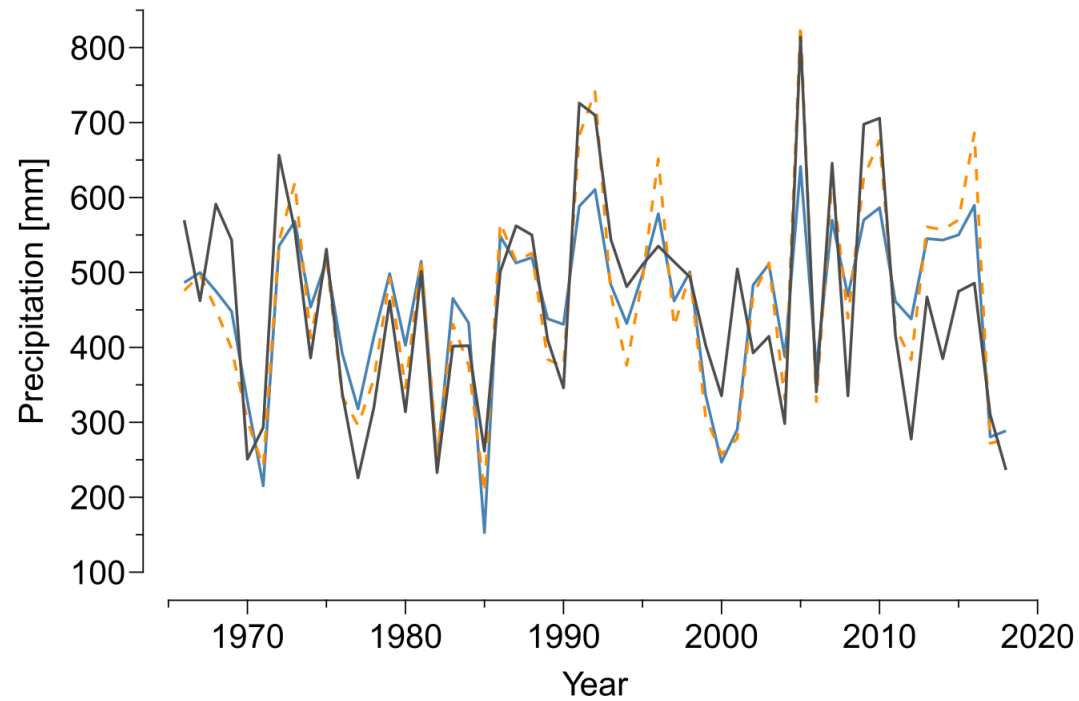


$R^2 = 0.63$
 $RE = 0.60$
 $CE = 0.53$

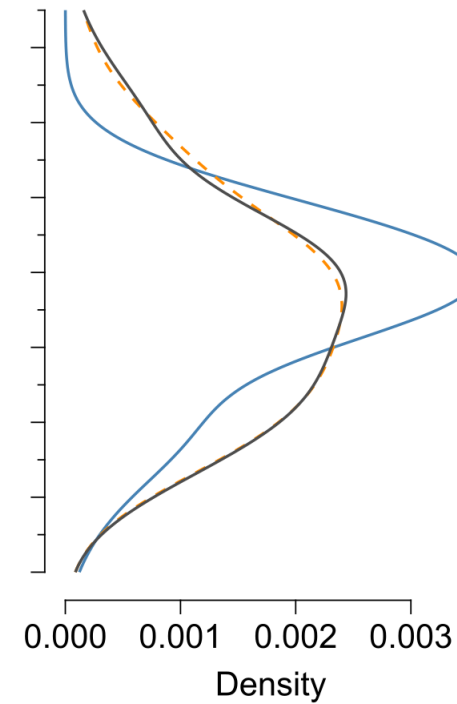
Reconstruction captures well precipitation variability

— Observation — Reconstruction - - - Bias-corrected

a)



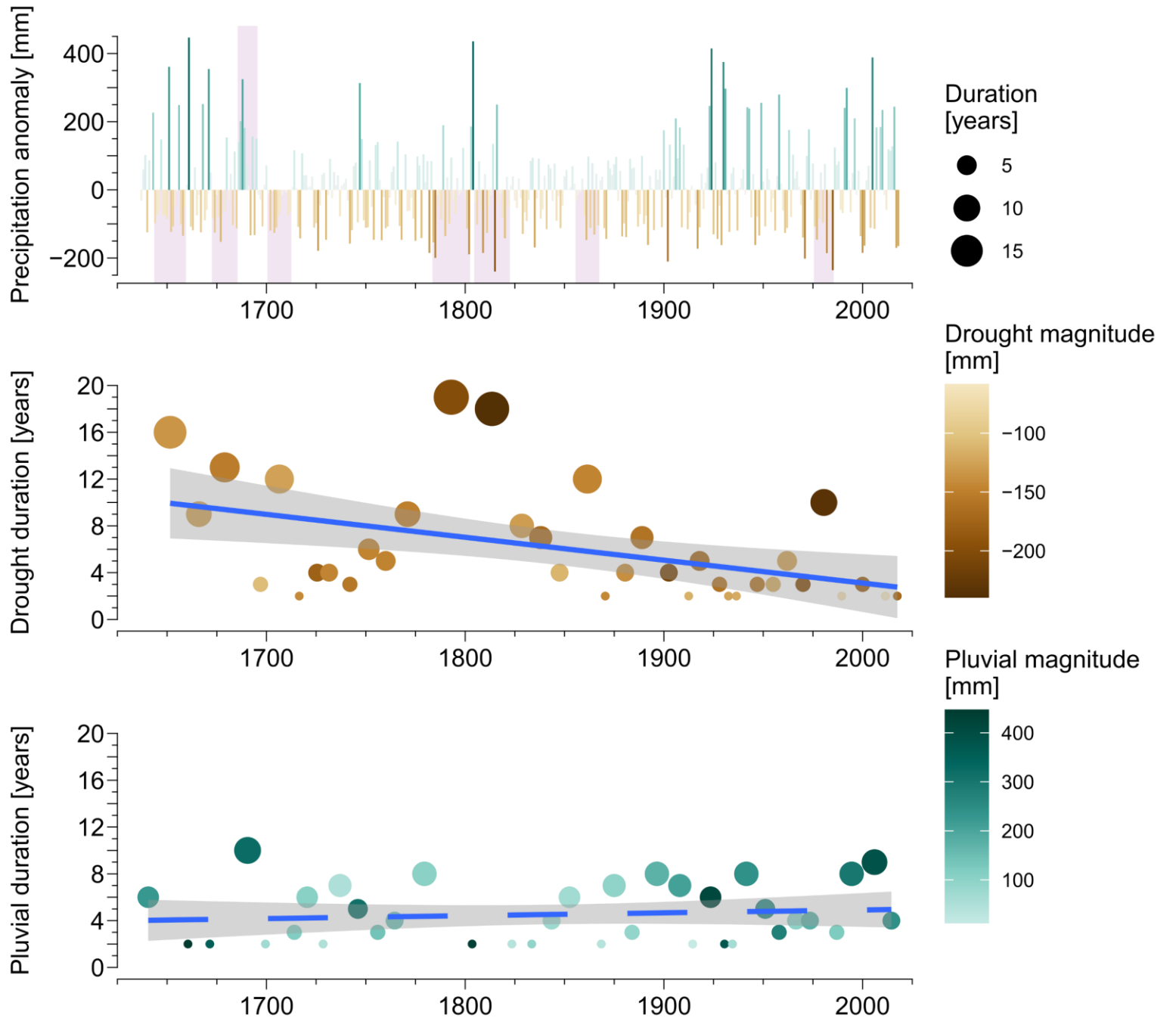
b)



$R^2 = 0.63$
 $RE = 0.60$
 $CE = 0.53$

Droughts are getting shorter and more frequent

Drought-breaking *wet-year pairs* are more frequent.
A subtle manifestation of the wetting trend?



A Stronger Water Cycle

Such devastation
When the rivers swell
And land inundated
Will this be our fate
Mighty trees, do tell!

(And the trees answered)

Floods you must worry
But lest you forget
Droughts are getting worse
In four centuries

A stronger water cycle
Could mean more troubles:
Frequent floods and droughts!
More tree ring records
Less water hurdle.



Khan et al. (2022),
Geophysical Research Letters



<https://github.com/ntthung/chitral-precip>

Thank you!

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🐦 @Hung_TT_Nguyen