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FLOOD MONITORING CONDUCTED BY CITIZEN SCIENTISTS

THE DENSIFICATION OF HYDROLOGICAL NETWORKS APPLYING SMARTPHONE TECHNOLOGY

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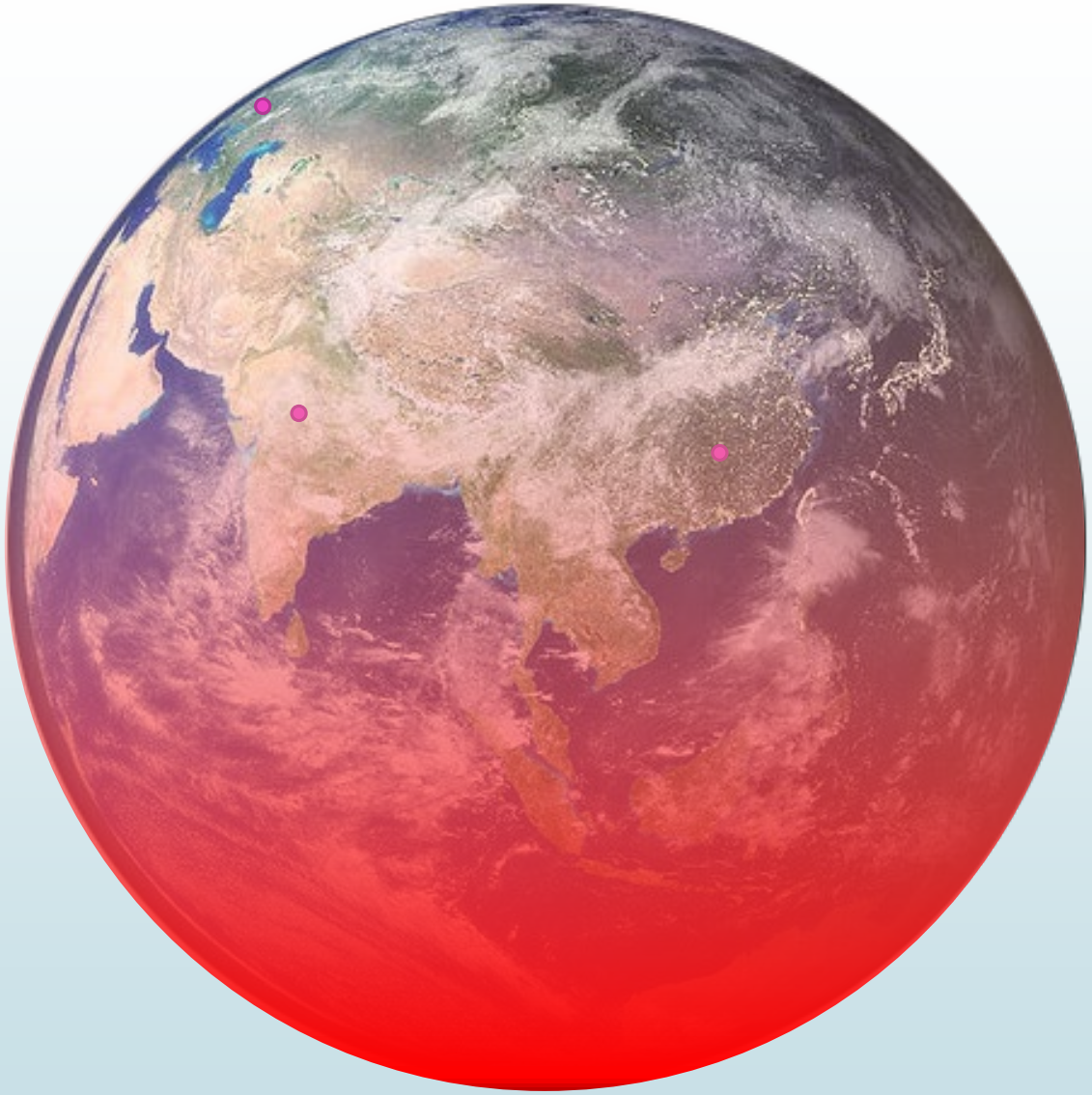
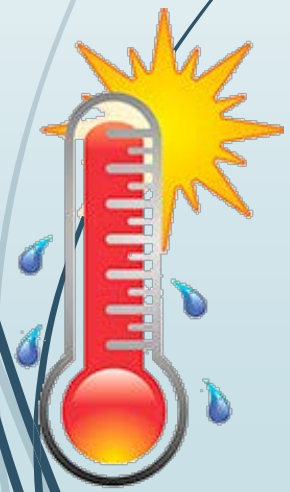
Doocy et al. (2013)





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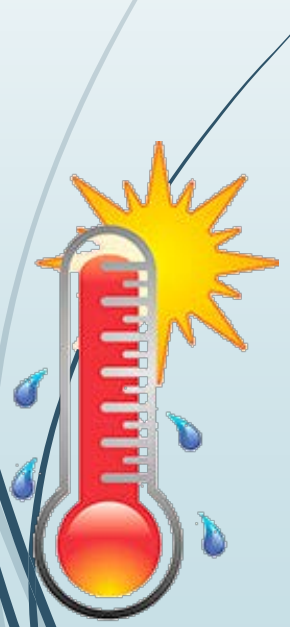

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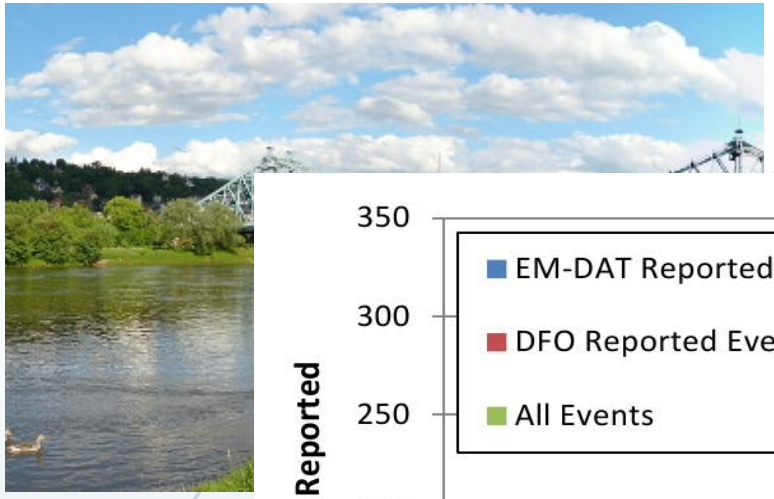

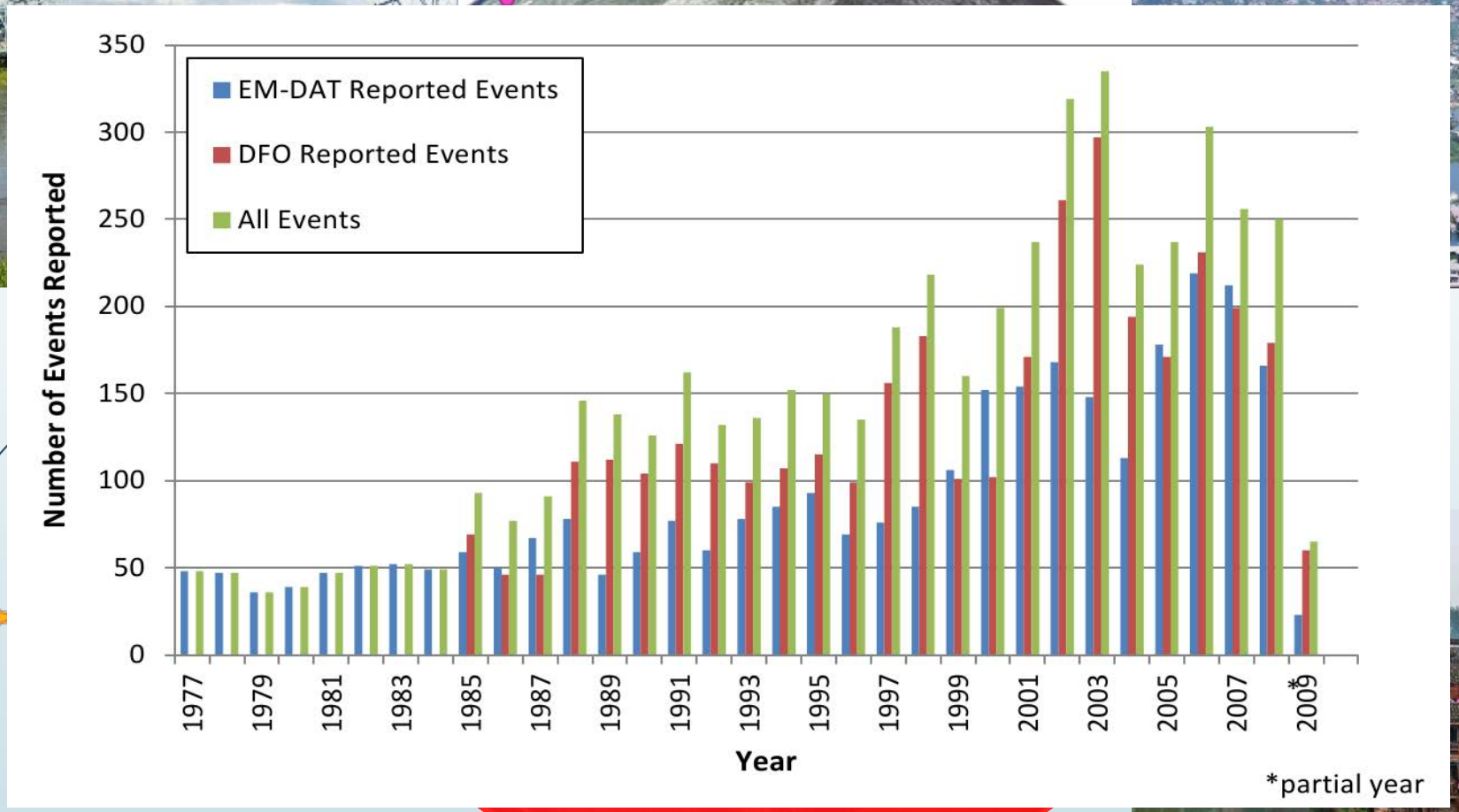

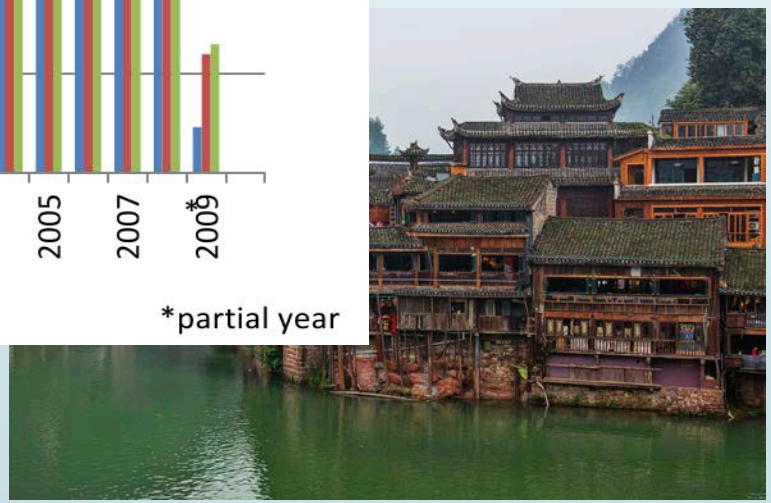

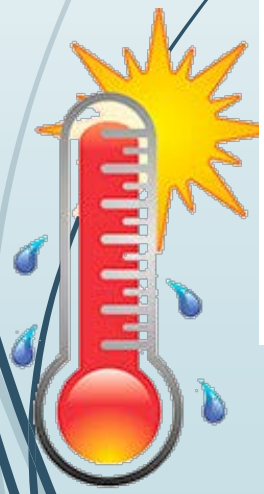

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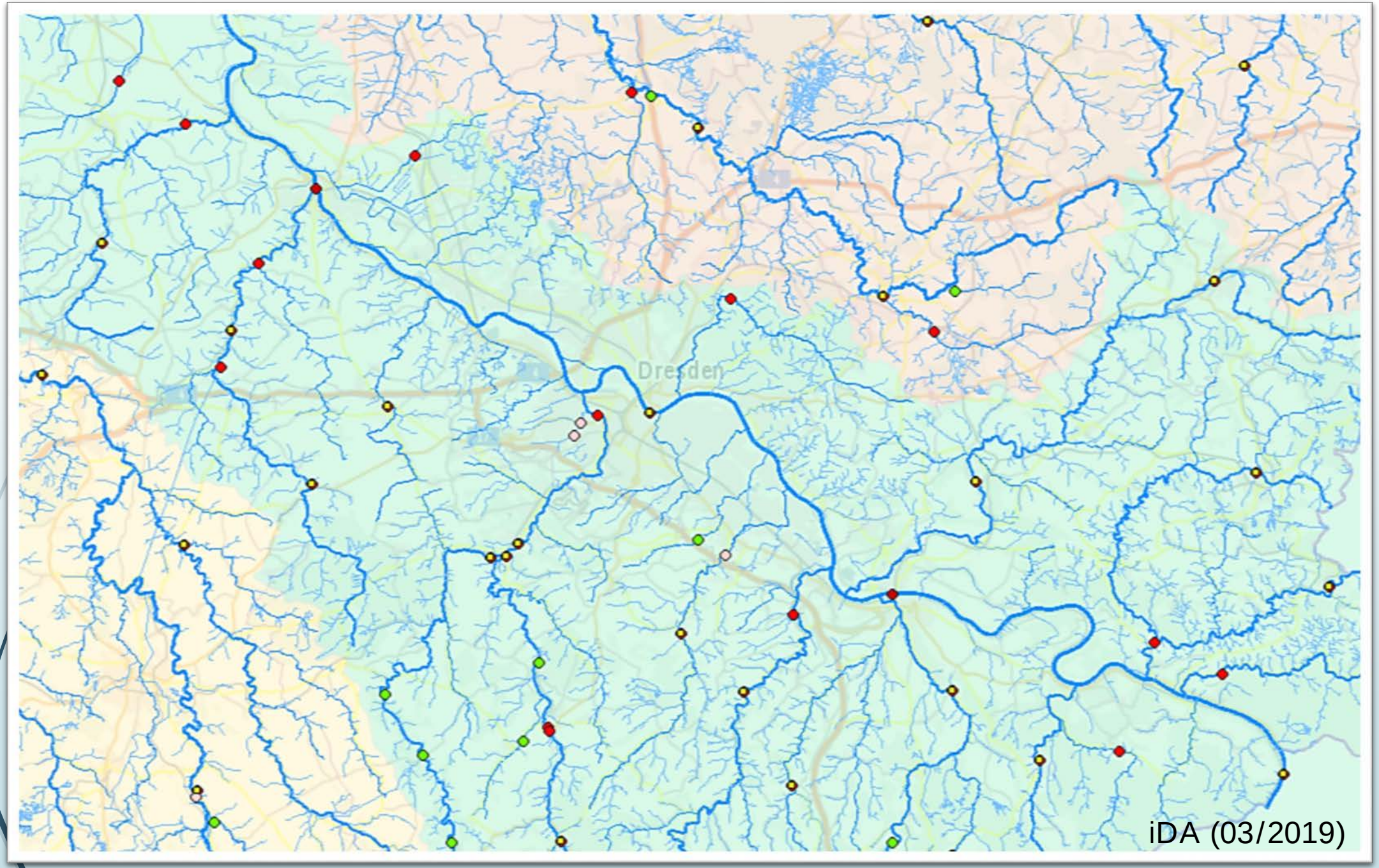
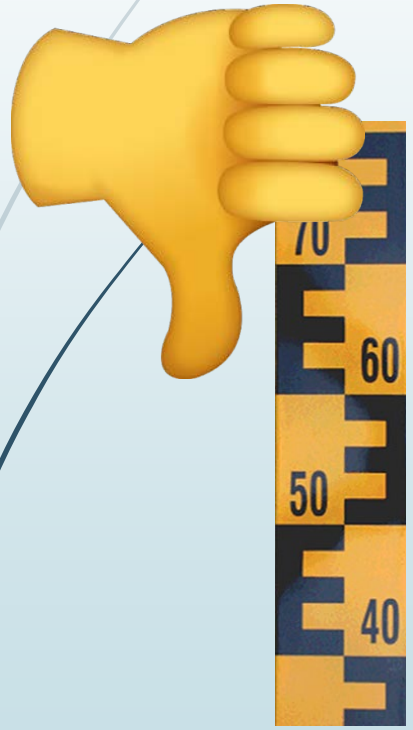

Dresden
iDA (03/2019)

How to improve this issue?

Applied photogrammetry! → Camera-based water level gauging techniques



Event-based water level gauging applying Smartphones

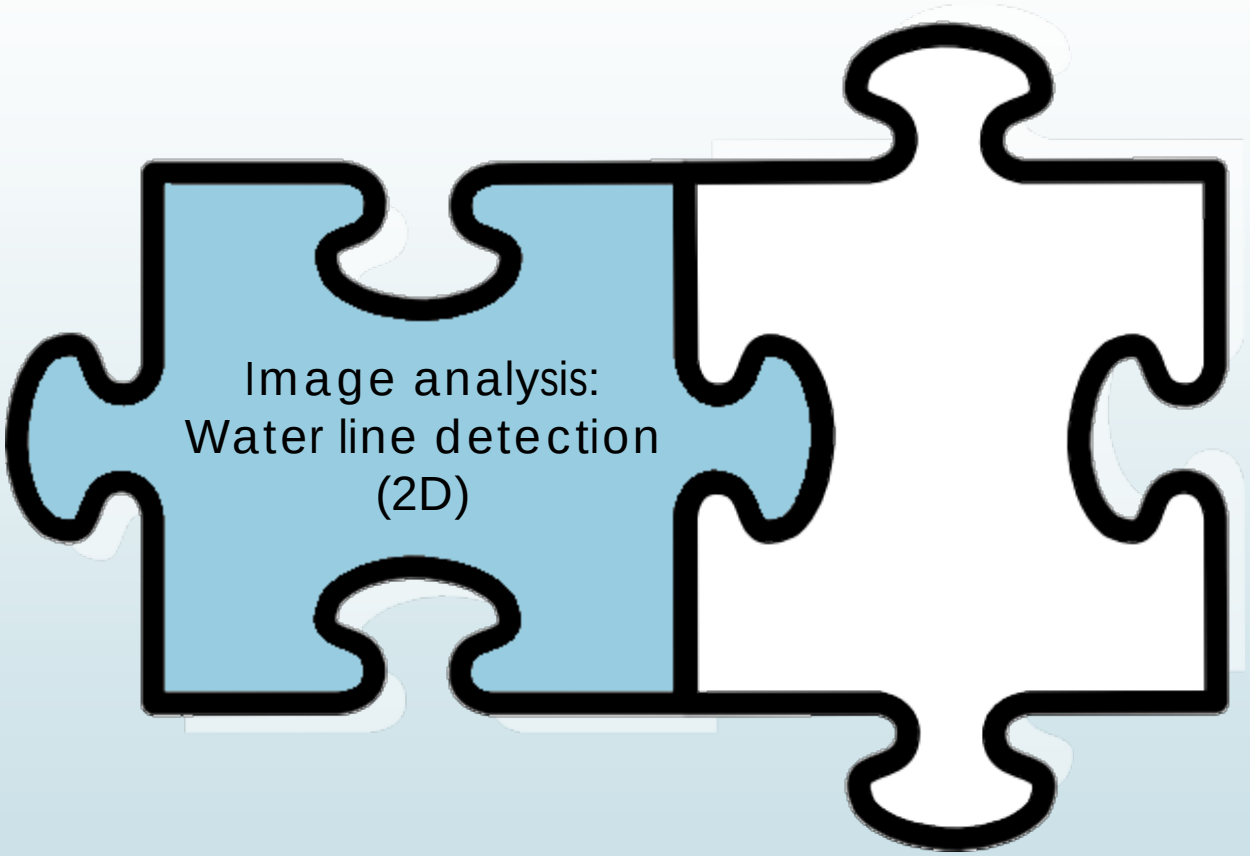
- Smartphone as wide-spread, flexible „measurement device“
  → use of VGI / Crowdsourcing

- *Flexible* „on-the-fly“ data acquisition (non-experts!)

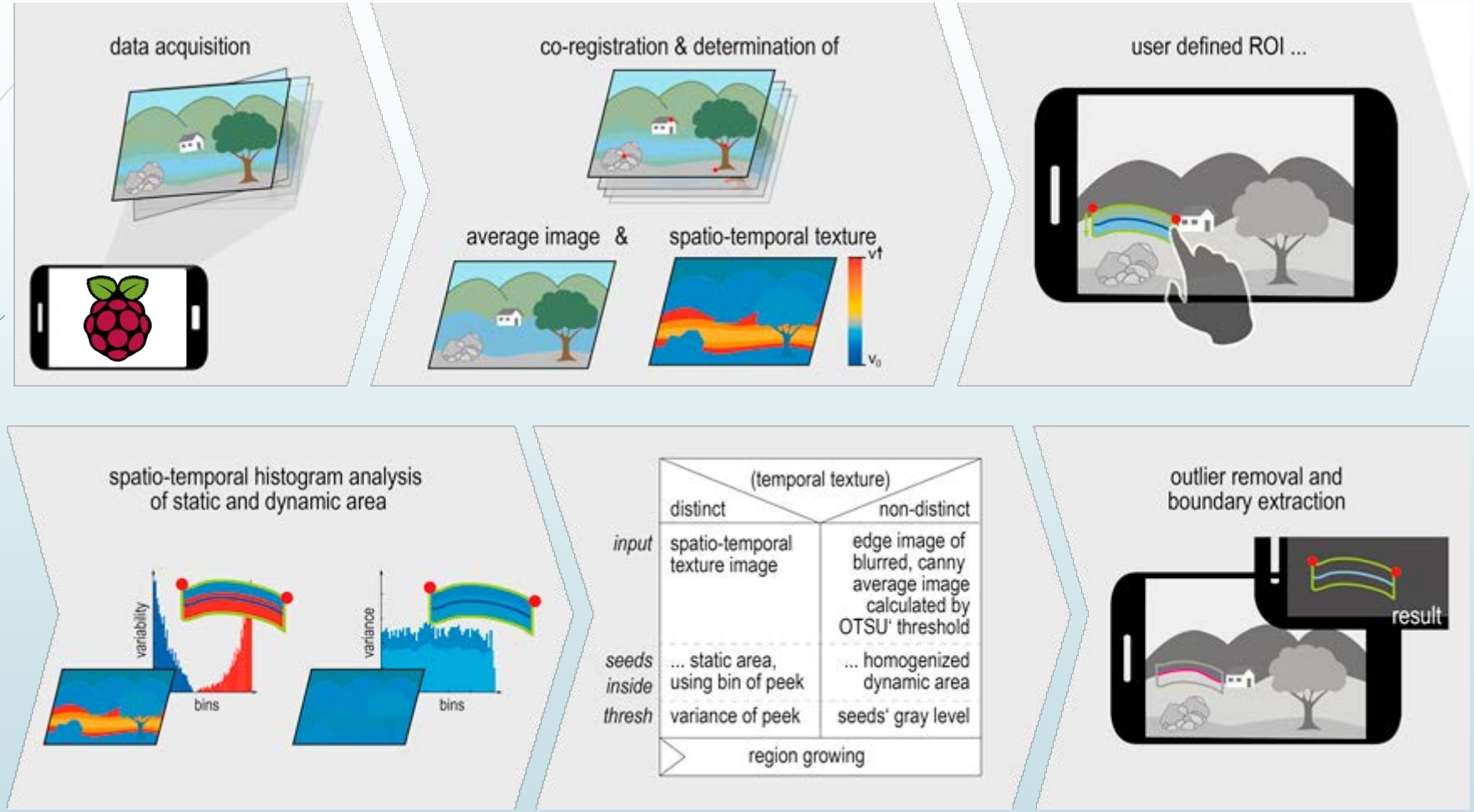
- receive multiple snapshots close to hotspots
  → high spatio-temporal resolution

How to solve?

How to solve?



Requirements: 2D water line



KRÖHNERT, M. & MEICHSNER, R., 2017. Segmentation of environmental time lapse image sequences for the determination of shore lines captured by hand-held smartphone cameras. *ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci., IV-2(W4)*: 1-8.

How to solve?

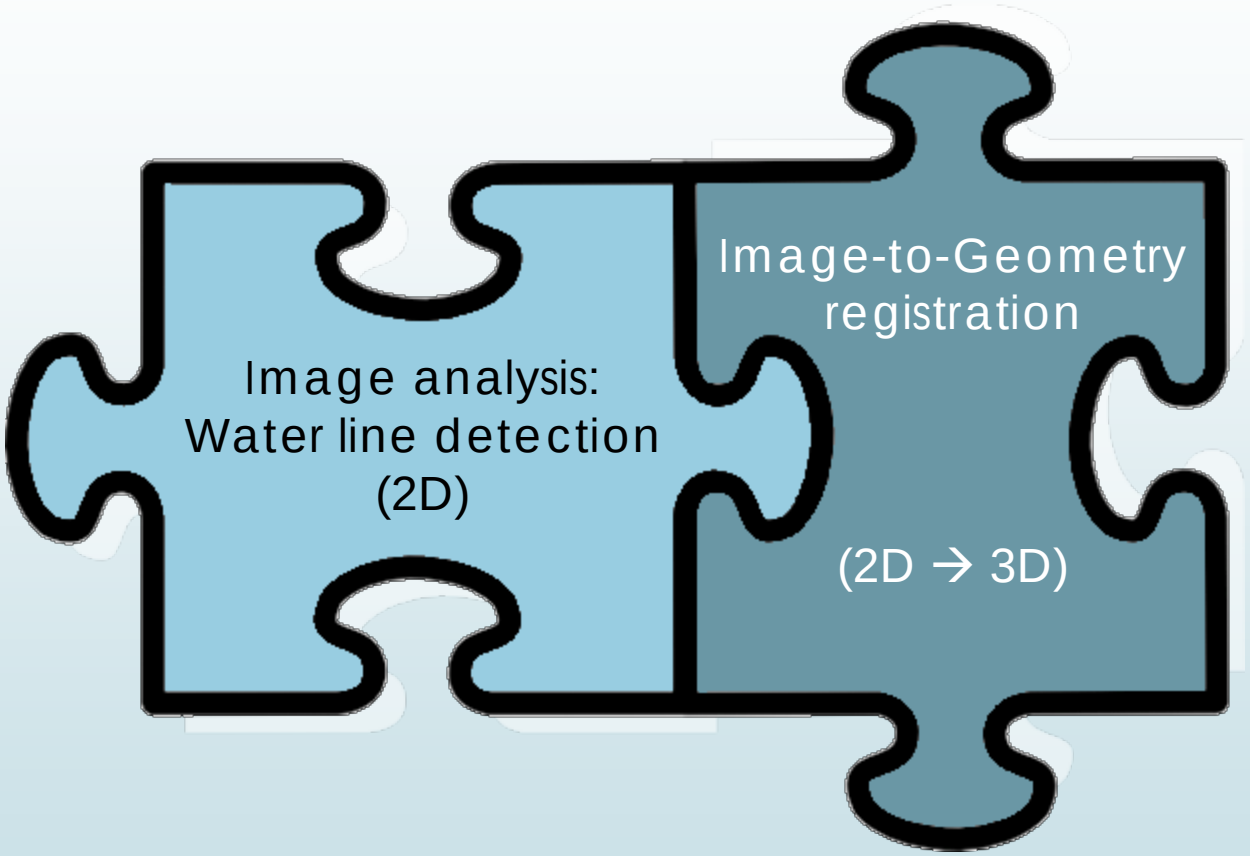
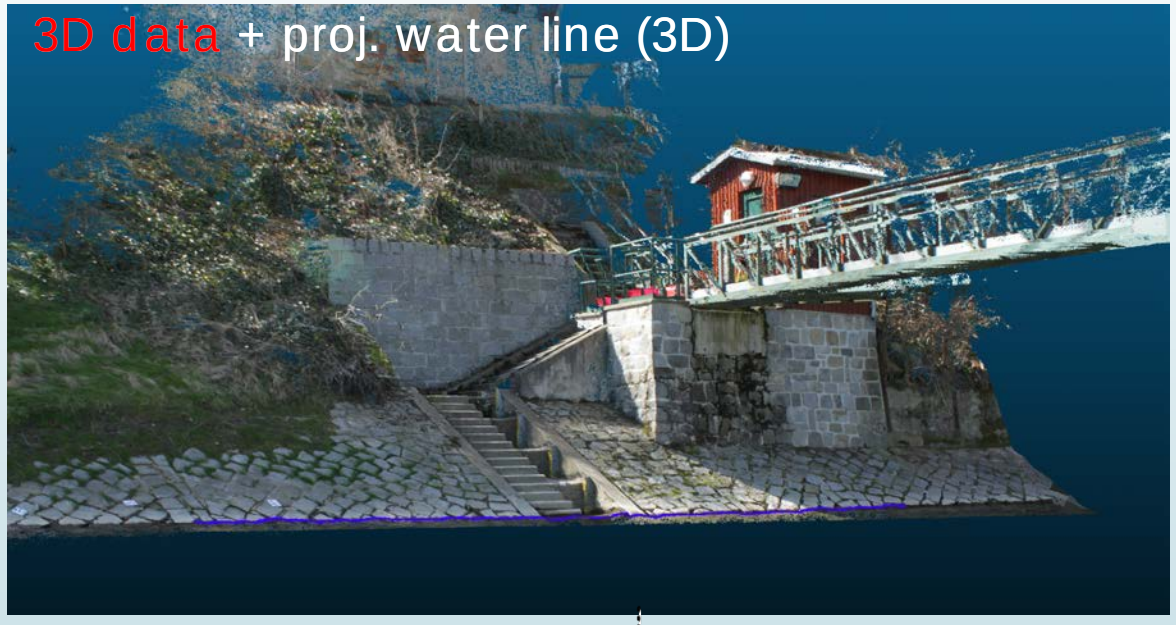


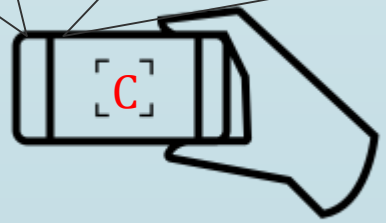
Image analysis:
Water line detection
(2D)
Image-to-Geometry
registration
(2D → 3D)

Requirements

Image-to-Geometry Registration

or “How to transform a water line into water levels?”

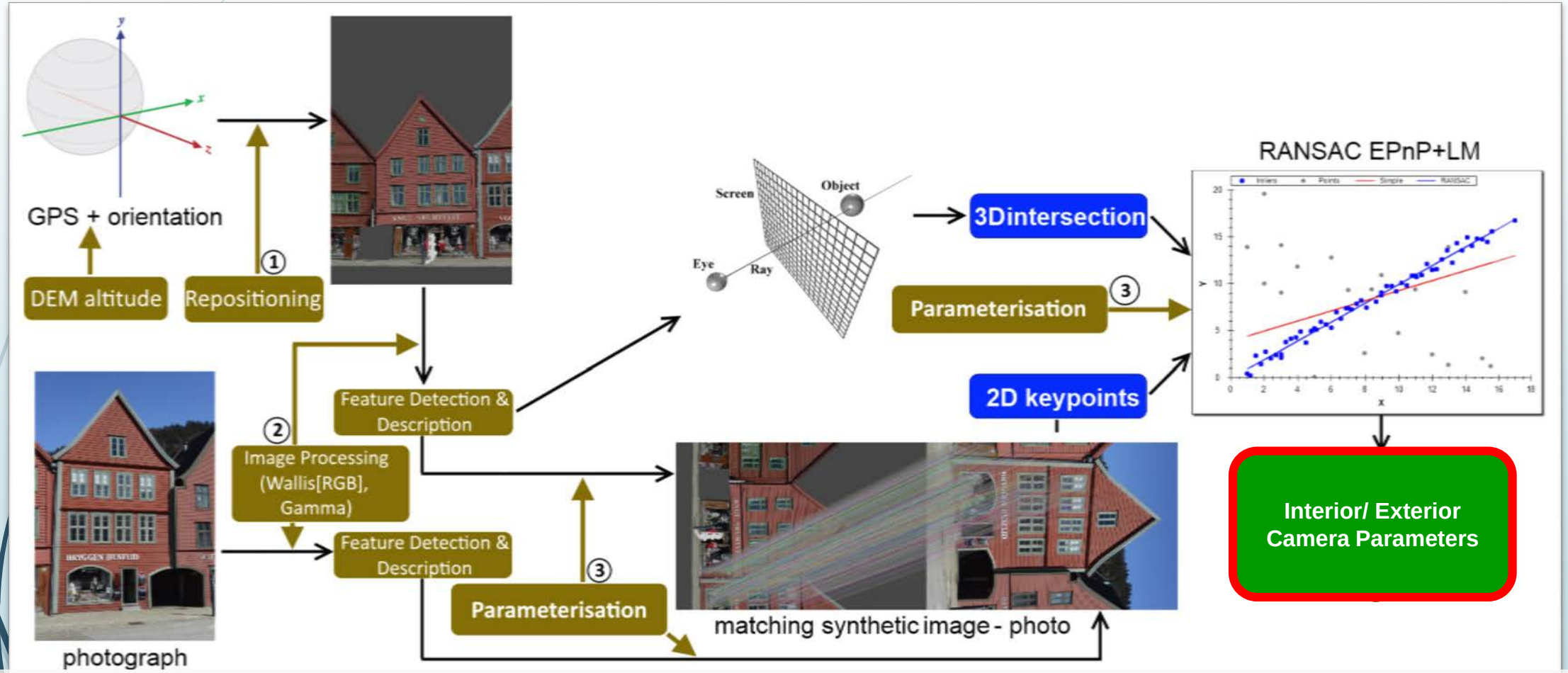




$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = R \begin{bmatrix} X \\ Y \\ Z \end{bmatrix} + t$$

Image-to-Geometry Registration

or “How to transform a water line into water levels?”



KRÖHNERT, M., KEHL, C., LITSCHKE, H. and BUCKLEY, S. J., 2017. Image-to-Geometry Registration on Mobile Devices - Concepts, Challenges and Applications. *3D-NordOst, 20* (Ed. L. Paul, G. Stanke and M. Pochanke). Berlin, Germany: 99-108.

Results

Implementation

	Weißeritz
Catchment	366 km²
Environment	Urban, traffic junction point
Ø/max water level	1.3 m / (-)
Shore characteristics	Boulder, meadow, partly vegetation covered
Reference gauge	Flow, pressure gauge
temporal resolution	15 min
Camera gauge	
image-object distance temporal resolution	15 – 20 m 2 daily measurements (08:30 & 15:30 h, Σ 10d)

No. of measurement series	No. of measured water levels / outlier	Standard deviation $\sigma_{\Delta z}$ [cm]
1 (4 days)	7 / 1	1.1
2 (6 days)	10 / 2	2.7
Ø		**1.9**

Deviation between reference- and camera gauge

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