

# From source to mouth; Understanding the preserved successions of rivers

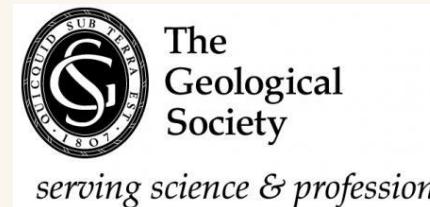
Hazel Beaumont<sup>1, 2\*</sup>, Stuart D. Burley<sup>2, 3</sup>, Thomas Gould<sup>4</sup> and Stuart Clarke<sup>2</sup>

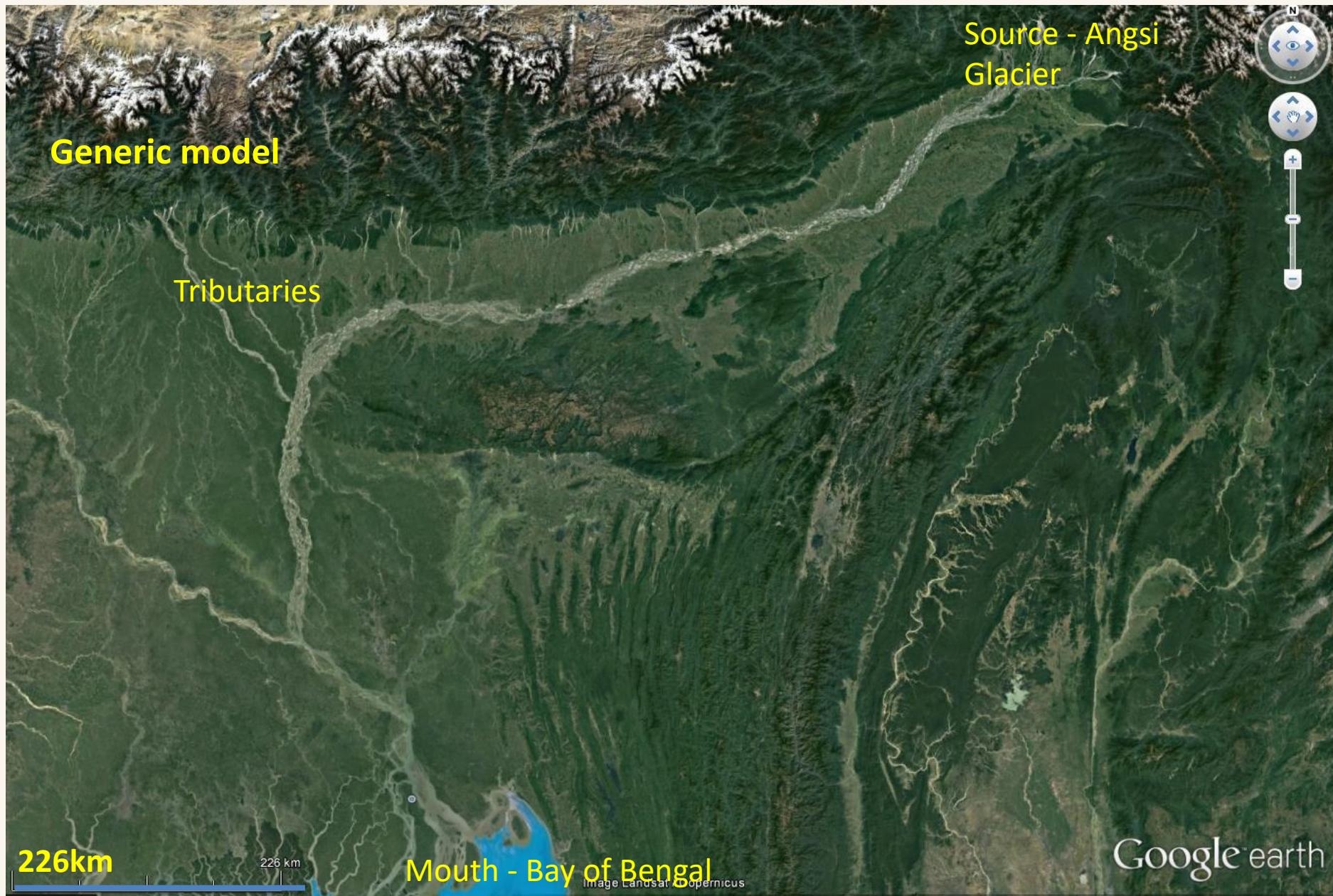
<sup>1</sup> Department of Geography and Environmental Management, University of the West of England, Bristol, UK \* [hazel.beaumont@uwe.ac.uk](mailto:hazel.beaumont@uwe.ac.uk)

<sup>2</sup> Basin Dynamics Research Group, School of Geography, Geology and the Environment, Keele University, Keele, UK

<sup>3</sup> Discovery Geoscience, Lapworth, Warwickshire, UK

<sup>4</sup> Ichron, Part of the RPS Group, Century House, Gadbrook Business Centre, Northwich, Cheshire, U.K





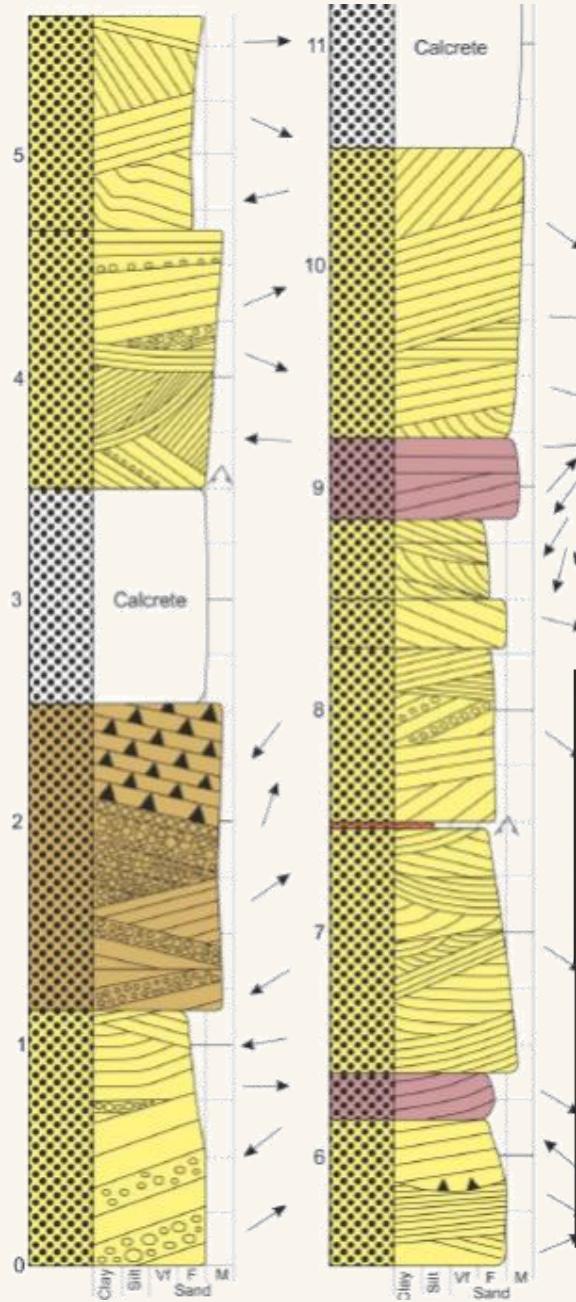


From this to this?!



## How do we analyse sediments?

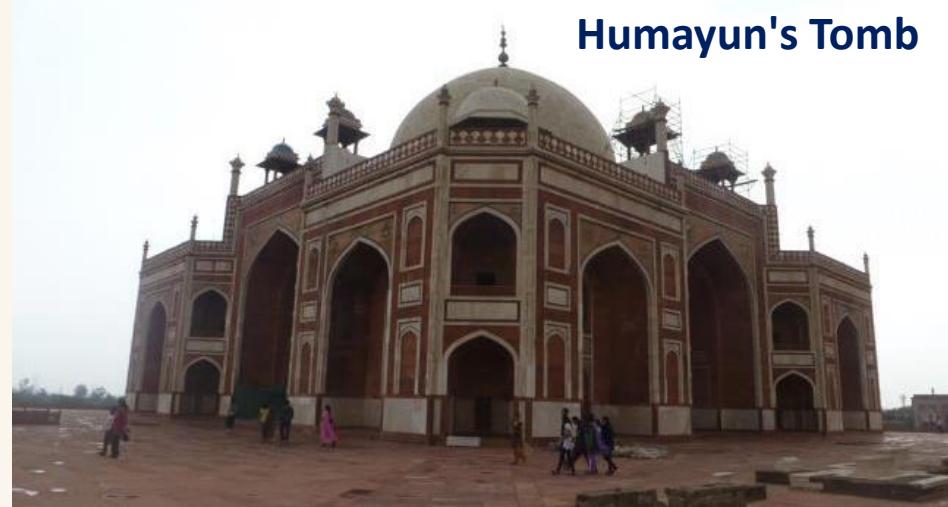
- Analysing sedimentary textures and structures
- Logging
- Panelling
- Petrography / SEM



**Jodphur**



**Humayun's Tomb**



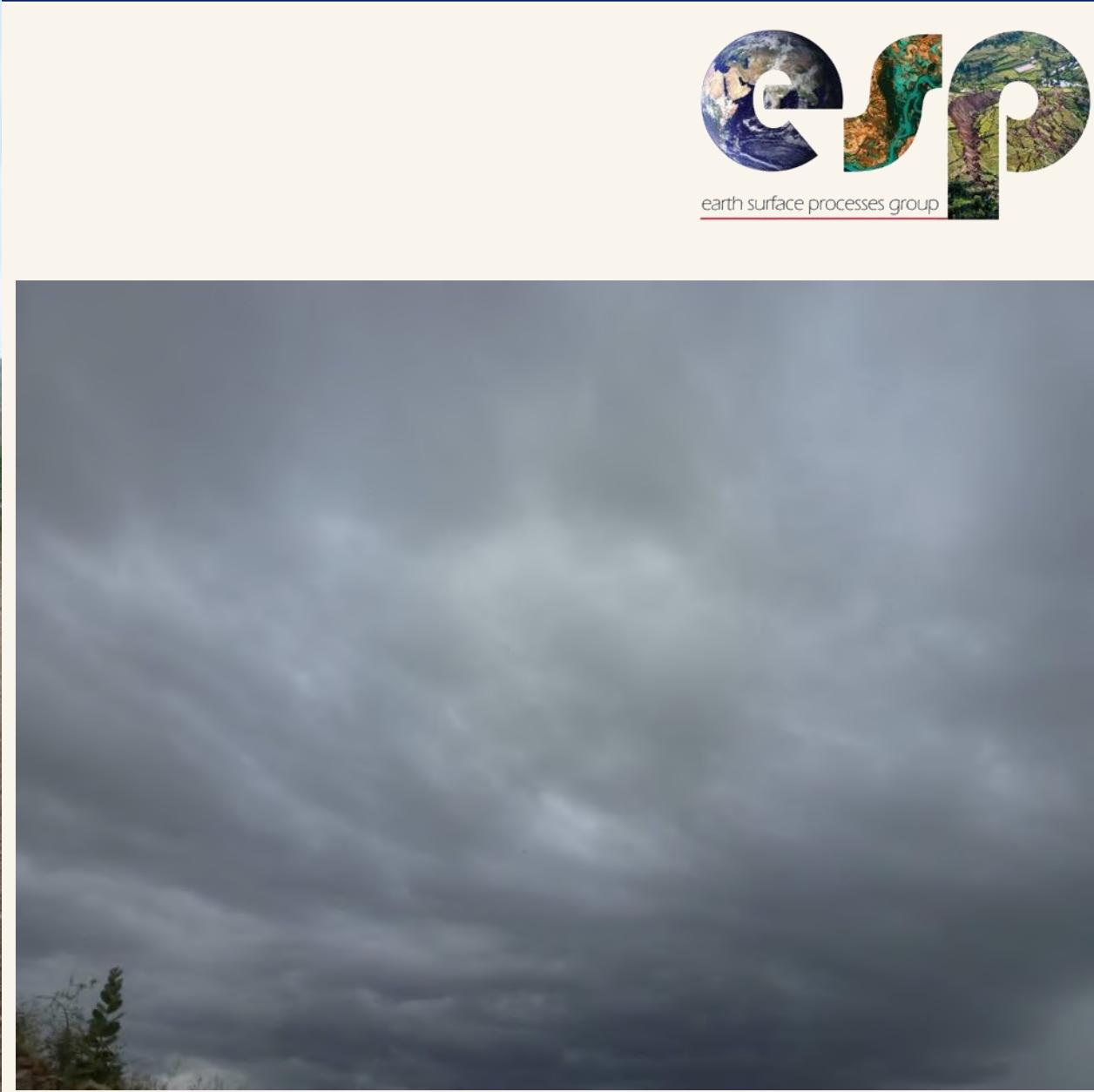
**Holi festival**



**Jantar Mantar Observatory**



It can rain...

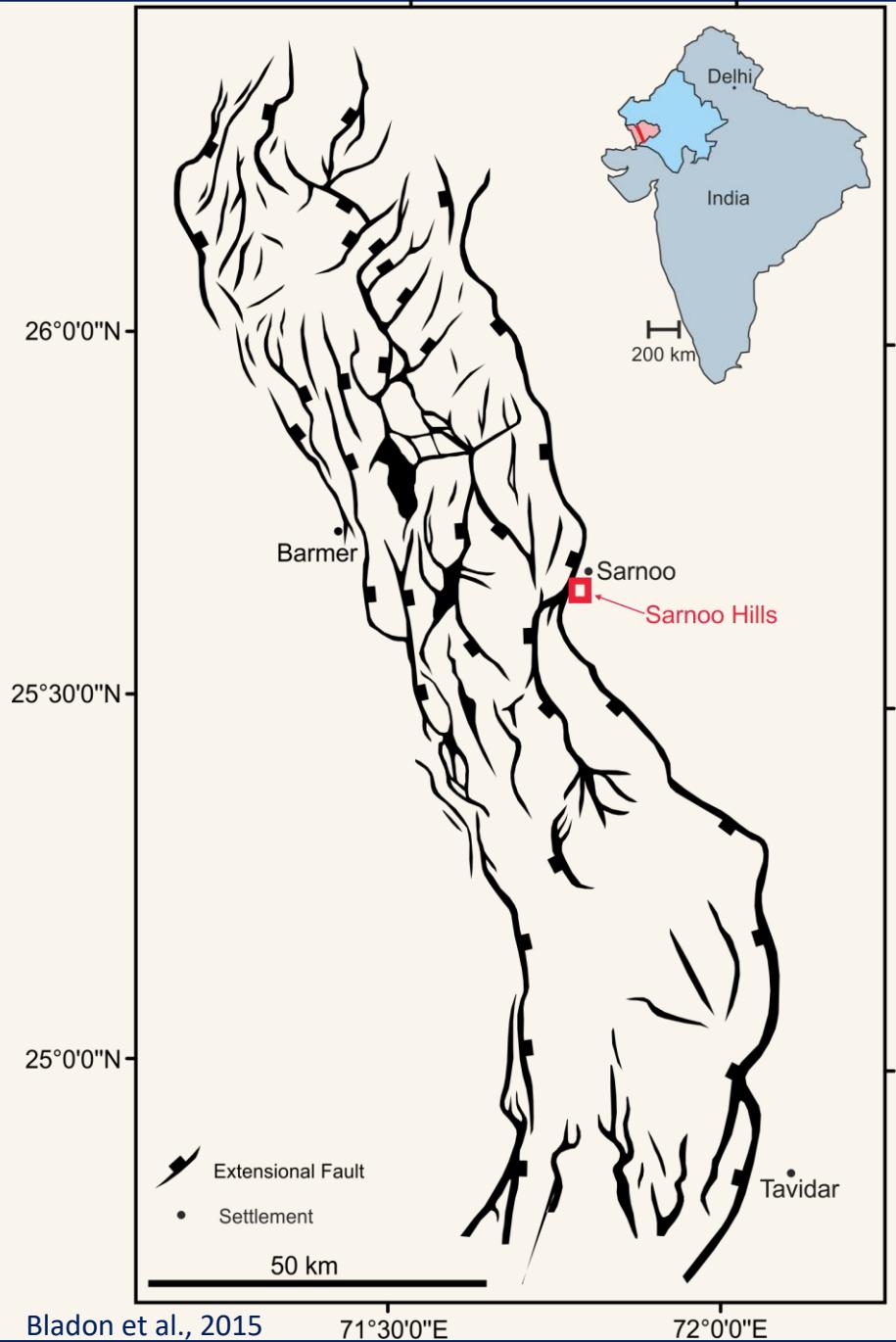






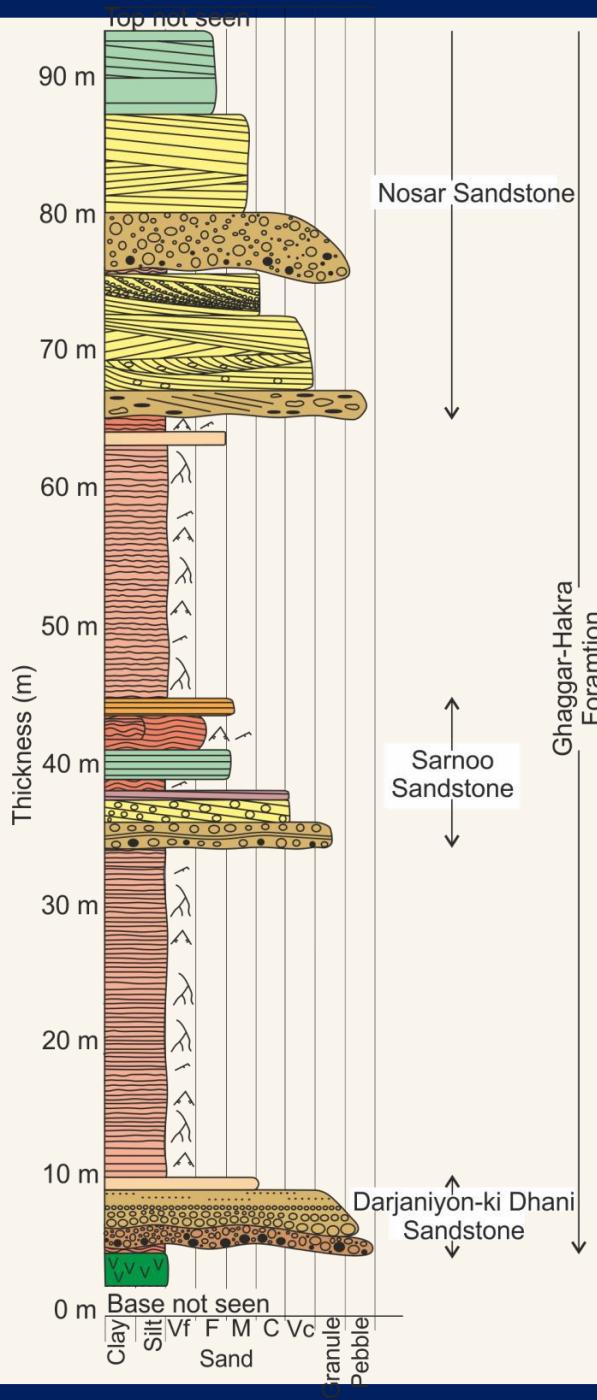


## Background and problem

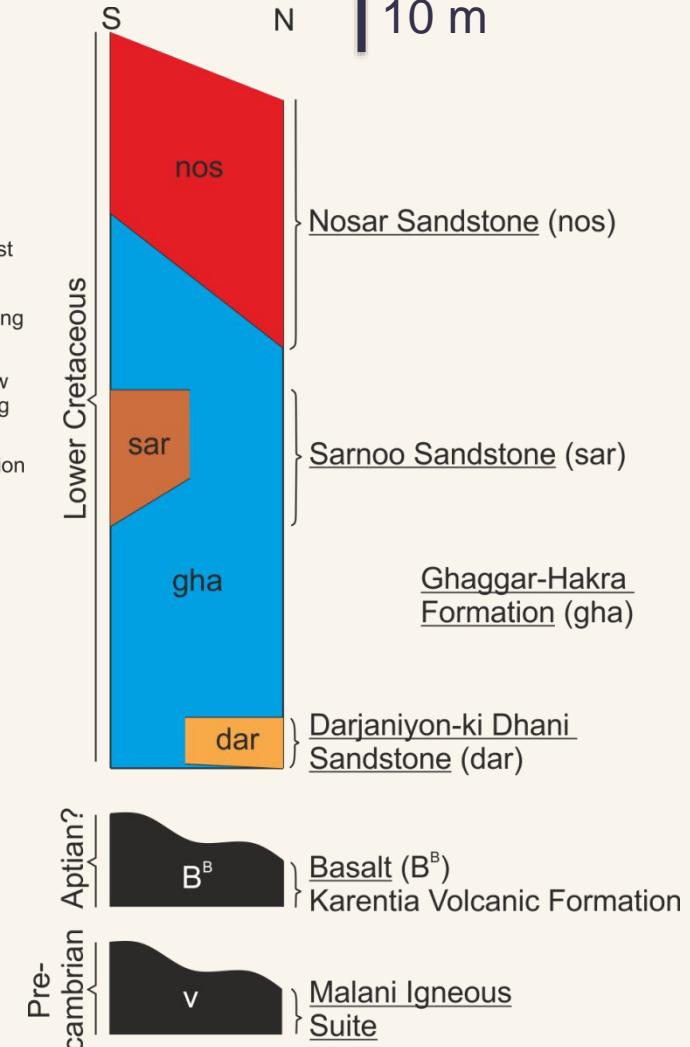




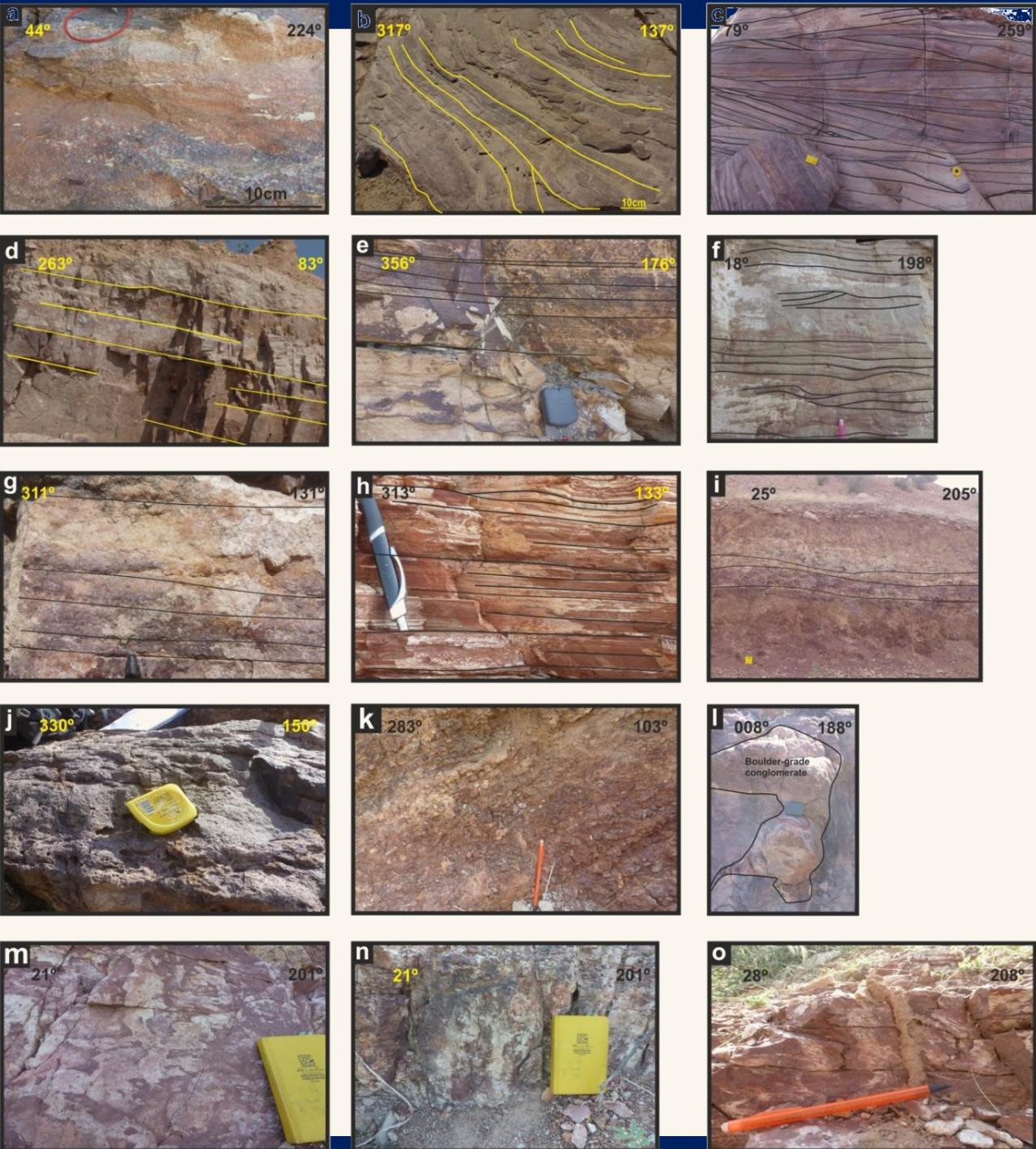
# Ghaggar-Hakra Formation



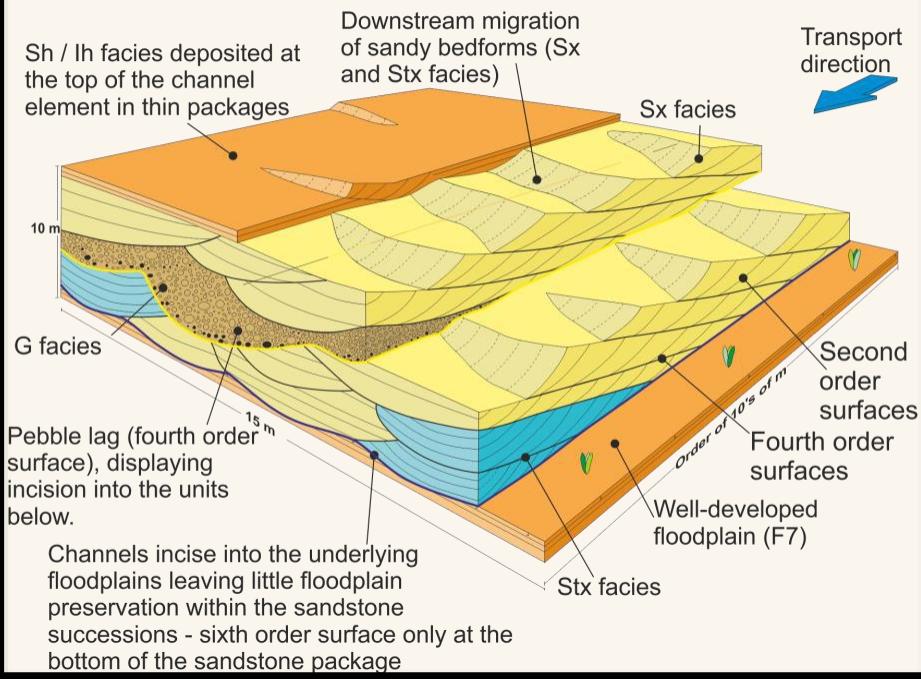
Bladon et al., 2015



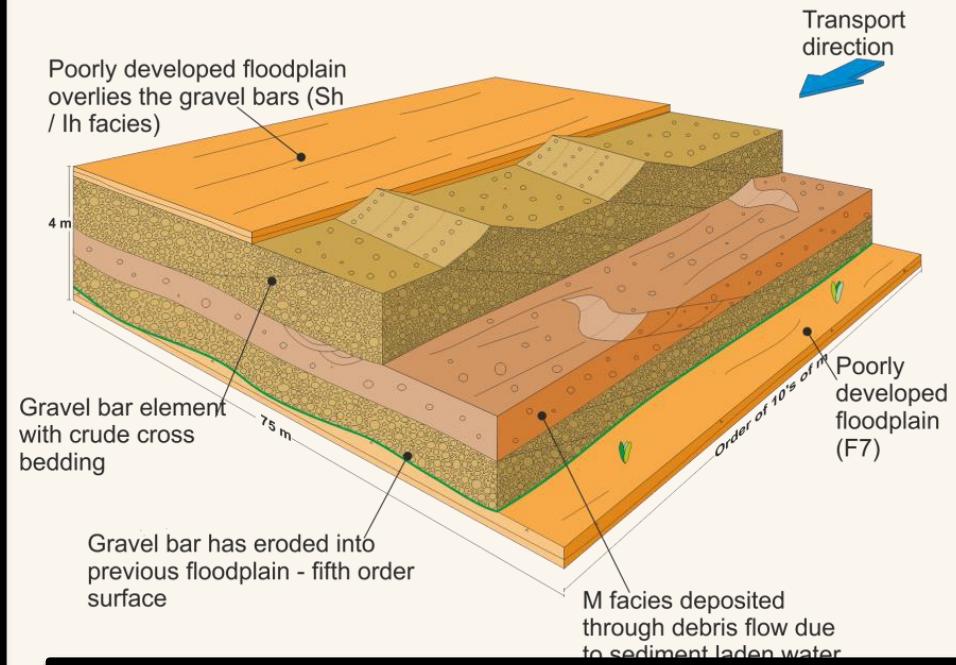
# Facies (the depositional regimes)



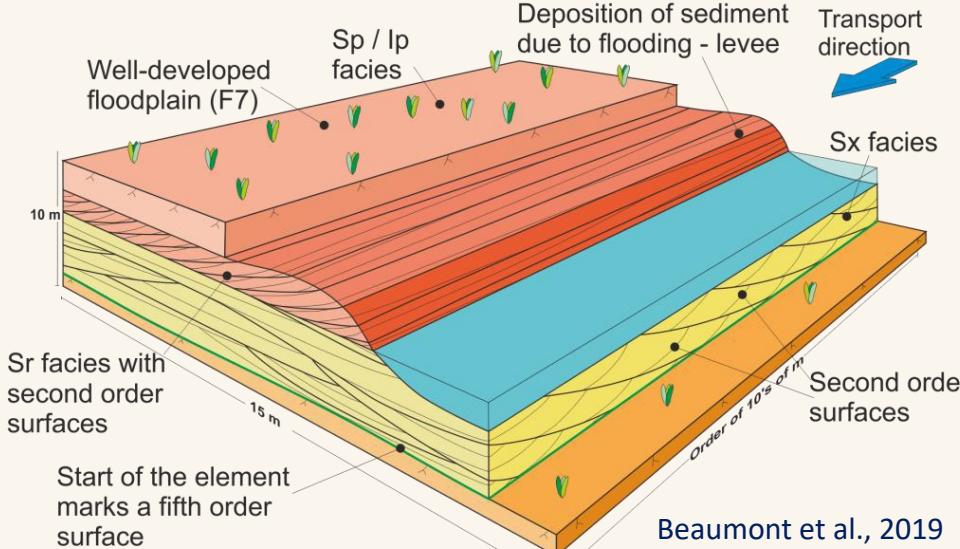
### Element F1: Channel element



### Element F3 : Gravel bar element

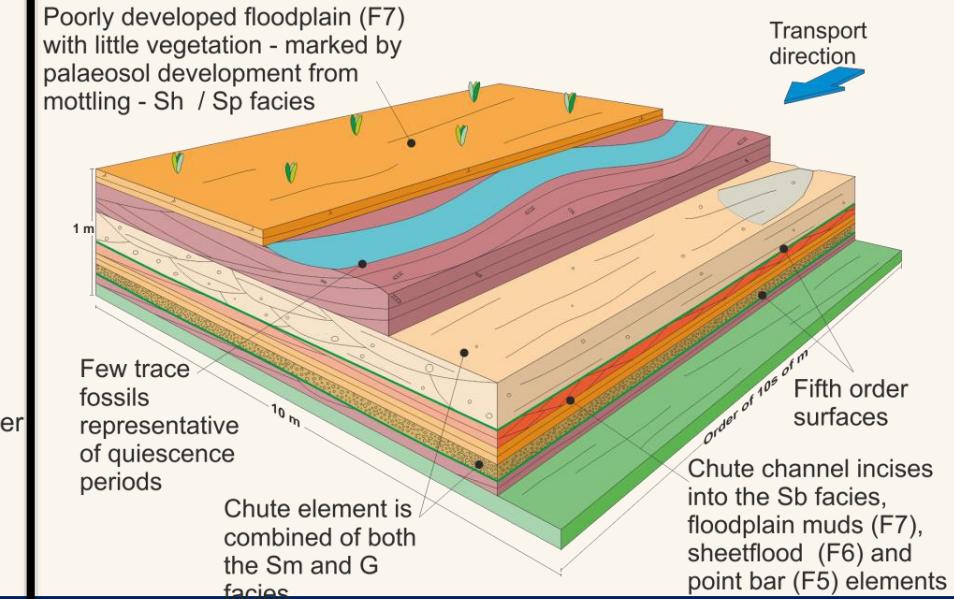


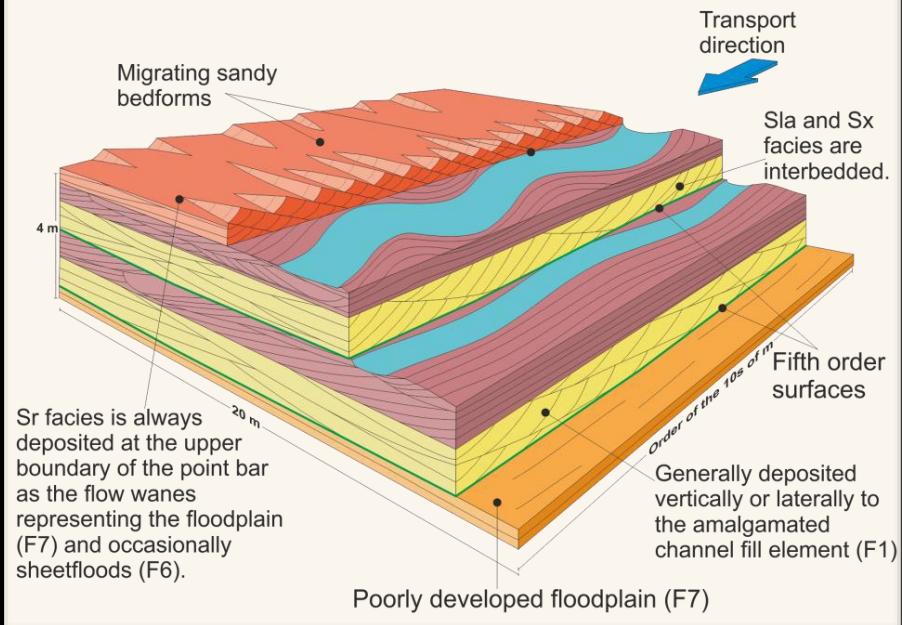
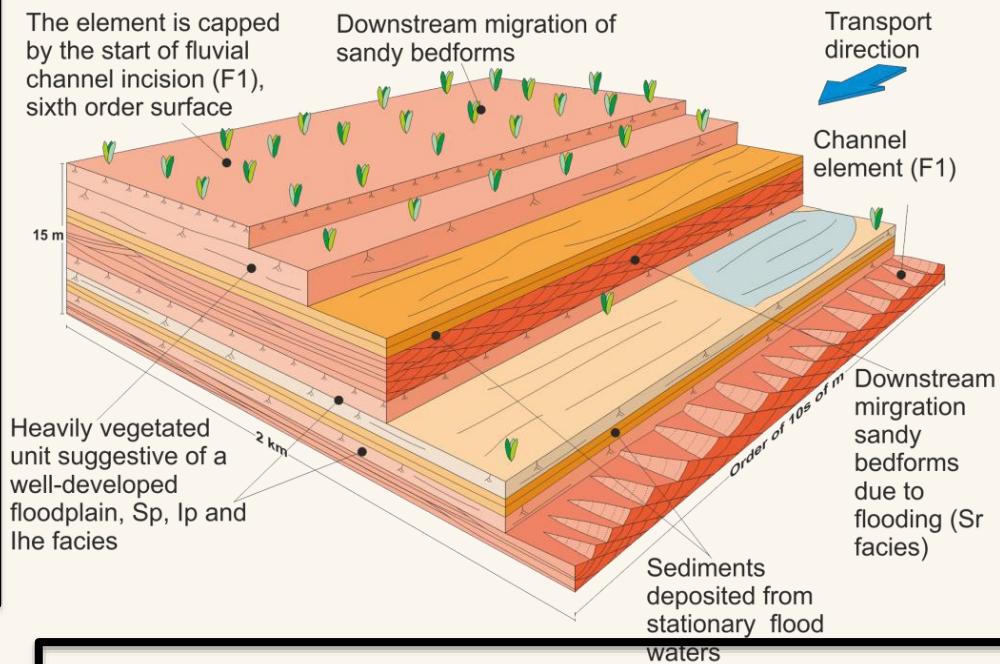
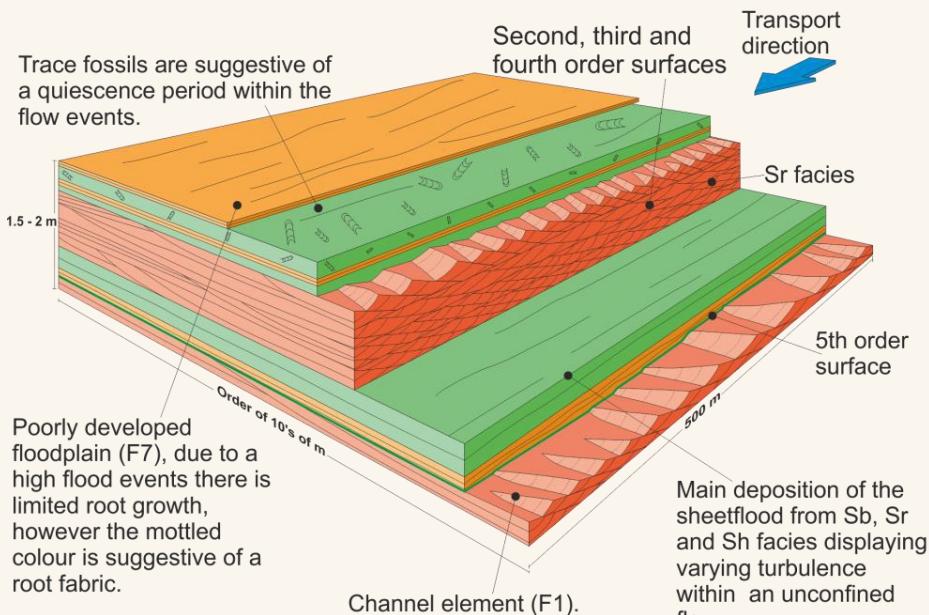
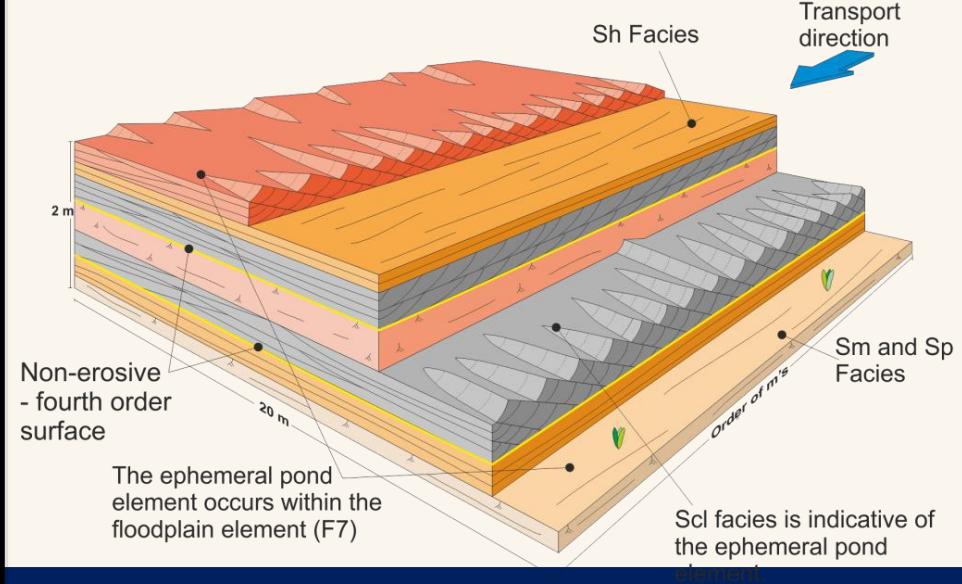
### Element F2: Channel margin element



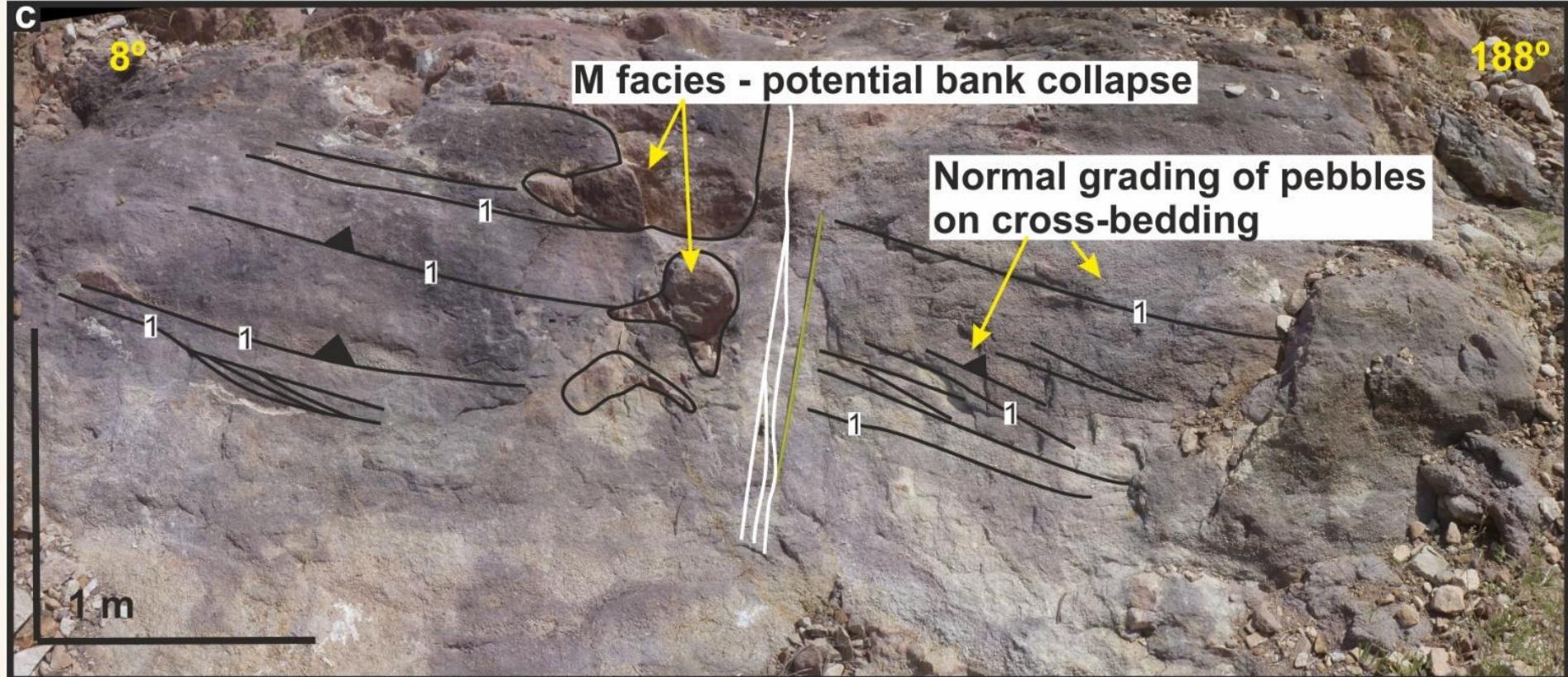
Beaumont et al., 2019

### Element F4: Chute channel element



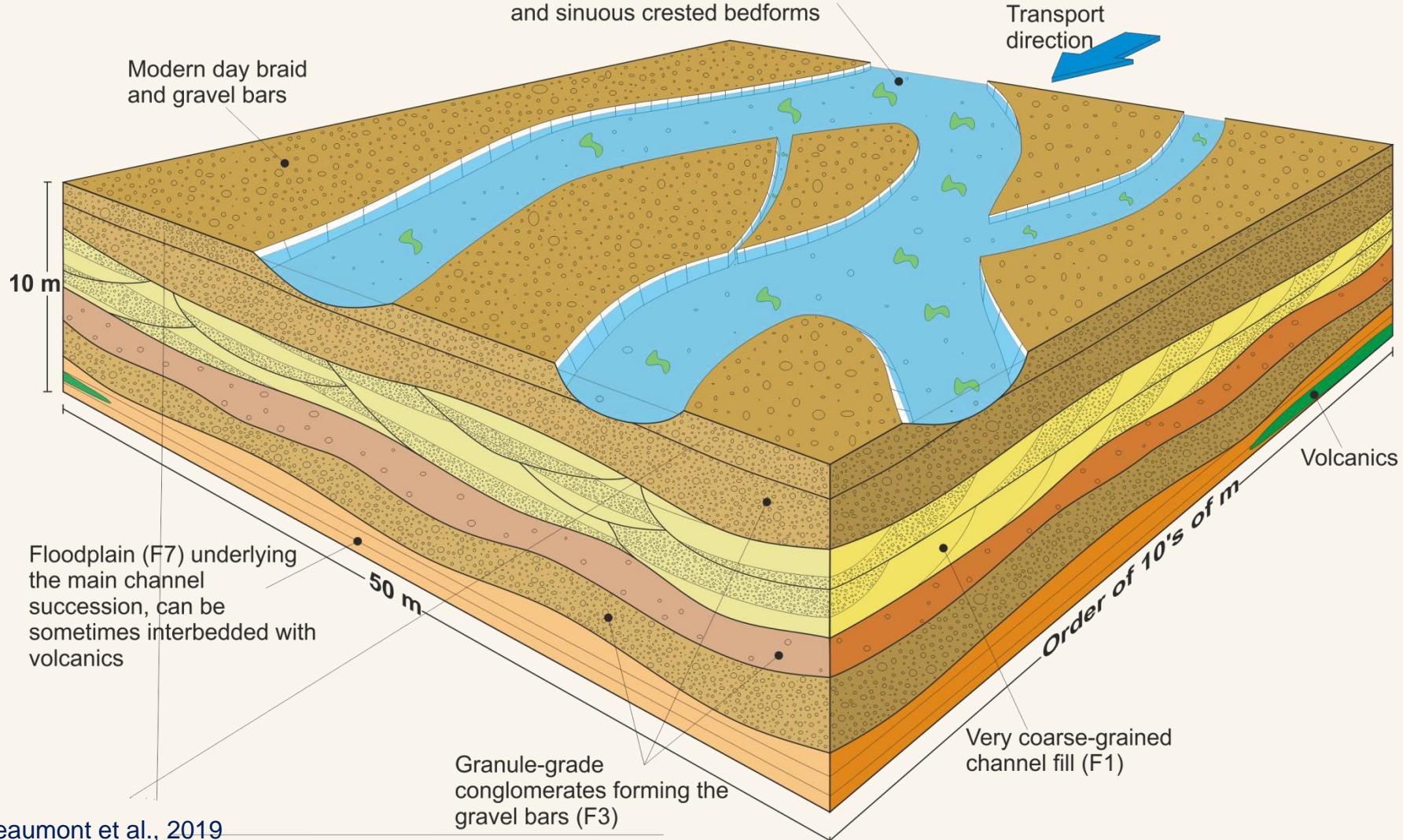
**Element F5: Point bar element****Element F7: Floodplain element****Element F6: Sheetflood element****Element F8: Ephemeral pond element**

# Model one

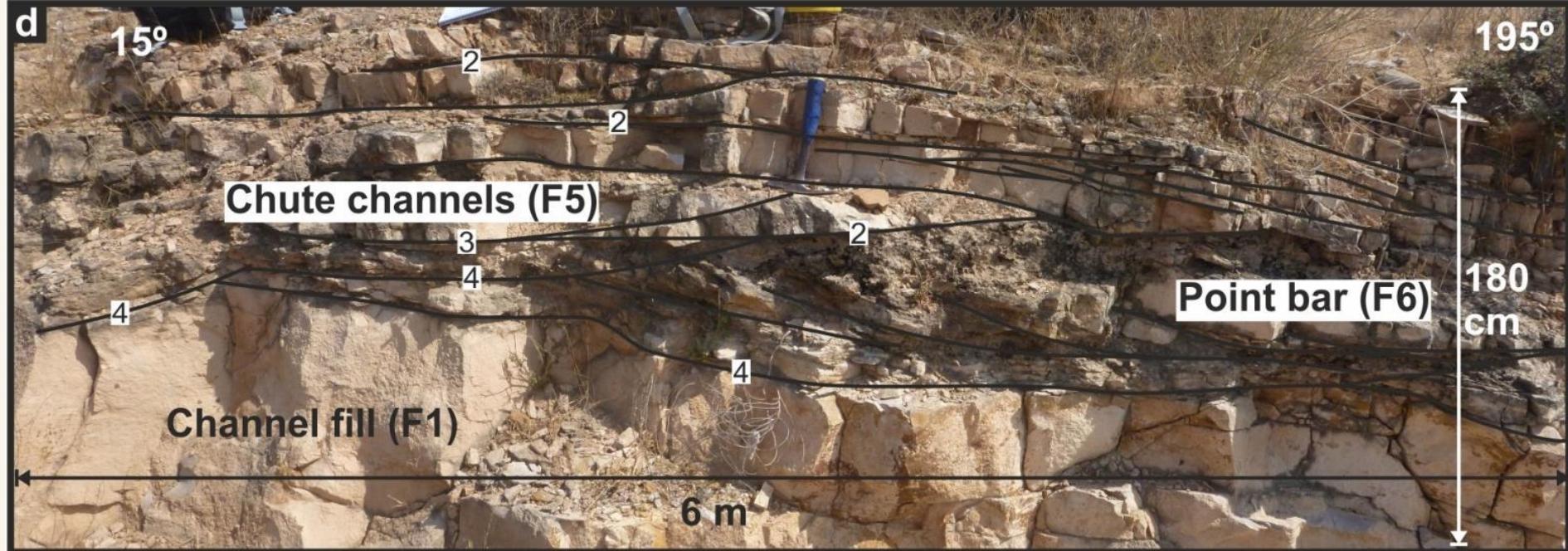


# Gravel bedload, low sinuosity

## Darjaniyon-ki Dhani Sandstone

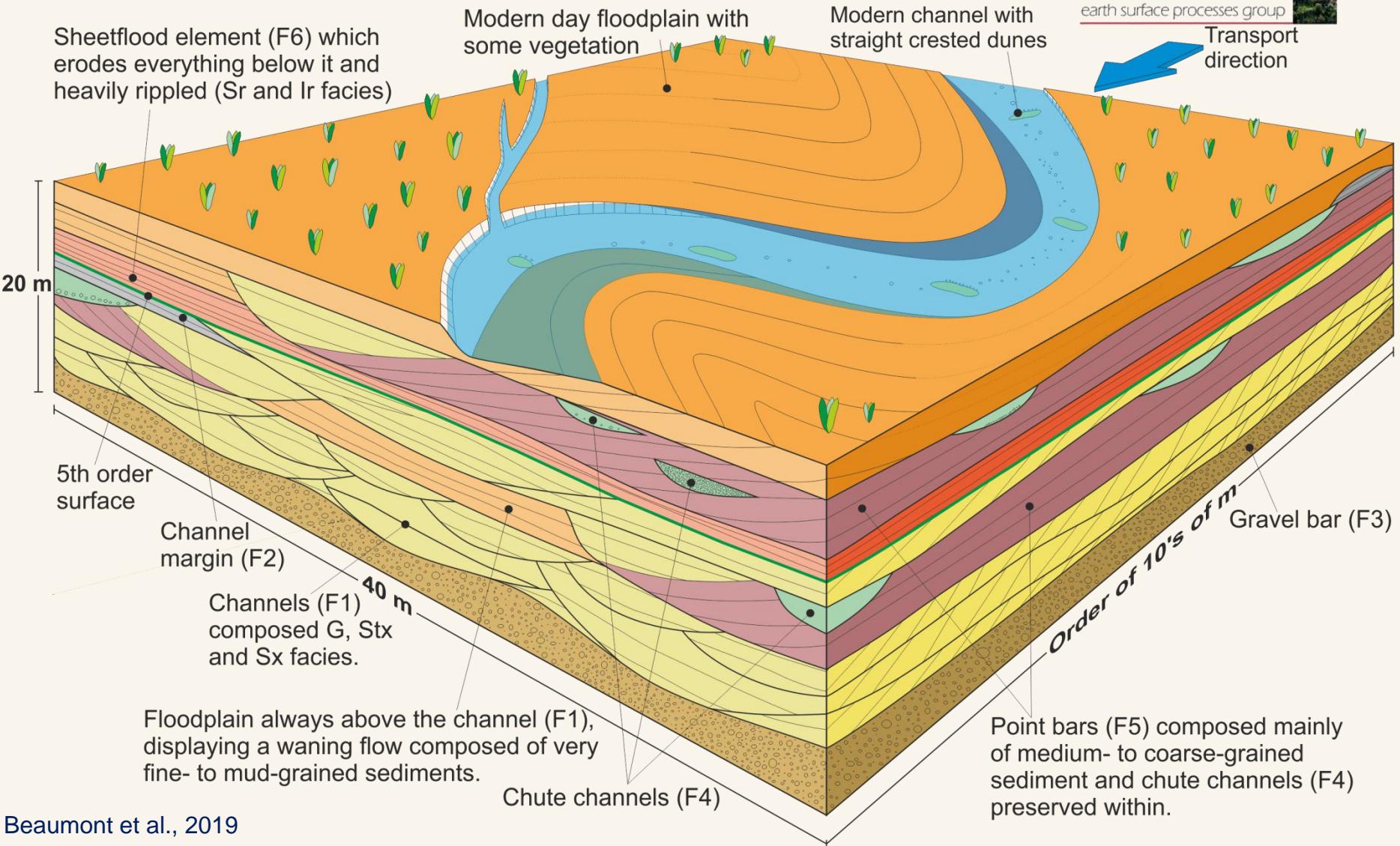


## Model two

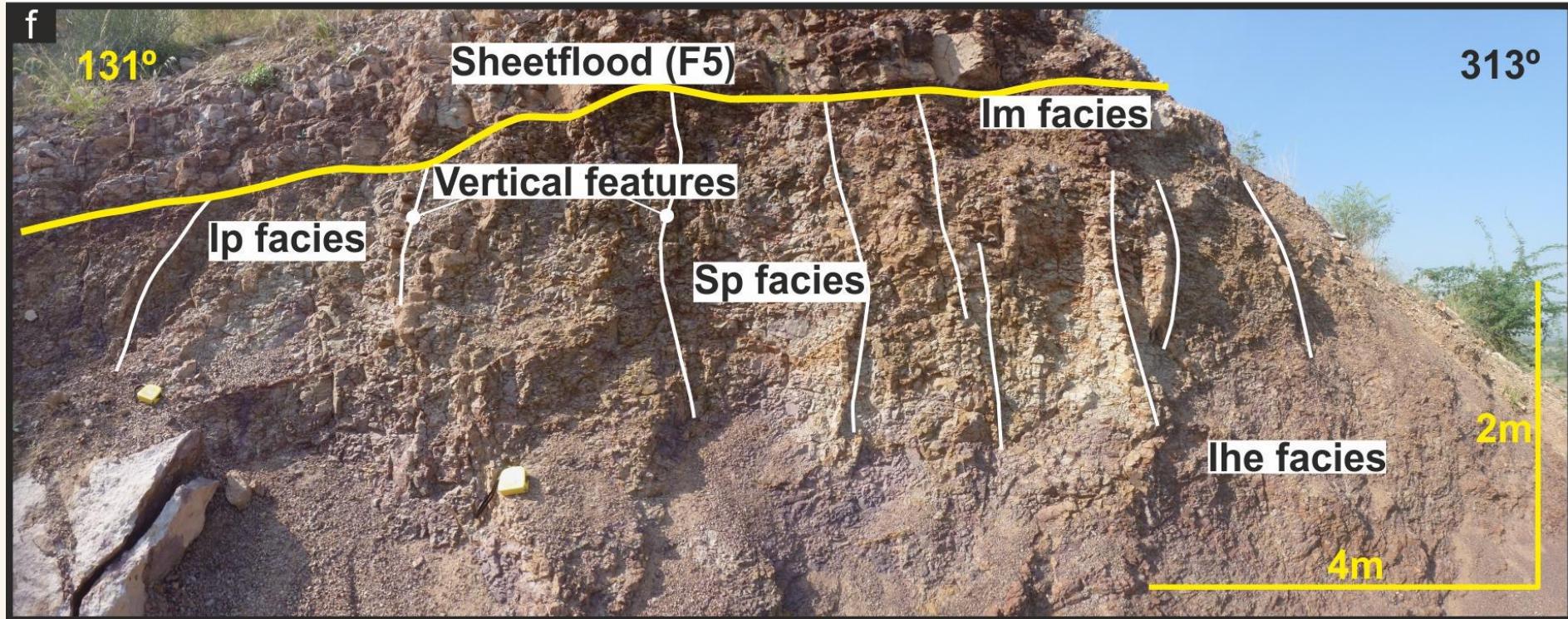


# High sinuosity

## Sarnoo Sandstone

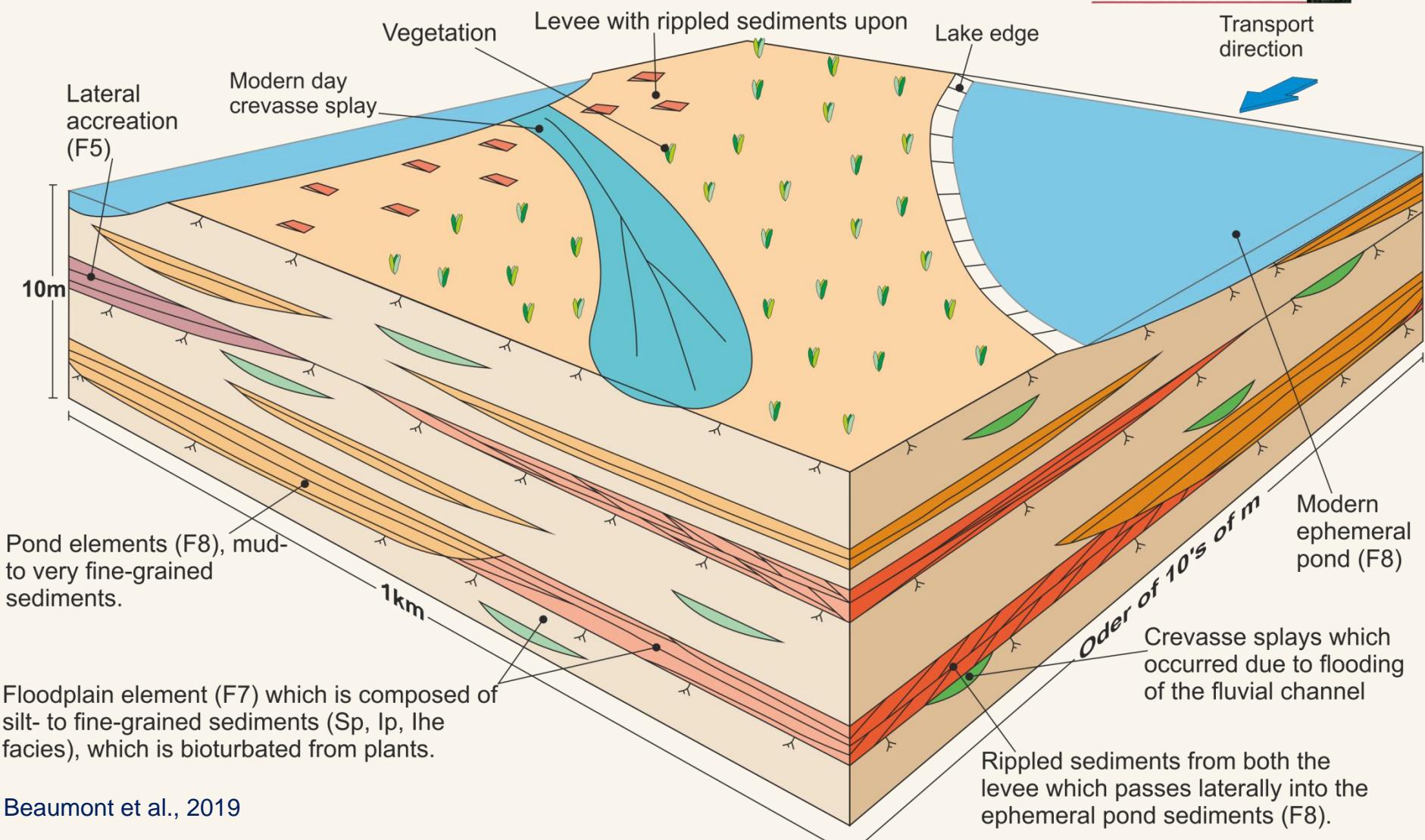


## Model three

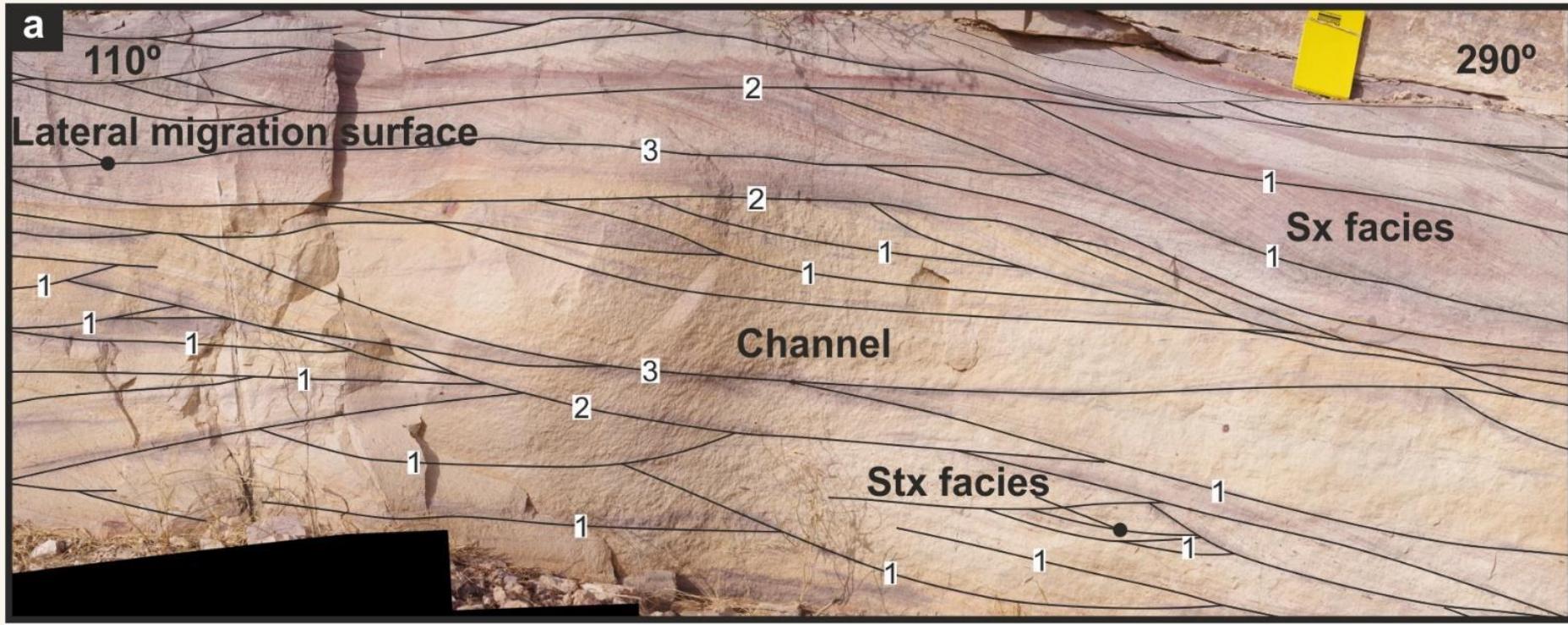


# Floodplain

## Ghaggar-Hakra Undivided

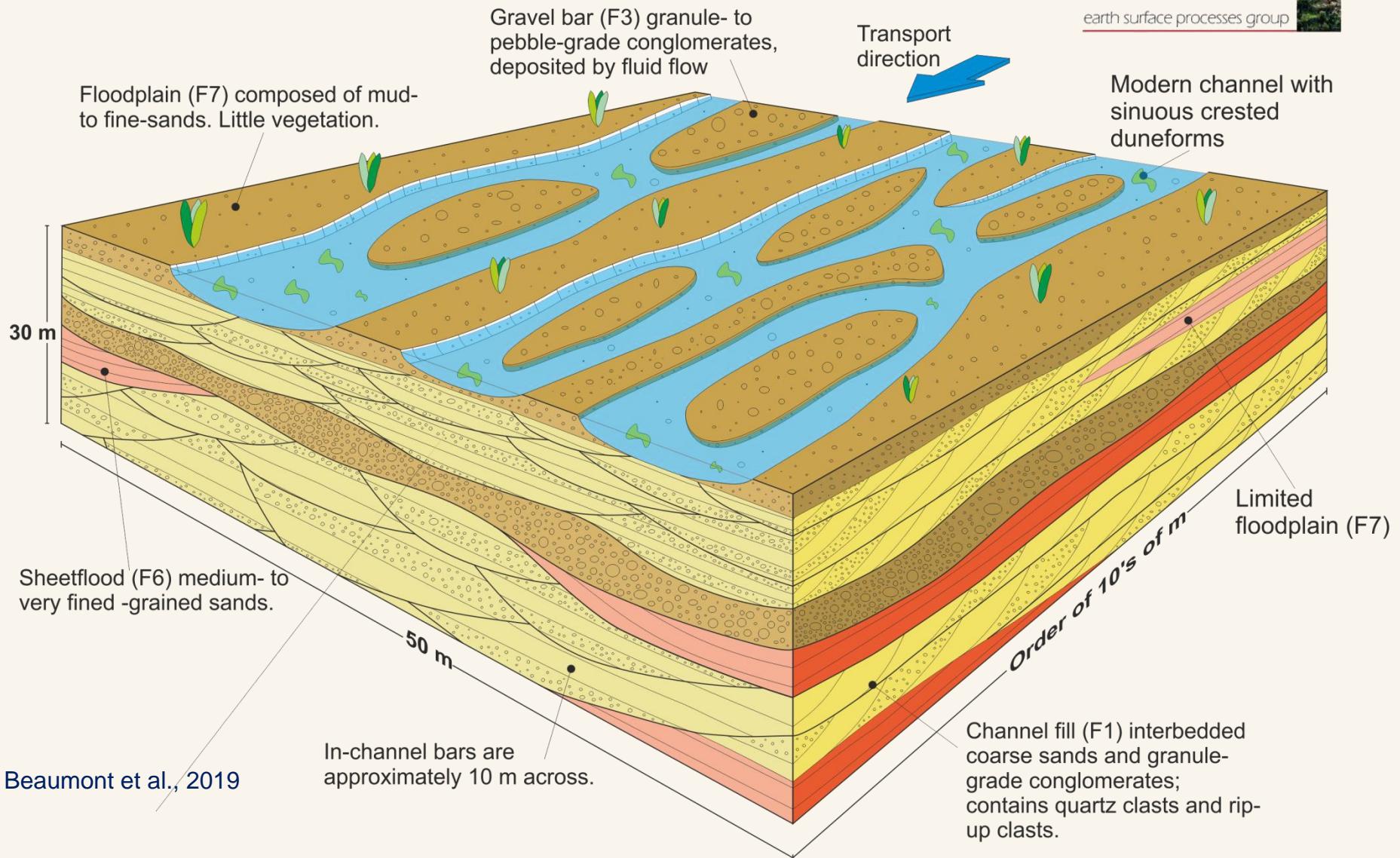


## Model four

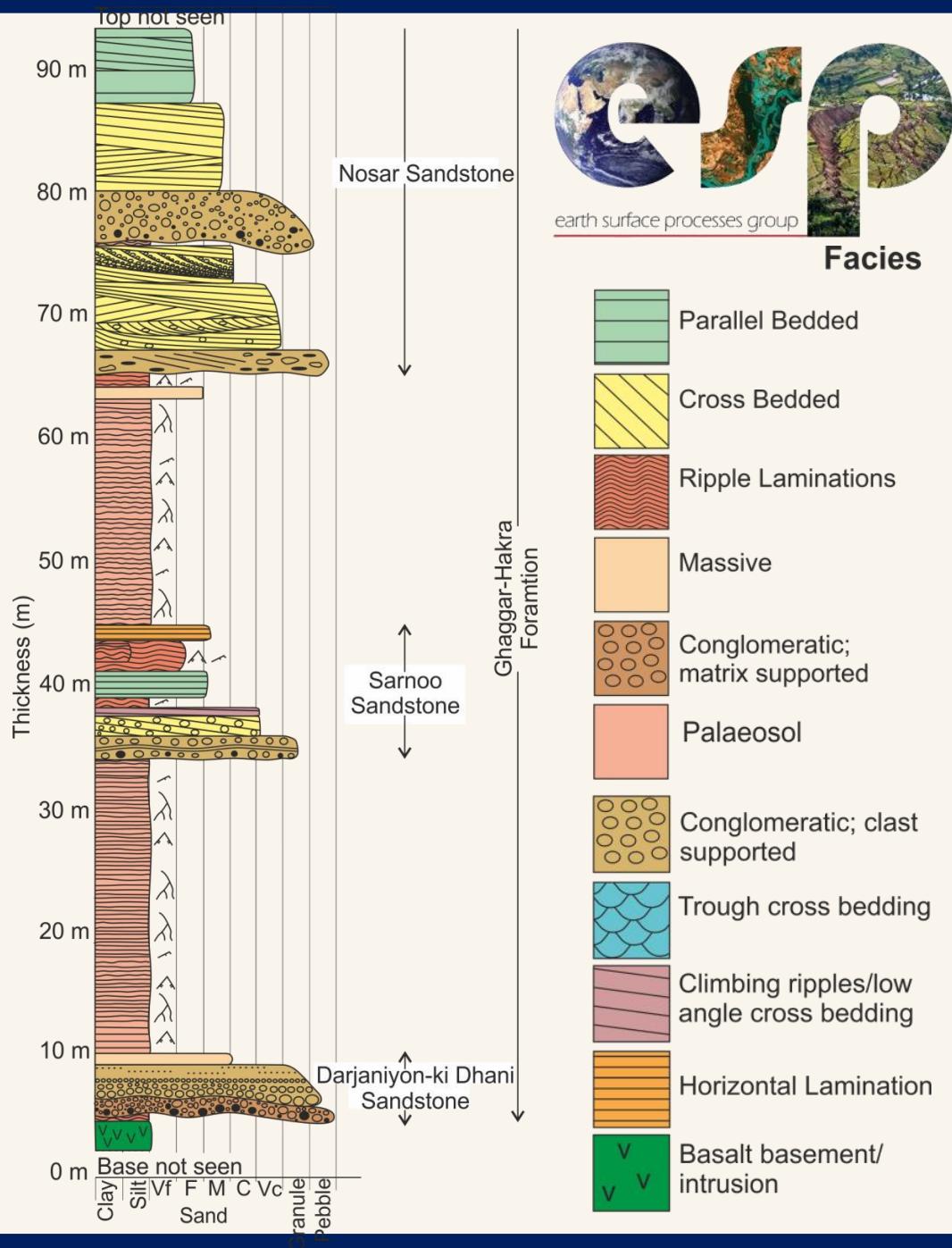
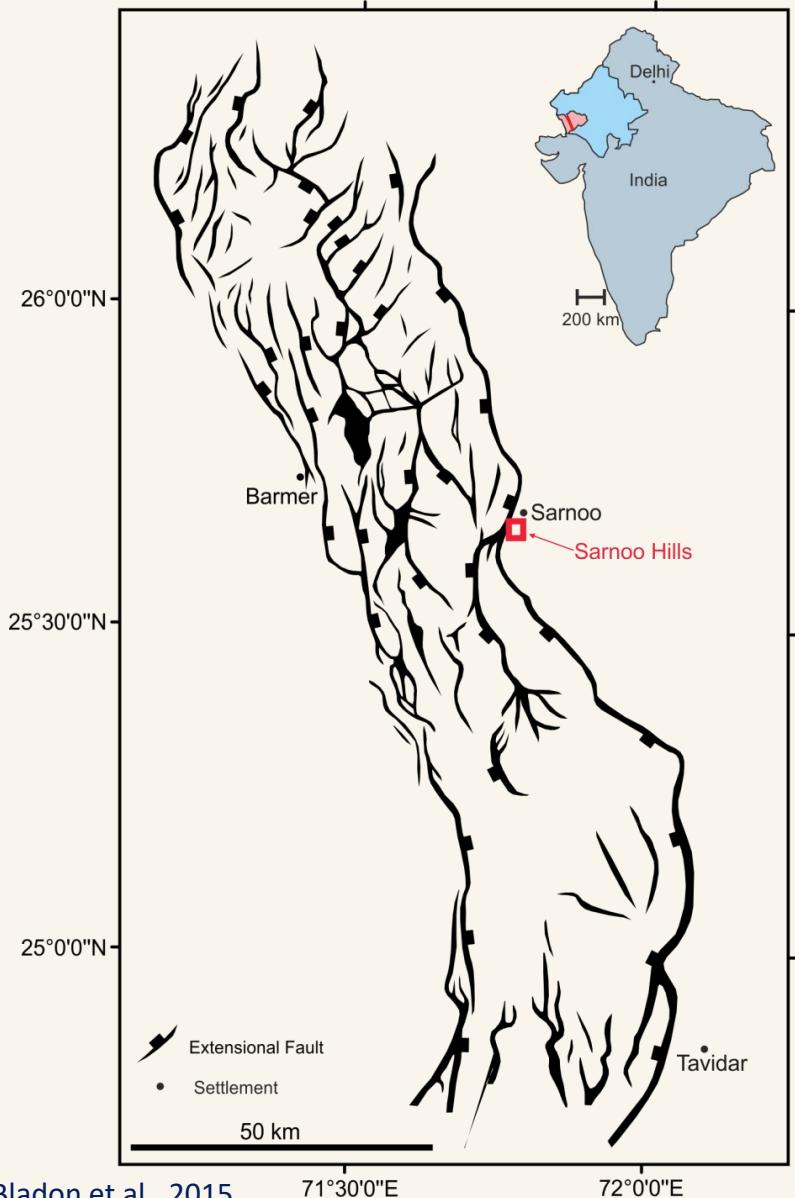


## Well-developed, low sinuosity

## Nosar Sandstone

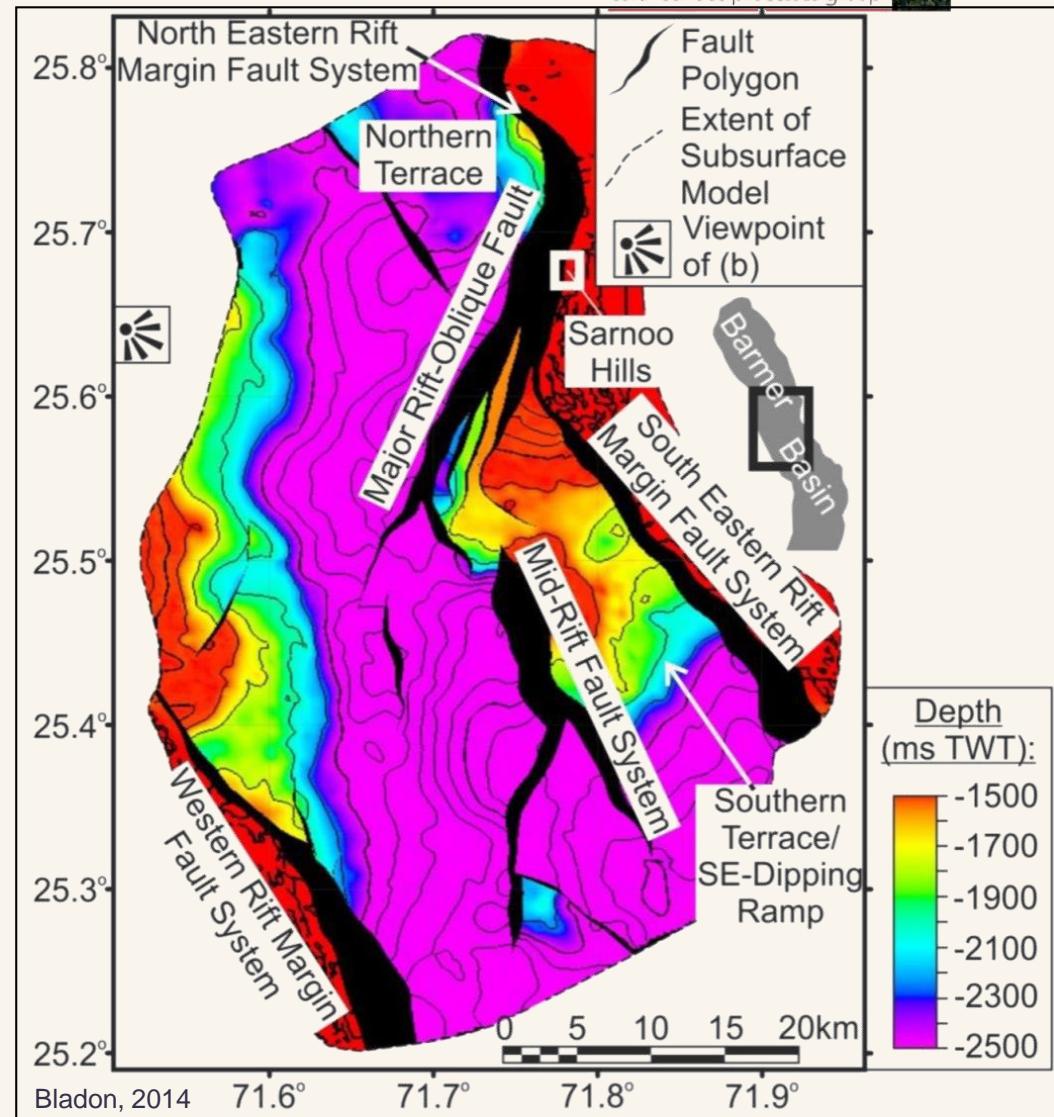
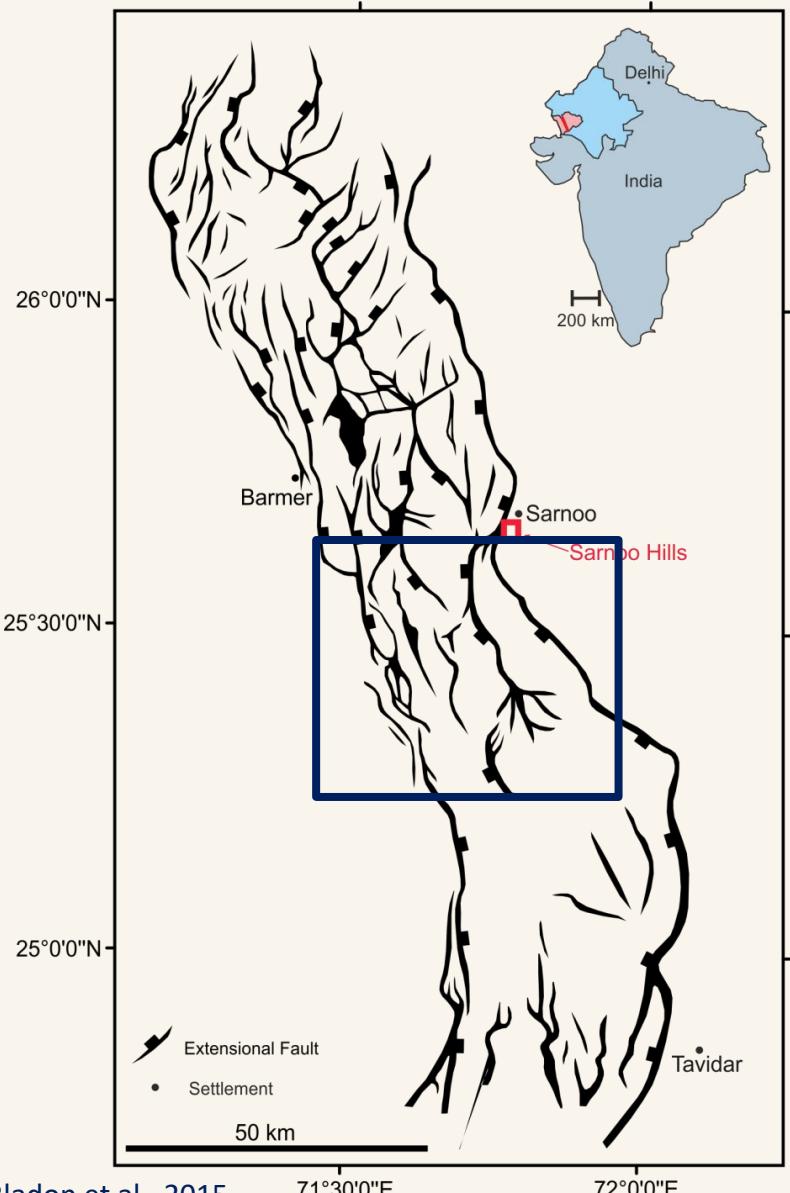


# Ghaggar-Hakra Formation

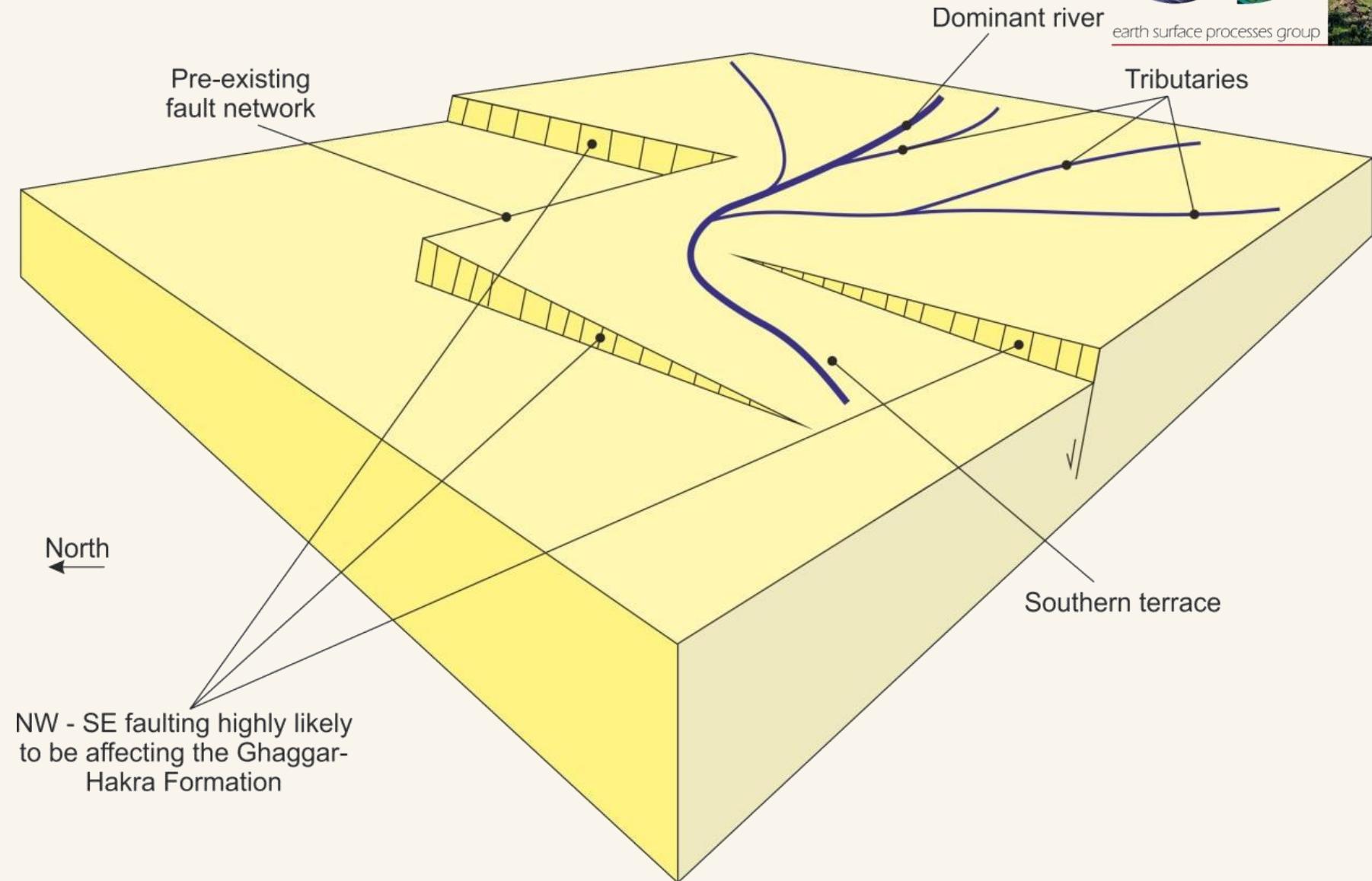


Facies

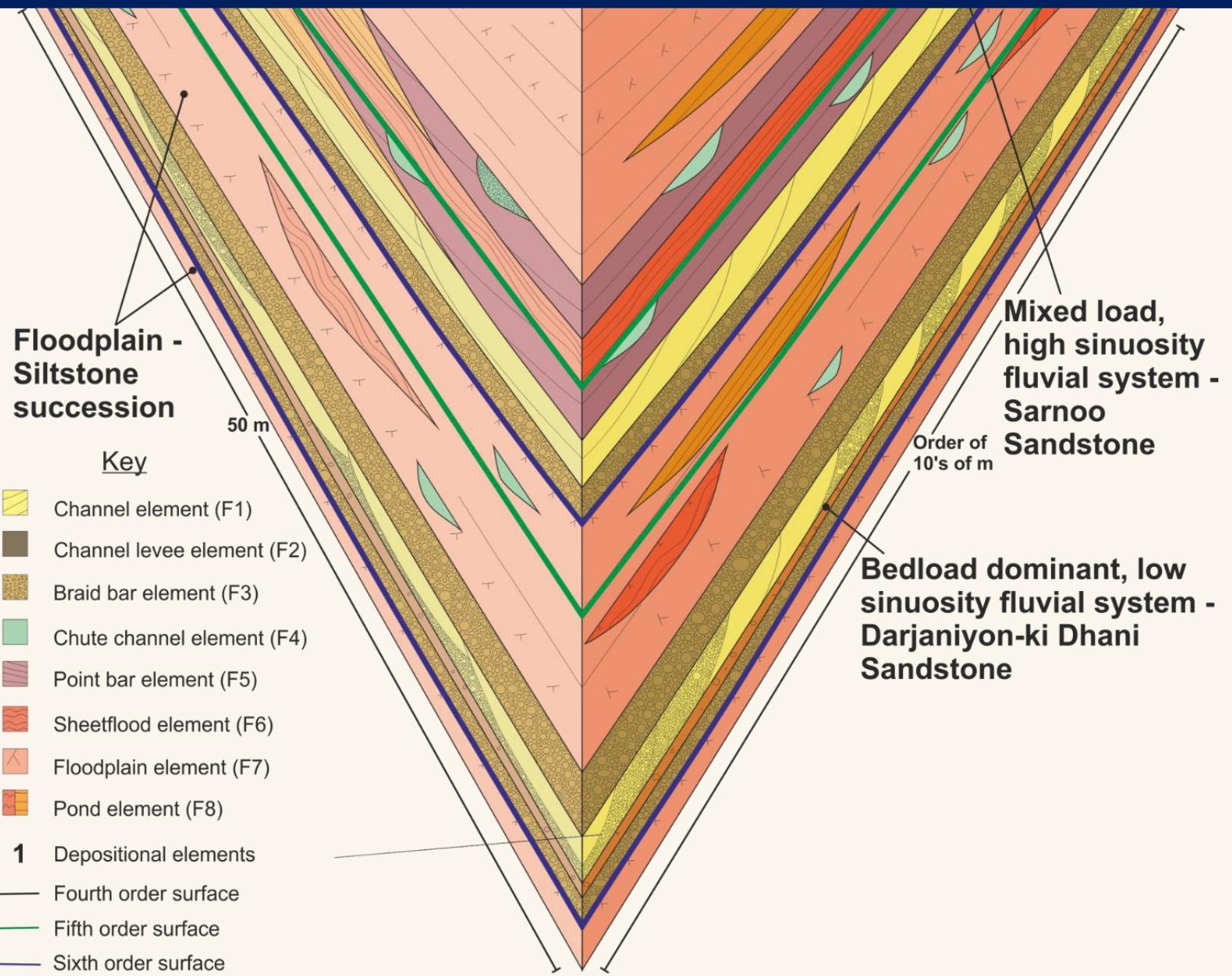
# Timing of faulting



# Tectonic influences



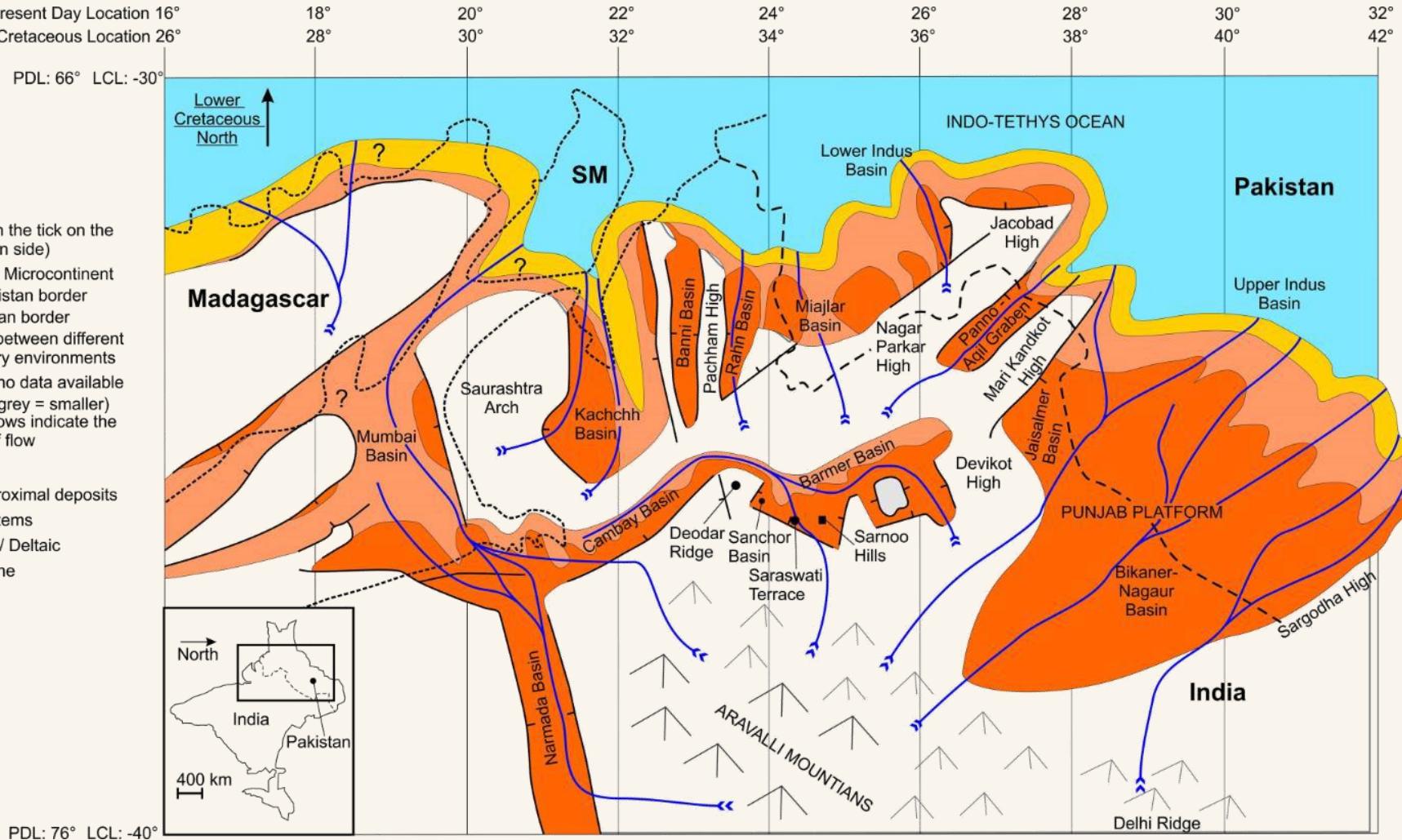
NW - SE faulting highly likely  
to be affecting the Ghaggar-  
Hakra Formation



# Provenance



PDL: Present Day Location 16°  
LCL: Lower Cretaceous Location 26°



## Summary



- The Darjaniyon-ki Dhani Sandstone is a gravel bedload, low sinuous fluvial system
- The Sarnoo Sandstone is a mixed load, high sinuous system
- The Nosar Sandstone is a well-developed, bedload dominant, low sinuous system.
- Changes in fluvial style between the Darjaniyon-ki Dhani and Sarnoo sandstones relate to the growth of the fluvial system
- The changes between the Sarnoo and the Nosar sandstone are related to the growing fault network.
- Four key architectural elements which are: channel fill, braid bars, point bars and the floodplain
- Sometimes the core is better preserved than the outcrops



- We want to promote the importance of geoscience in a more sustainable society, and to advocate for equality, diversity and inclusion for all in geoscience
- <https://geoscienceforthefuture.com/>
- @geoforthefuture
- Follow us on Twitter & Instagram and like us on Facebook

# Students & Teachers



## What's the idea?

Got a question about geoscience, university or careers? Want to chat with a real life geoscientist?

Then #AskAGeo

Professional geoscientists are waiting for your questions!

## How to join?

Head to our website:  
[https://geoscienceforthefuture.com/ask\\_ago-hub/](https://geoscienceforthefuture.com/ask_ago-hub/)

Choose a geoscientist from our list and check out their contact preferences  
Contact them by Twitter or email to ask our questions or ask for a virtual chat.

#AskAGeo 

# Professionals



## What's the idea?

We want to encourage geoscientists to engage with school students to promote our subject and with teachers to provide subject support and ideas!

## How to join?

Do you want to get involved?  
Tweet or Insta @geoforthefuture #AskAGeo  
or email us at [geoforthefuture@gmail.com](mailto:geoforthefuture@gmail.com)

Include a photo of yourself, an engaging short bio (>280 characters) and a way to contact you (a twitter handle or email address). You will be added to the #AskAGeo hub on our website.

#AskAGeo 

# Any Questions?!

## Acknowledgements

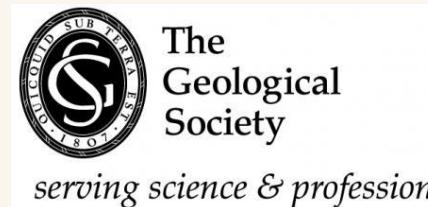
- James Solan, Andrew Bladon and Bhanwar Lal for field assistance
- Cairn for funding and administrating all field work
- Cairn and Ichron for providing essential help and reading materials

## References

- Bladon A.J., Burley S.D., Clarke S.M. and Beaumont H. Geology and regional significance of the Sarnoo Hills eastern rift margin of the Barmer Basin, NW India, *Basin Research*, Accepted Article, DOI: 10.1111/bre.12093



earth surface processes group



BASIN DYNAMICS RESEARCH GROUP

