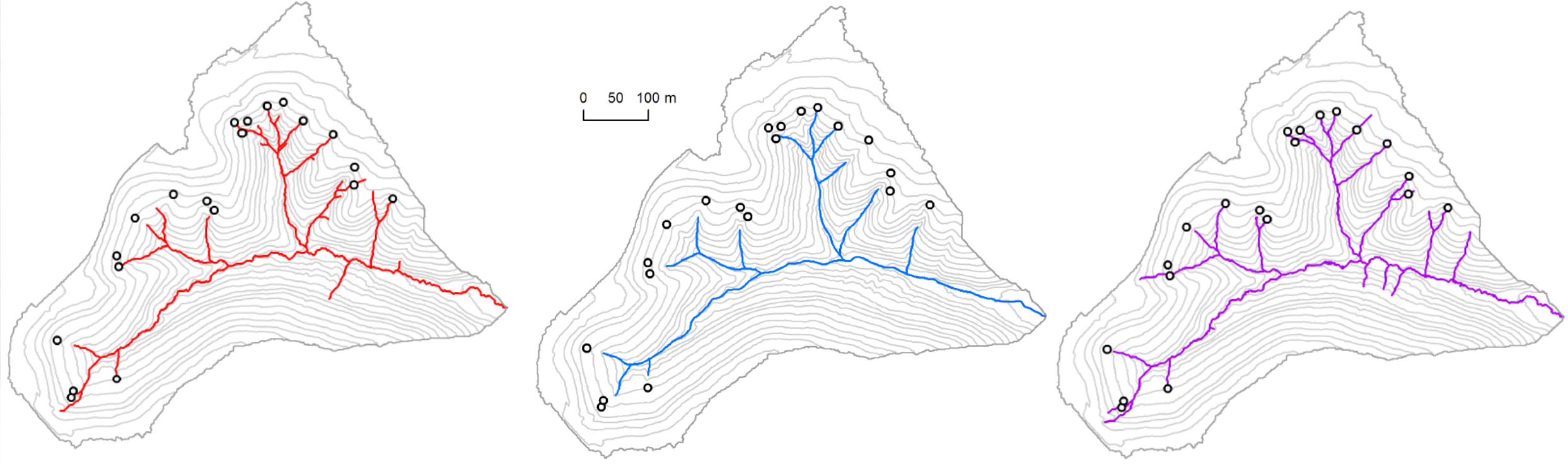
LSDTopoTools: reproducible topographic analysis

Fiona Clubb, Stuart Grieve, Boris Gailleton, Martin Hurst, Declan Valters and Simon Mudd

What is our software?

- Not a GIS!
- Set of topographic analysis routines, written in C++
- Designed to implement latest developments in topographic analysis
- Supports numerical modelling of landscape evolution
- To enable reproducible topographic analysis and the sharing of workflows

Some LSD Examples: 1. Channel network extraction

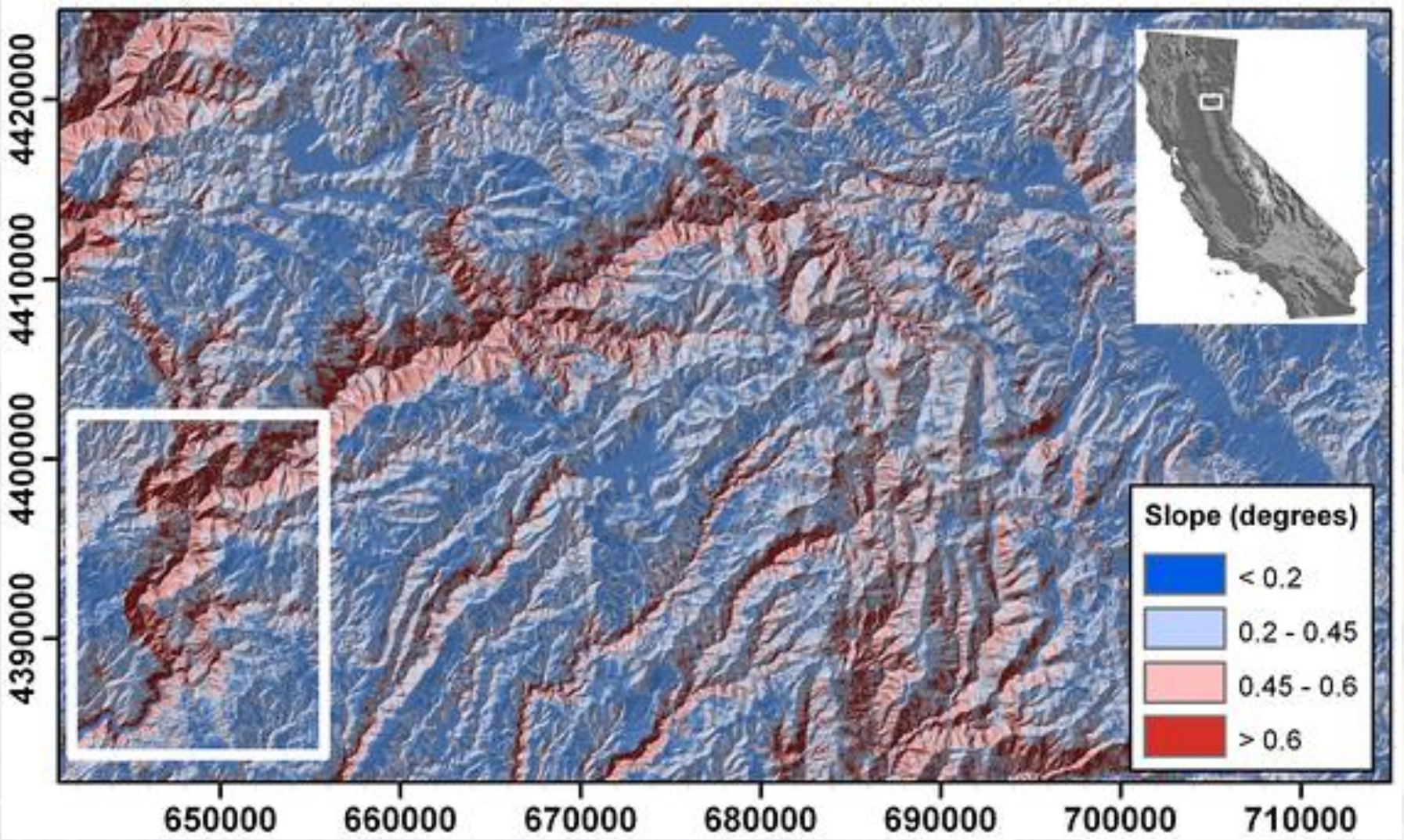


Several different channel extraction methods:

- Area thresholds
- Geometric-based methods (curvature)
- Process-based methods (DrEICH algorithm)

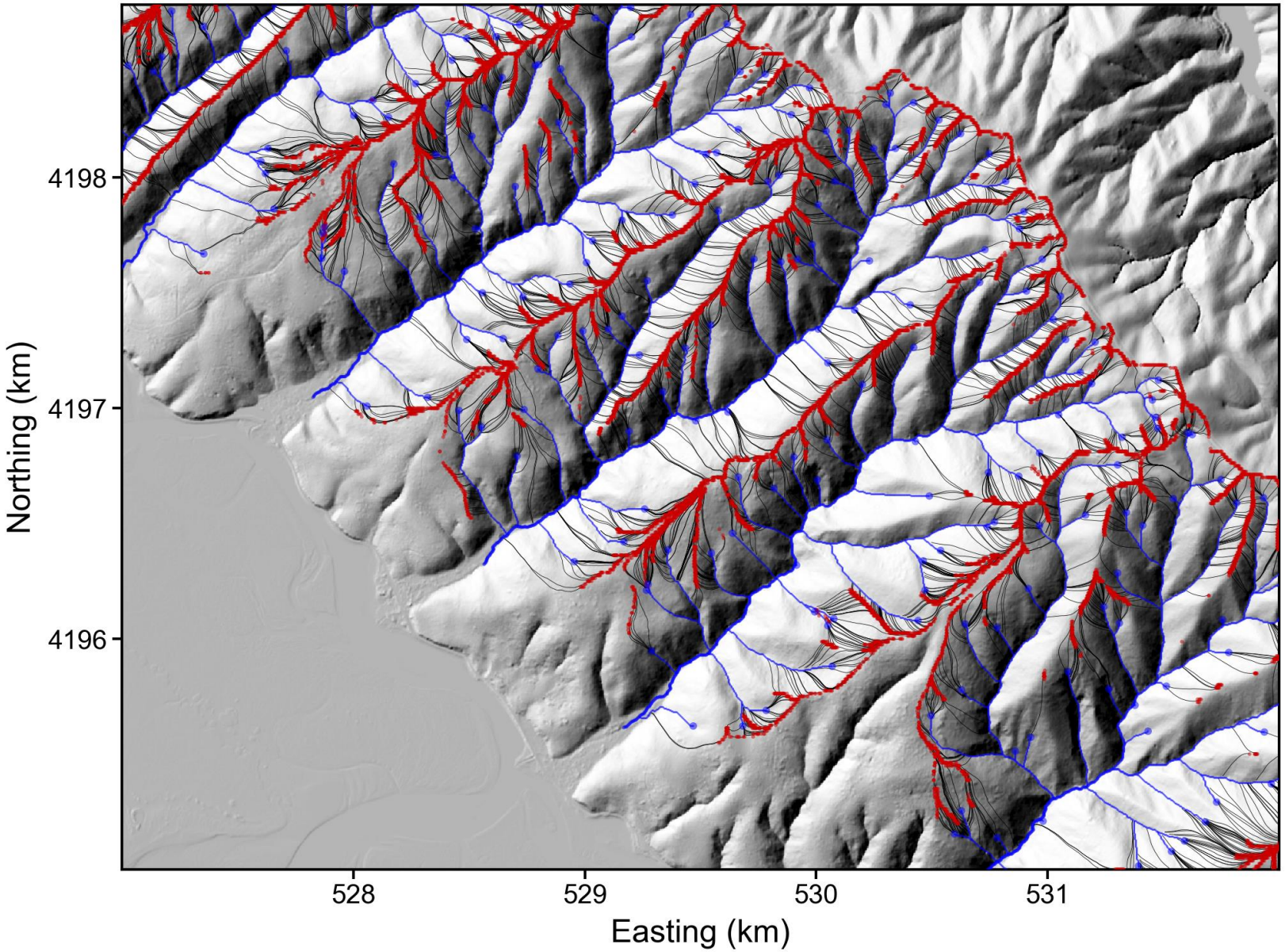
Clubb et al. (2014) *WRR*

2. Generating basic landscape metrics



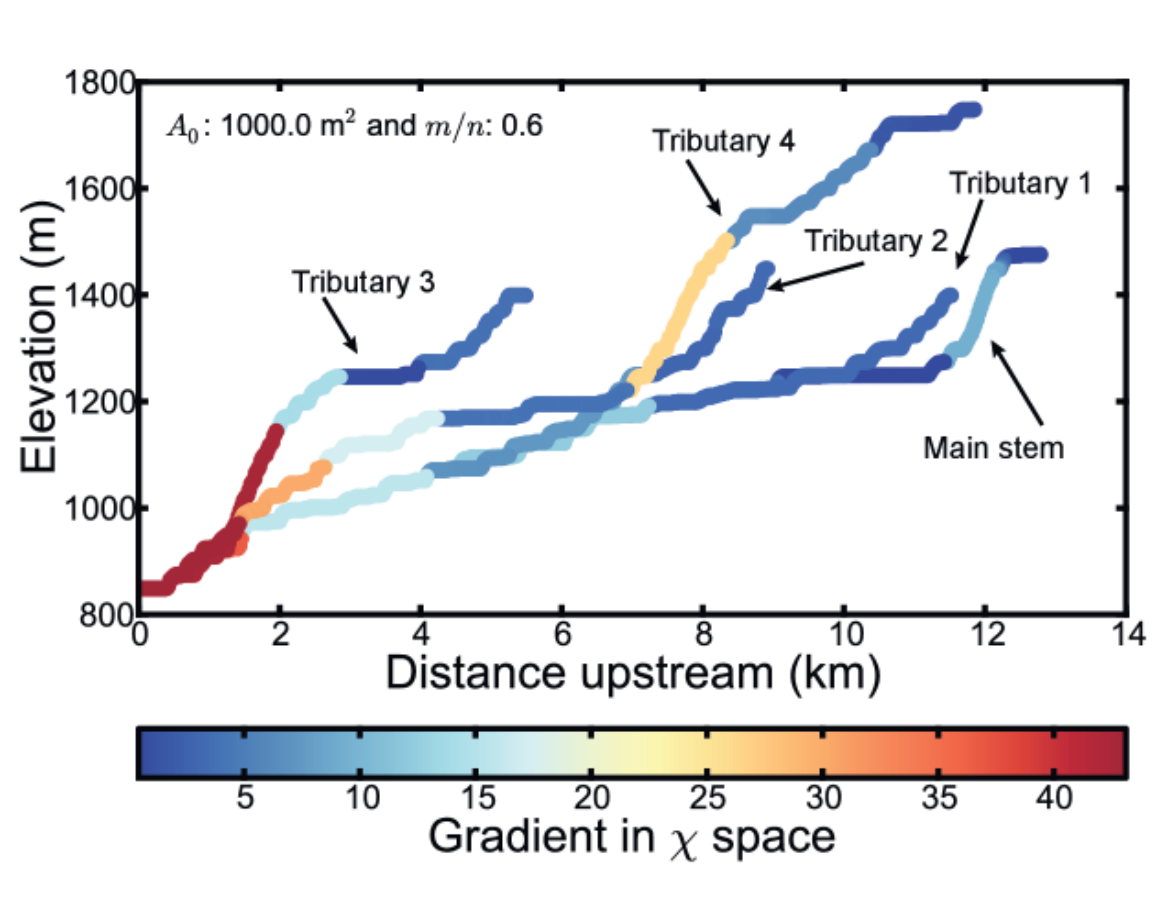
Hurst et al. (2012) *JGR-ES*

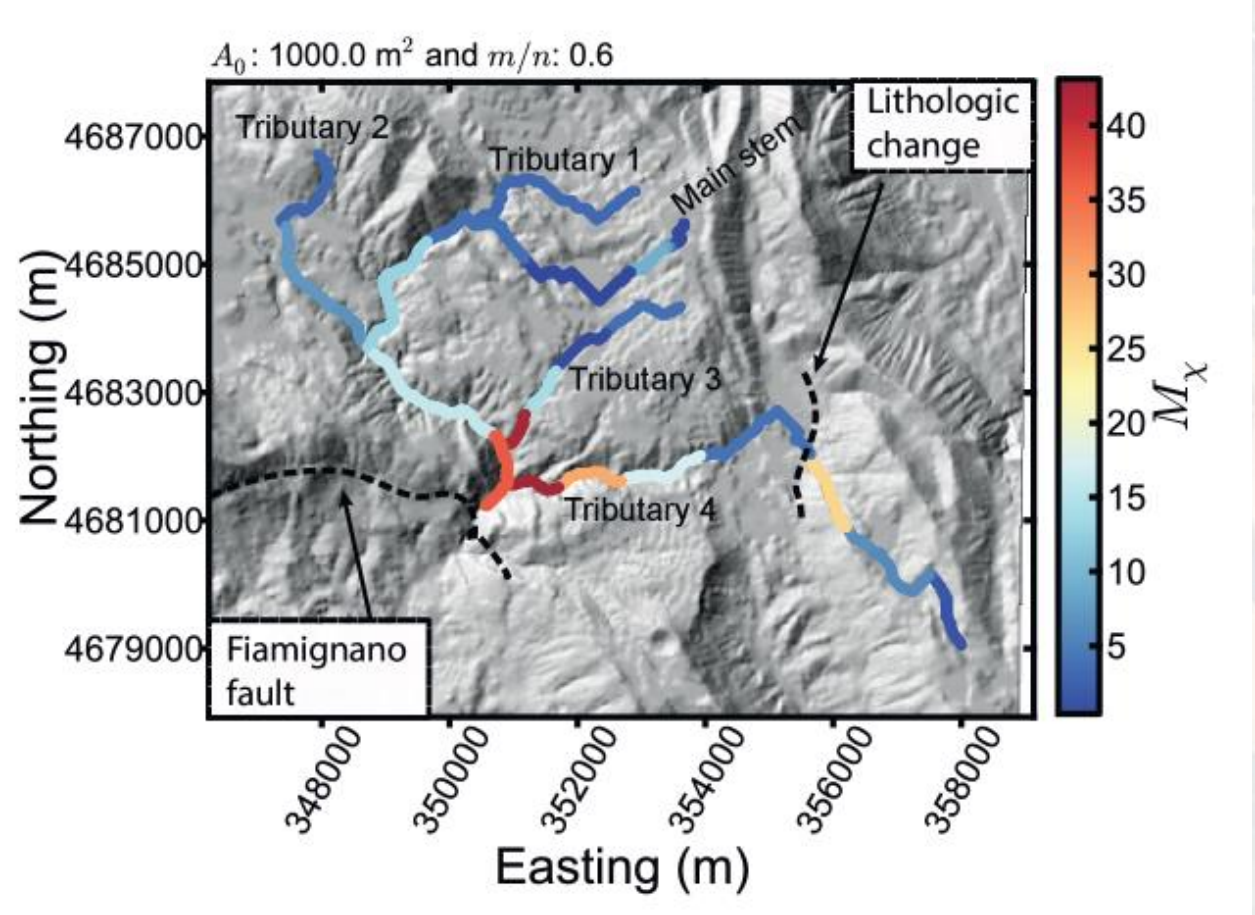
3. Hillslope flow routing



Grieve et al. (2016a,b), Hurst et al., (2012,2013,2019)

4. Channel steepness analysis

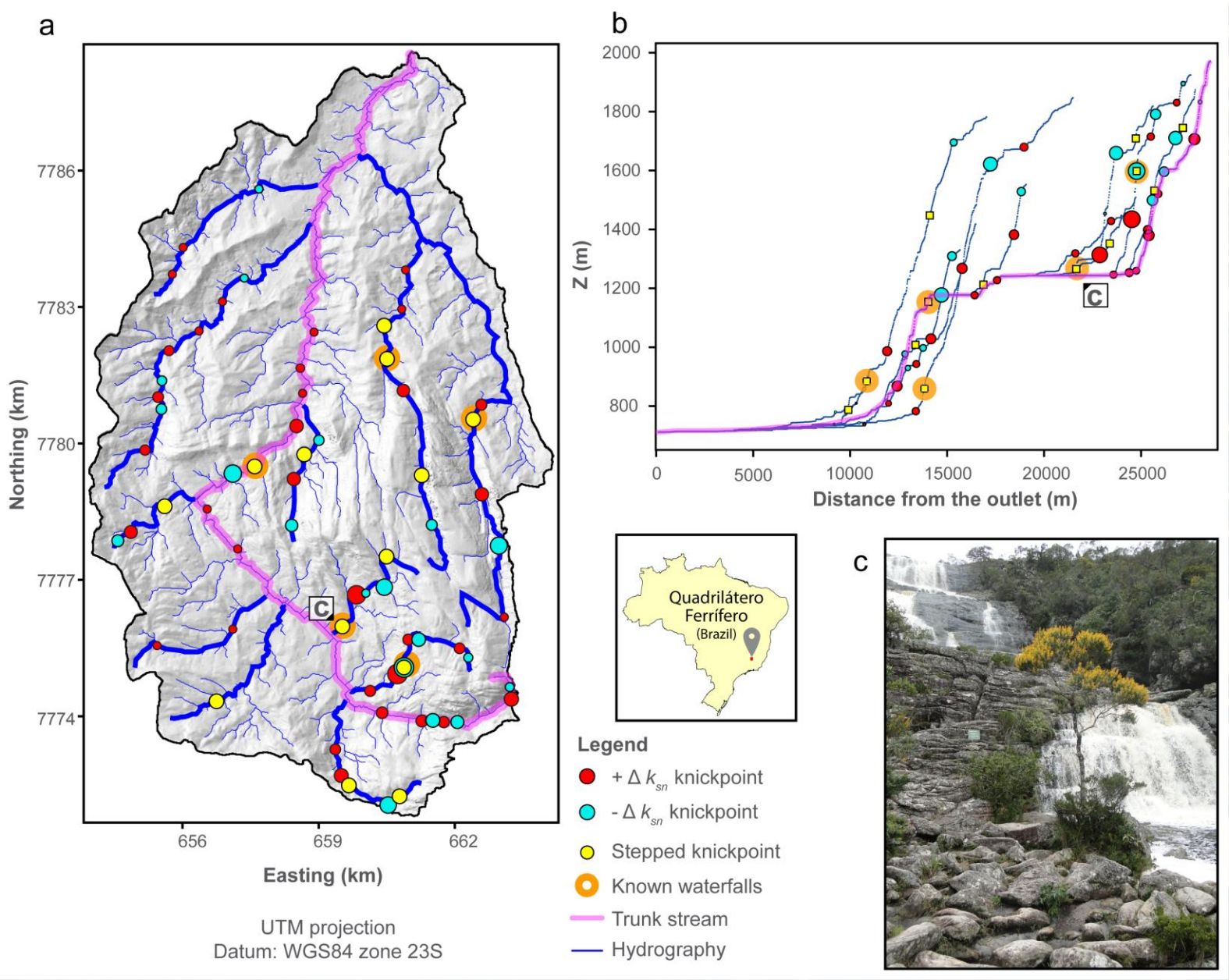




Rio Torto, Apennines, Italy

Mudd et al. (2014) *JGR-ES*

5. (Nearly) Automated extraction of knickpoints



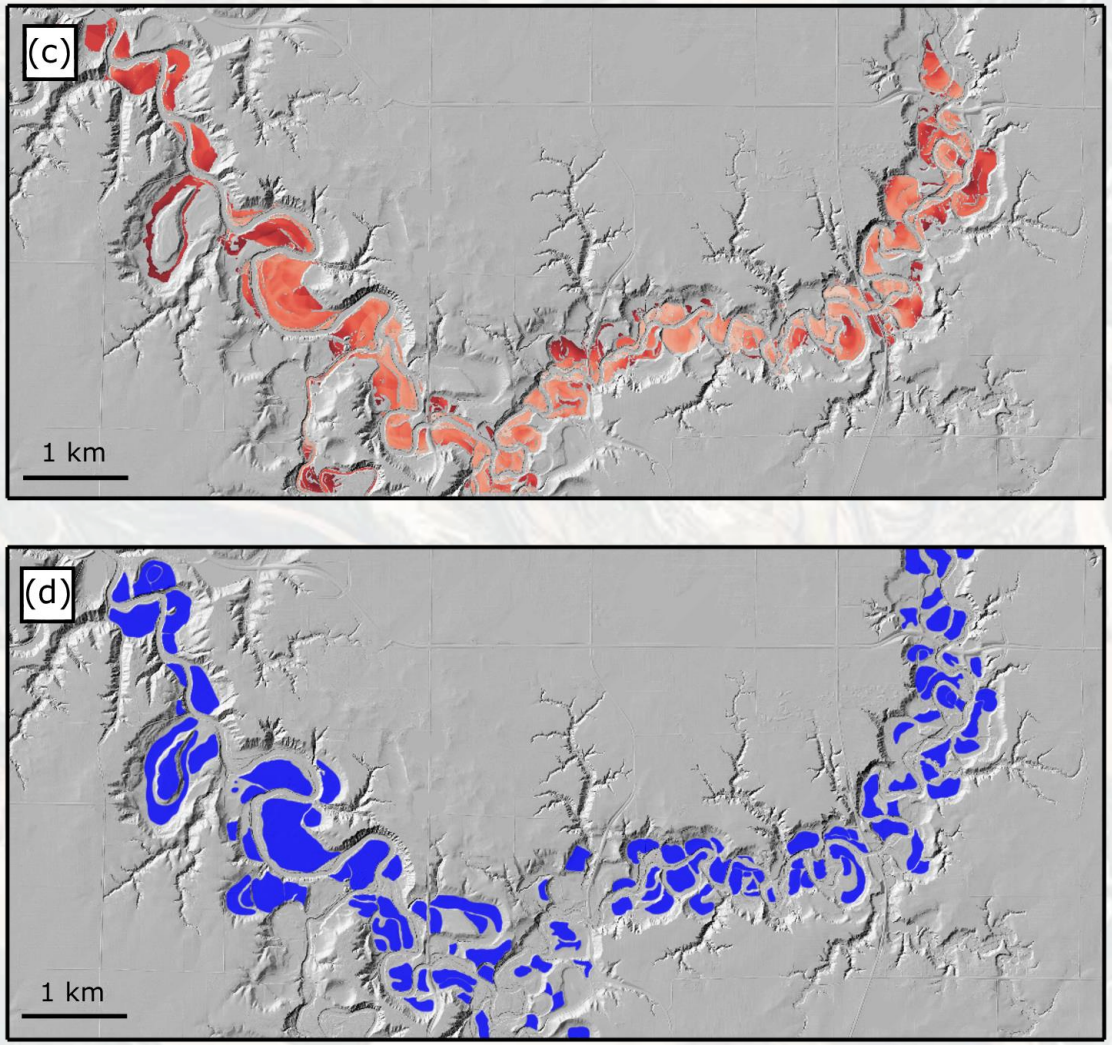
Quadrilátero Ferrífero, Minas Gerais, Brazil

Gailleton et al. (2019) *ESurf*

6. Floodplains and terraces

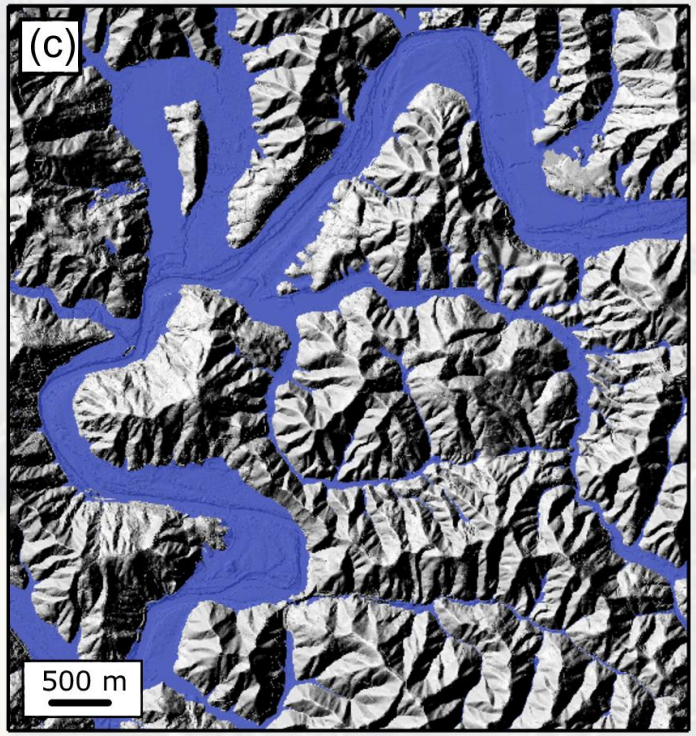
Le Sueur River, MN

Topographic method

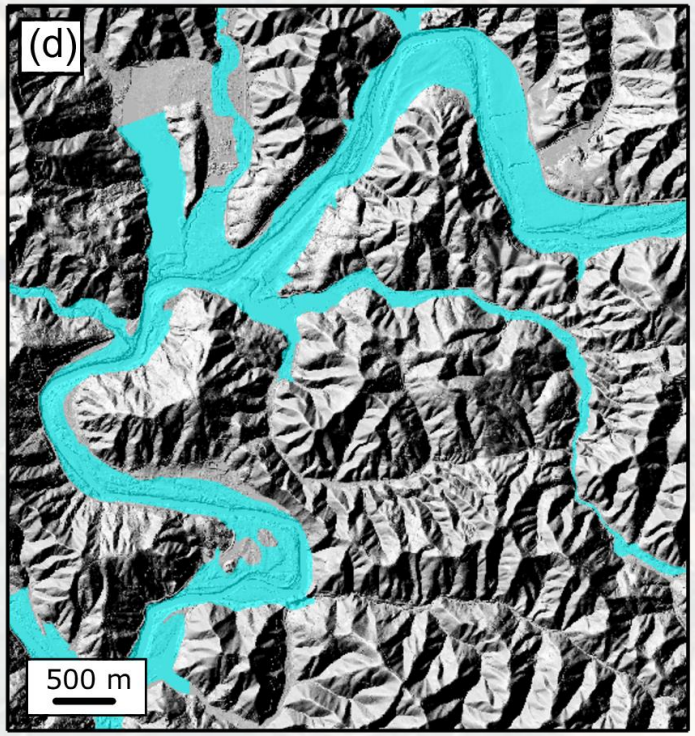


Field-mapped terraces

Topographic method



FEMA flood map



Russian River, CA

Clubb et al. (2017) *ESurf*

7. Delineation of salt marshes

Islay Marsh,
Devon, UK

Goodwin et al. (2018), *ESurf*

Today's workshop...

1. Channel network extraction
2. Generating slope, aspect and curvature
3. Channel steepness analysis

Want to learn more or collaborate?

- Check out our full documentation:
  - https://lsdtopotools.github.io/LSDTT_documentation/

- Send us an email:
  - Fiona fiona.j.clubb@durham.ac.uk @FionaClubb25
  - Boris s1675537@sms.ed.ac.uk @boris_gailleton
  - Stuart s.grieve@qmul.ac.uk @GIStuart
  - @LSDTopoTools