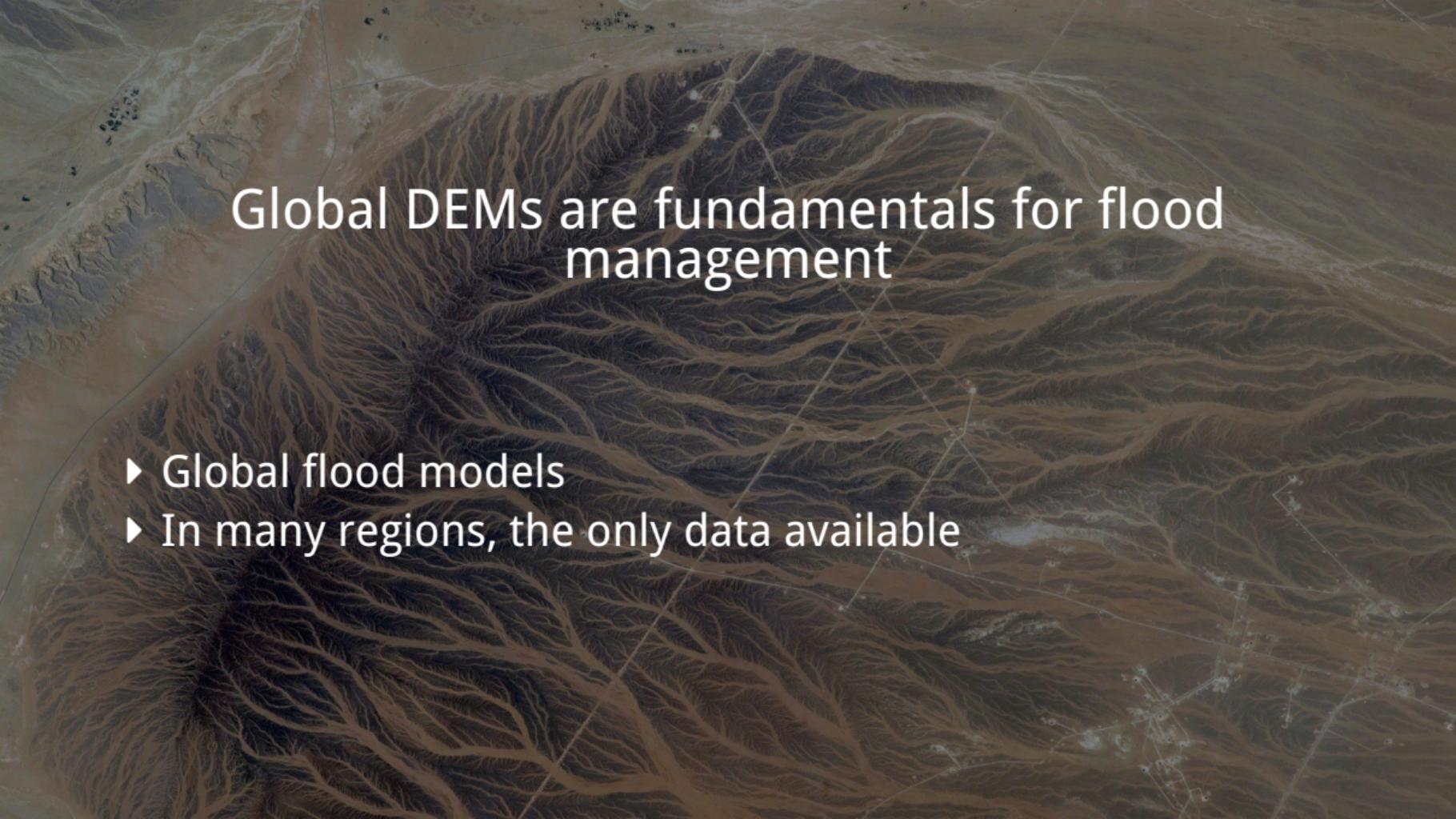


# Evaluation of open global Digital Elevation Models for urban flood modelling

Julio Soriano-Monzalvo, Laurent County, Adrián Pedrozo-Acuña

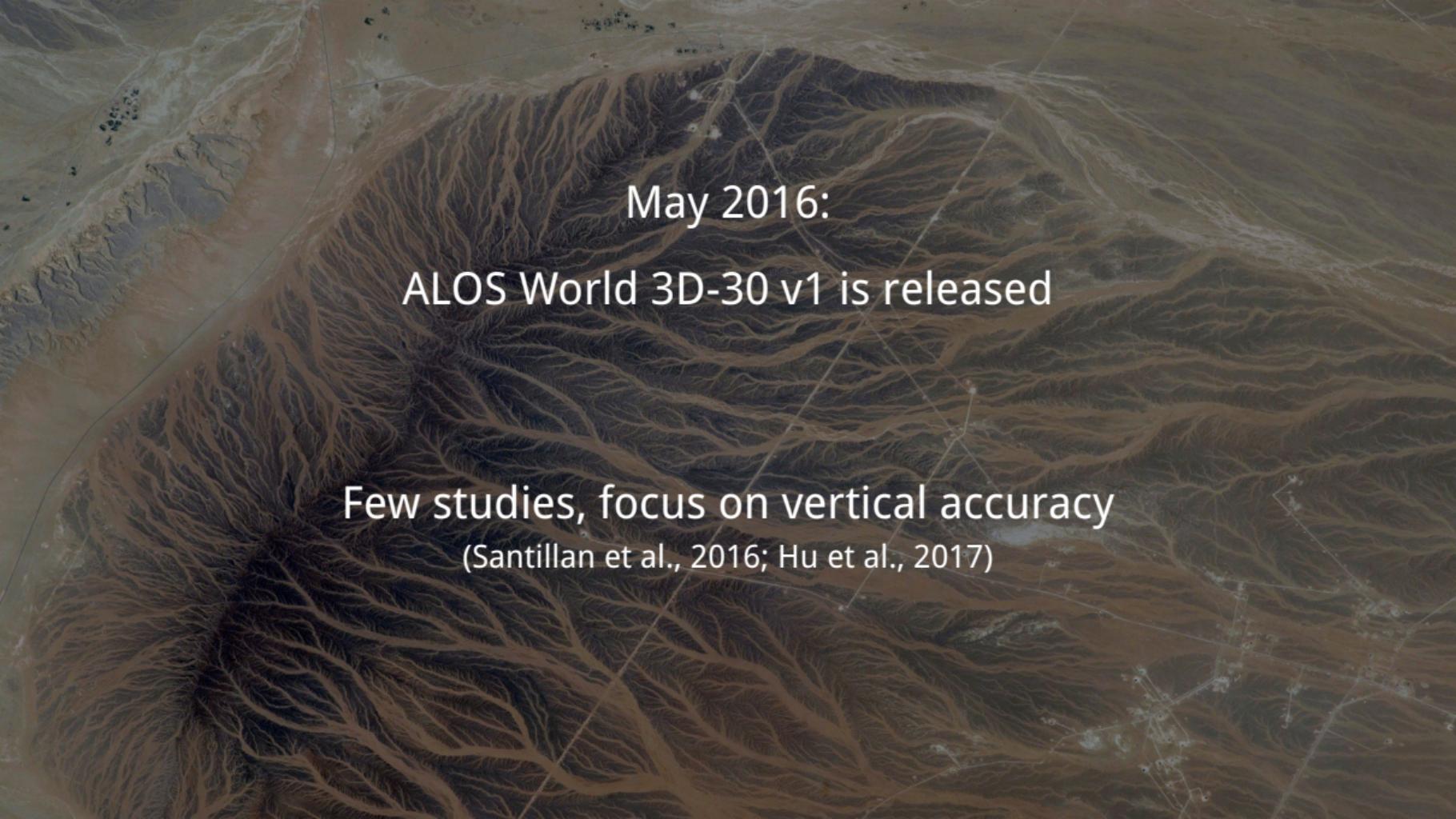


Seventh International Conference on Flood Management, Leeds, UK  
September 2017

A high-angle aerial photograph showing a complex network of brown, winding river channels and their floodplains. The terrain is a mix of dark brown and tan, with some green vegetation visible in the upper left corner. A small town or cluster of buildings is located in the lower right area. The overall pattern of the waterways creates a tree-like structure across the landscape.

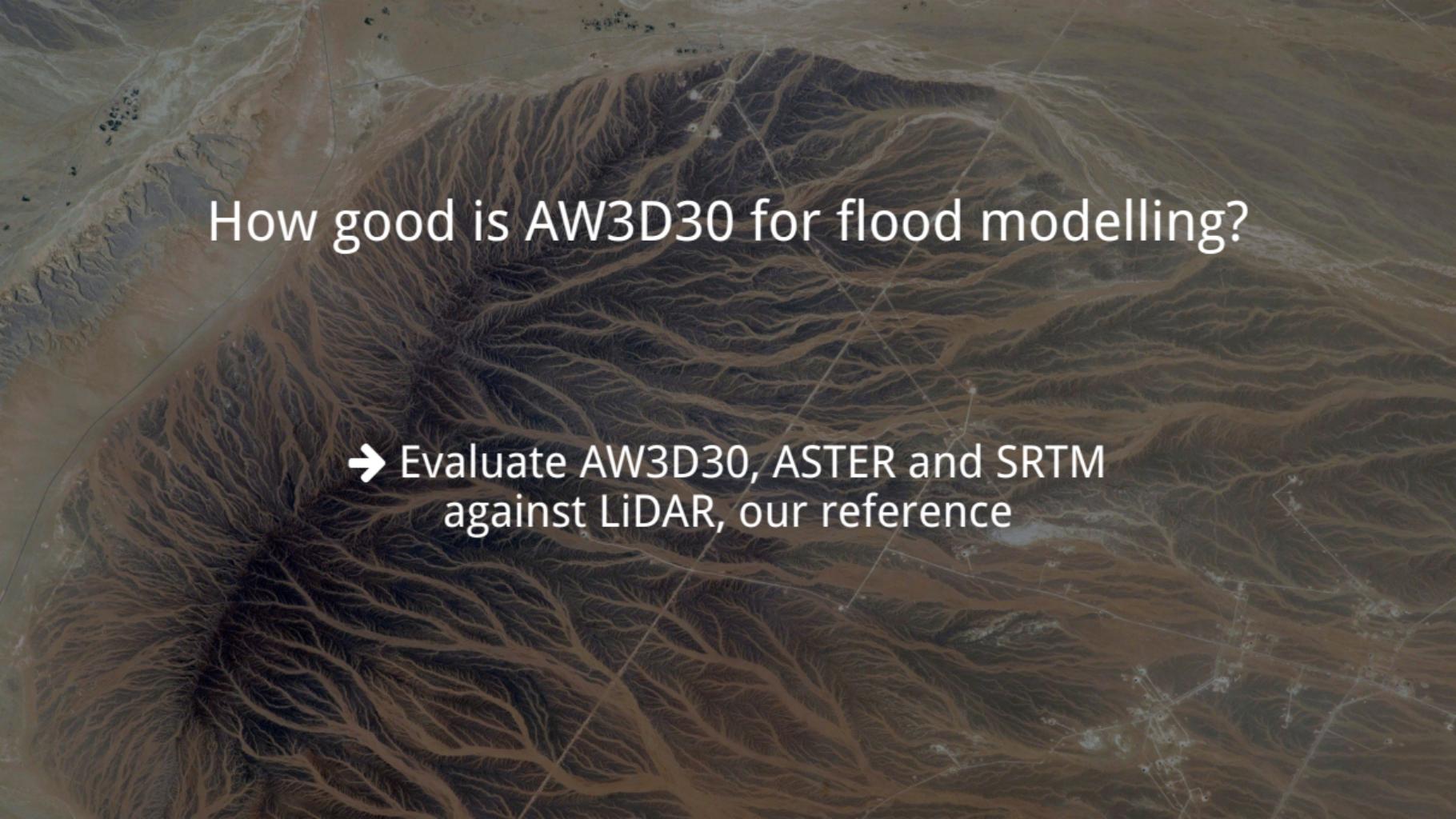
## Global DEMs are fundamentals for flood management

- ▶ Global flood models
- ▶ In many regions, the only data available

A high-angle aerial photograph of a desert landscape. The terrain is characterized by a dense network of dry, brown, branching riverbeds that converge towards the bottom right of the frame. In the lower right corner, there is a small, developed area with several buildings, roads, and utility poles. The surrounding land is a mix of light brown and tan colors, indicating arid soil. Some sparse green vegetation is visible in the upper left corner.

May 2016:  
ALOS World 3D-30 v1 is released

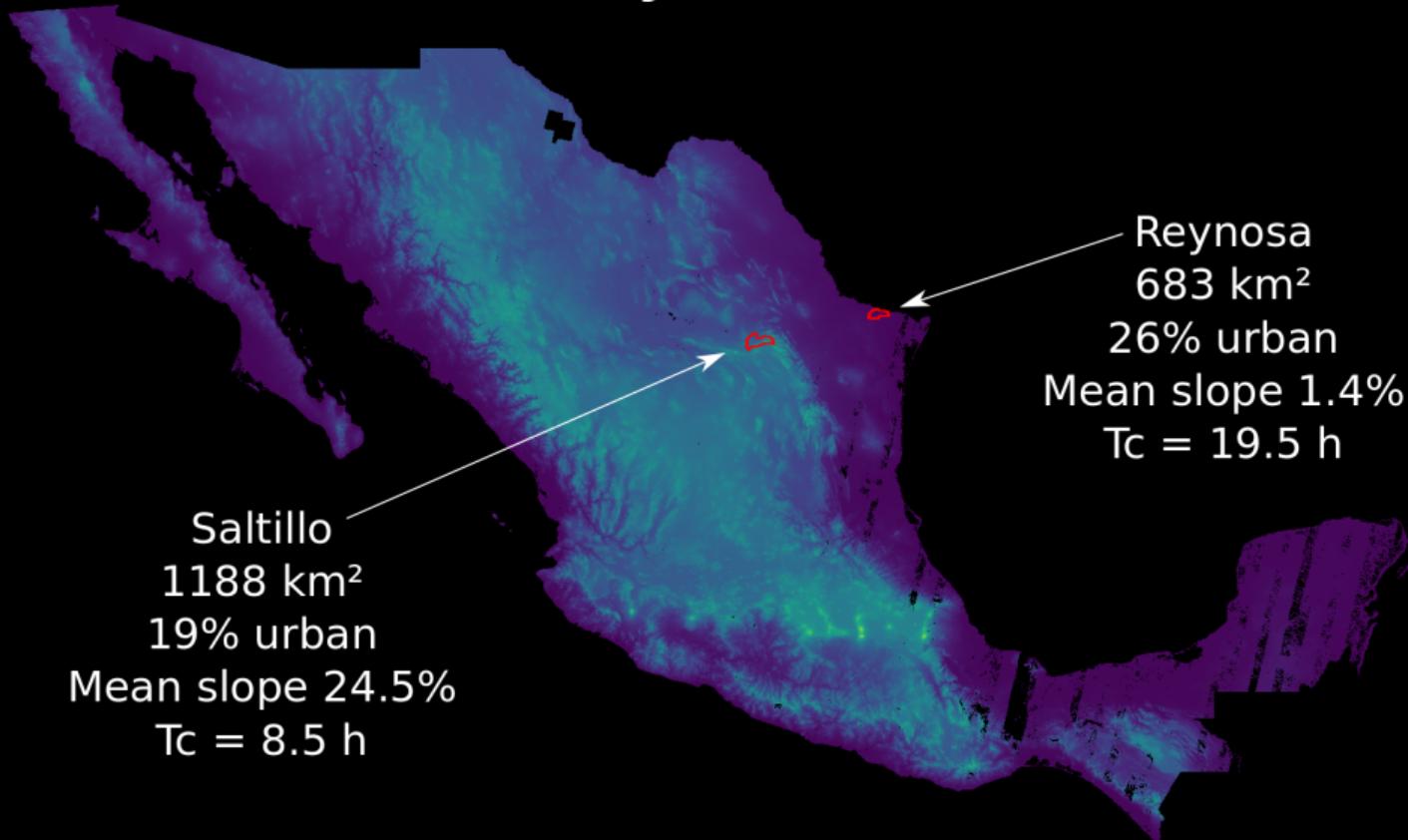
Few studies, focus on vertical accuracy  
(Santillan et al., 2016; Hu et al., 2017)

A high-resolution aerial photograph showing a complex network of brown, winding water channels or soil patterns across a landscape. The terrain is varied, with darker areas indicating more vegetated or developed land. A faint grid overlay is visible, likely representing a coordinate system or a digital elevation model. In the lower right corner, there is a cluster of small white buildings and some roads.

# How good is AW3D30 for flood modelling?

→ Evaluate AW3D30, ASTER and SRTM  
against LiDAR, our reference

# Study areas



The background image is a high-resolution aerial photograph of a desert or arid region. It features a complex network of dry, brown, branching riverbeds (braided streams) etched into the dark, reddish-brown earth. A faint white grid is overlaid on the image, likely representing a coordinate system or a digital elevation model. In the lower right corner, there are some small, scattered white dots and lines, possibly representing survey points or specific geological features.

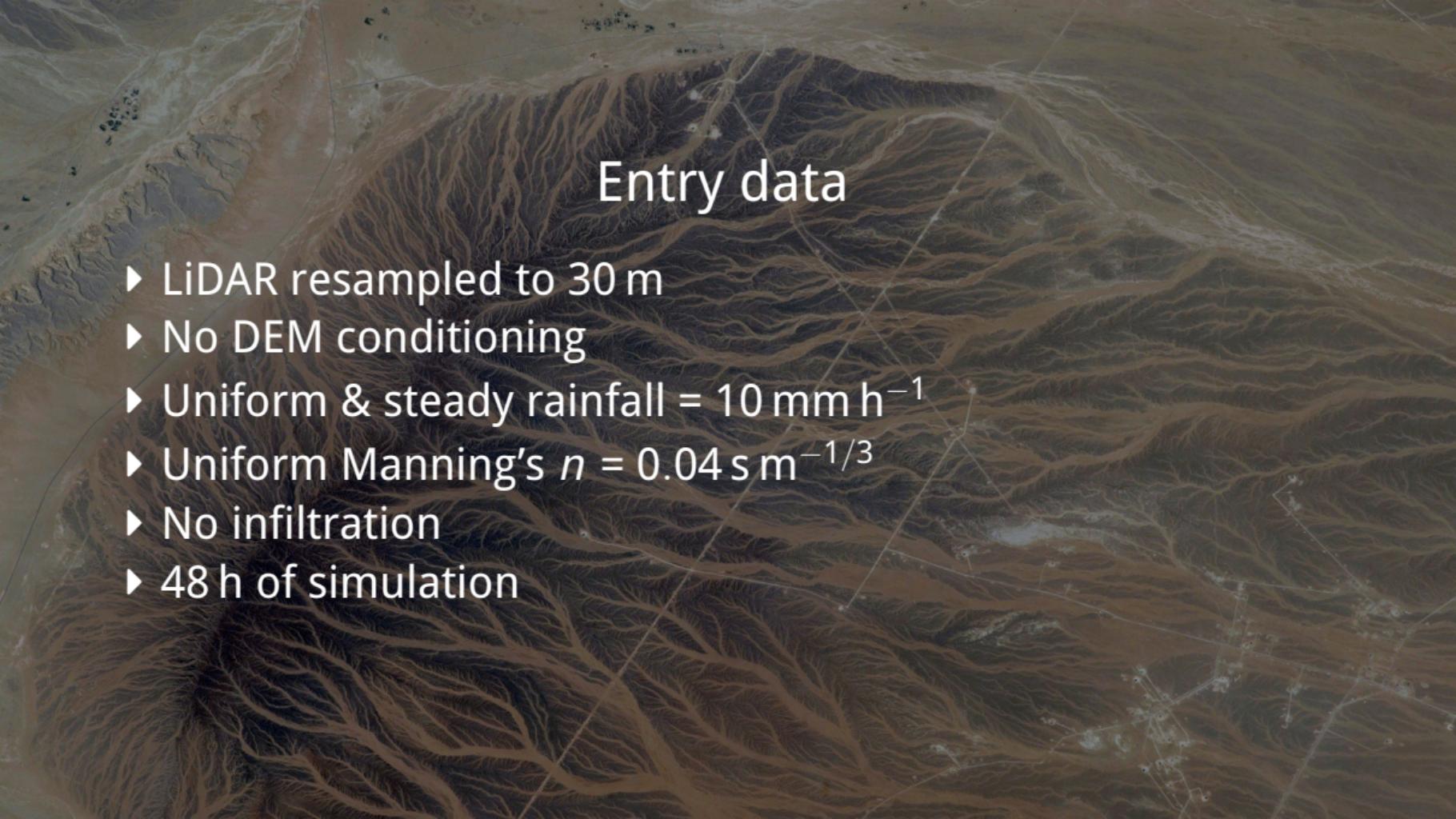
# Computer model

itzī

(Courty et al., 2017)

- ▶ Raster-based
- ▶ Partial inertia
- ▶ Gis-integrated
- ▶ Open source

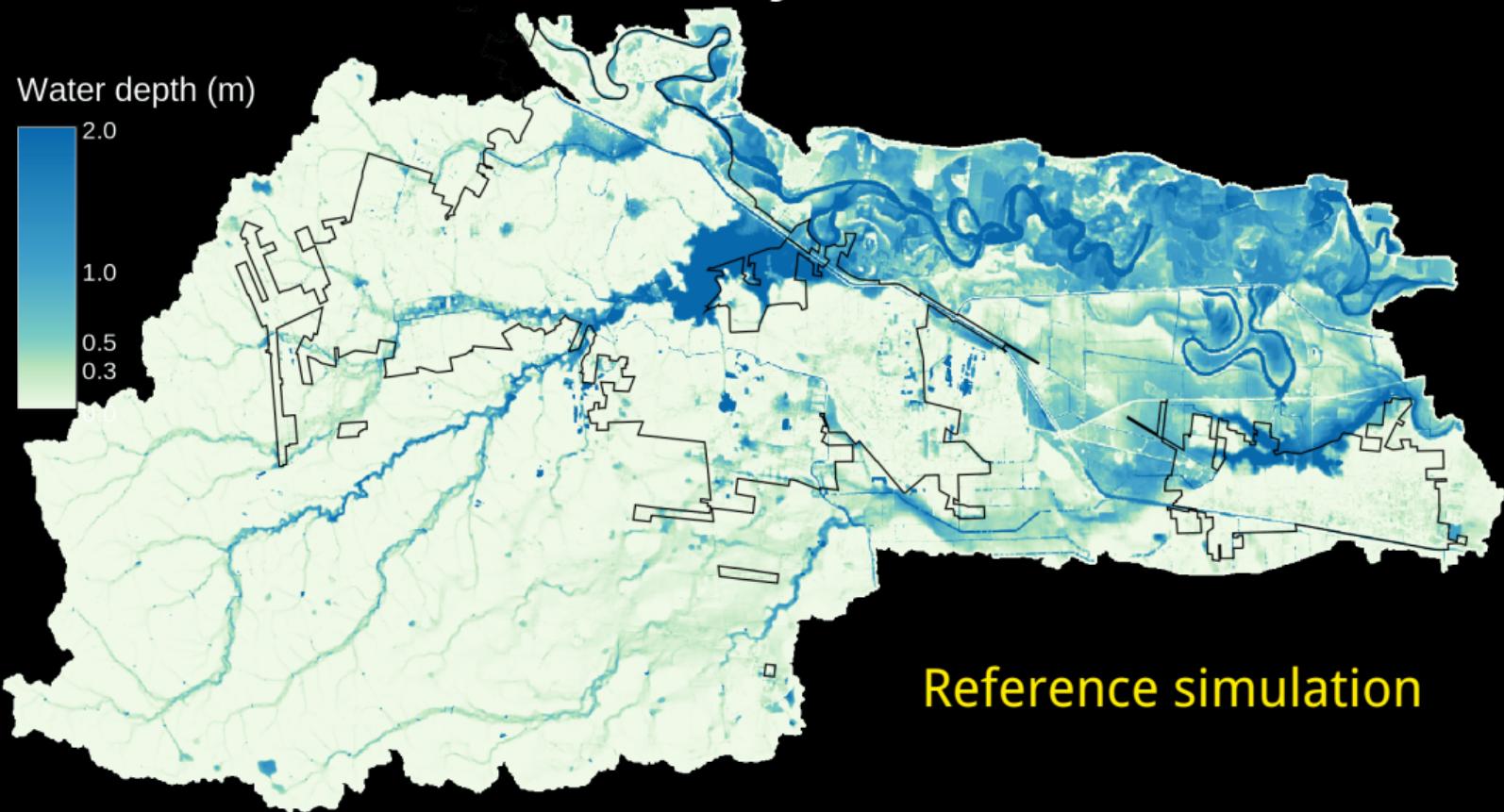
[www.itzi.org](http://www.itzi.org)



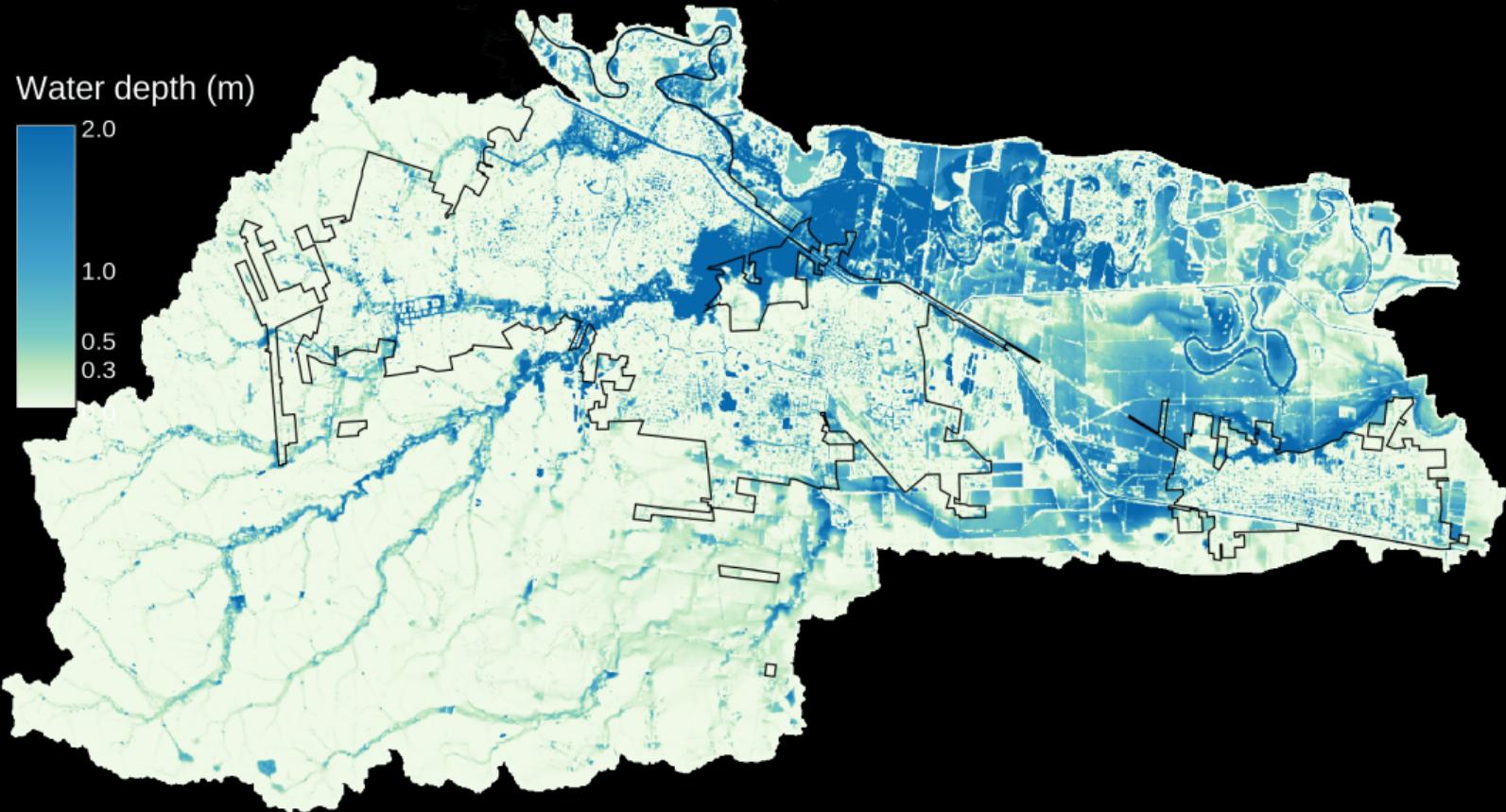
## Entry data

- ▶ LiDAR resampled to 30 m
- ▶ No DEM conditioning
- ▶ Uniform & steady rainfall =  $10 \text{ mm h}^{-1}$
- ▶ Uniform Manning's  $n = 0.04 \text{ sm}^{-1/3}$
- ▶ No infiltration
- ▶ 48 h of simulation

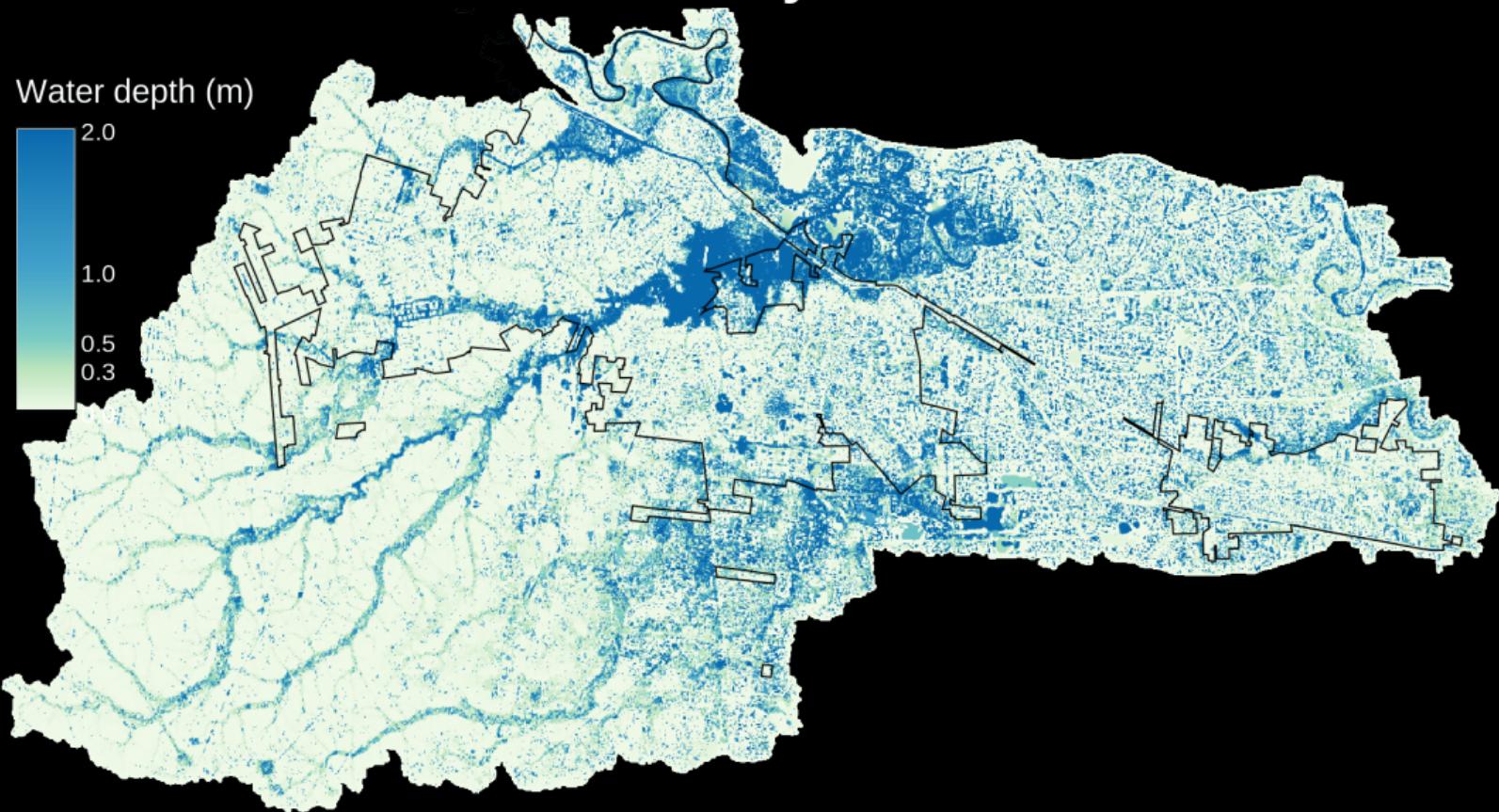
# Flat catchment (Reynosa): lidar DTM



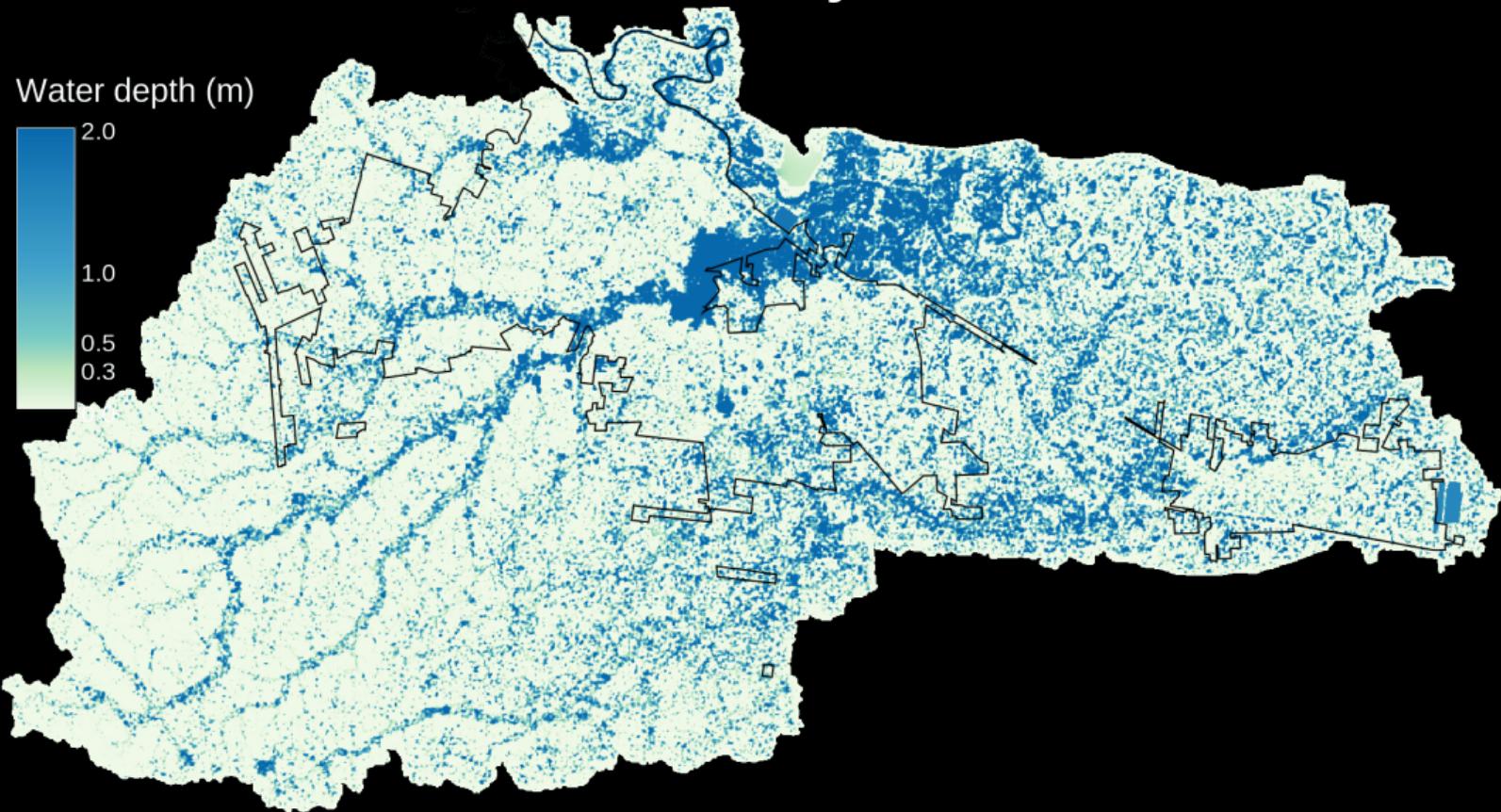
# Flat catchment (Reynosa): lidar DSM



# Flat catchment (Reynosa): AW3D30



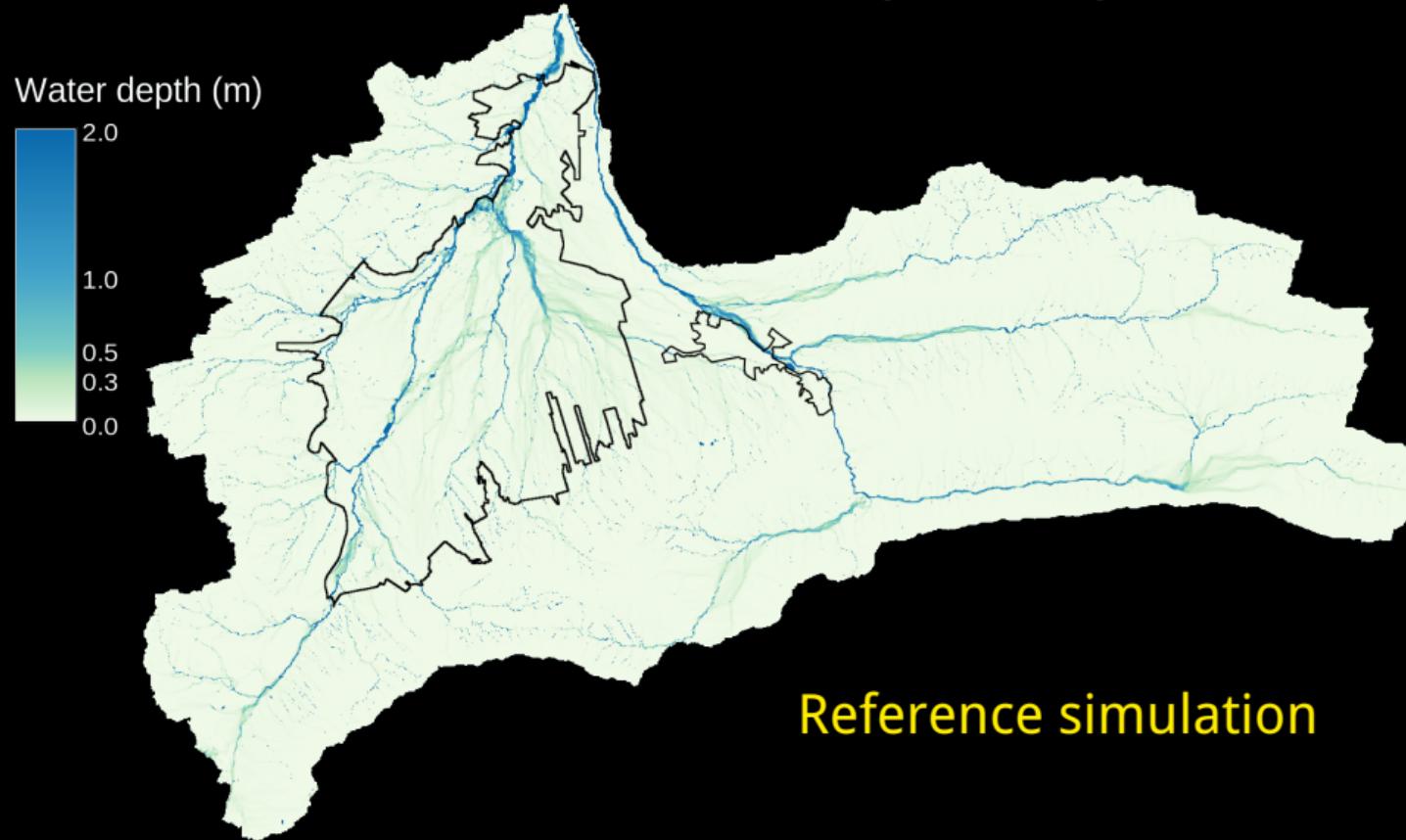
# Flat catchment (Reynosa): SRTM



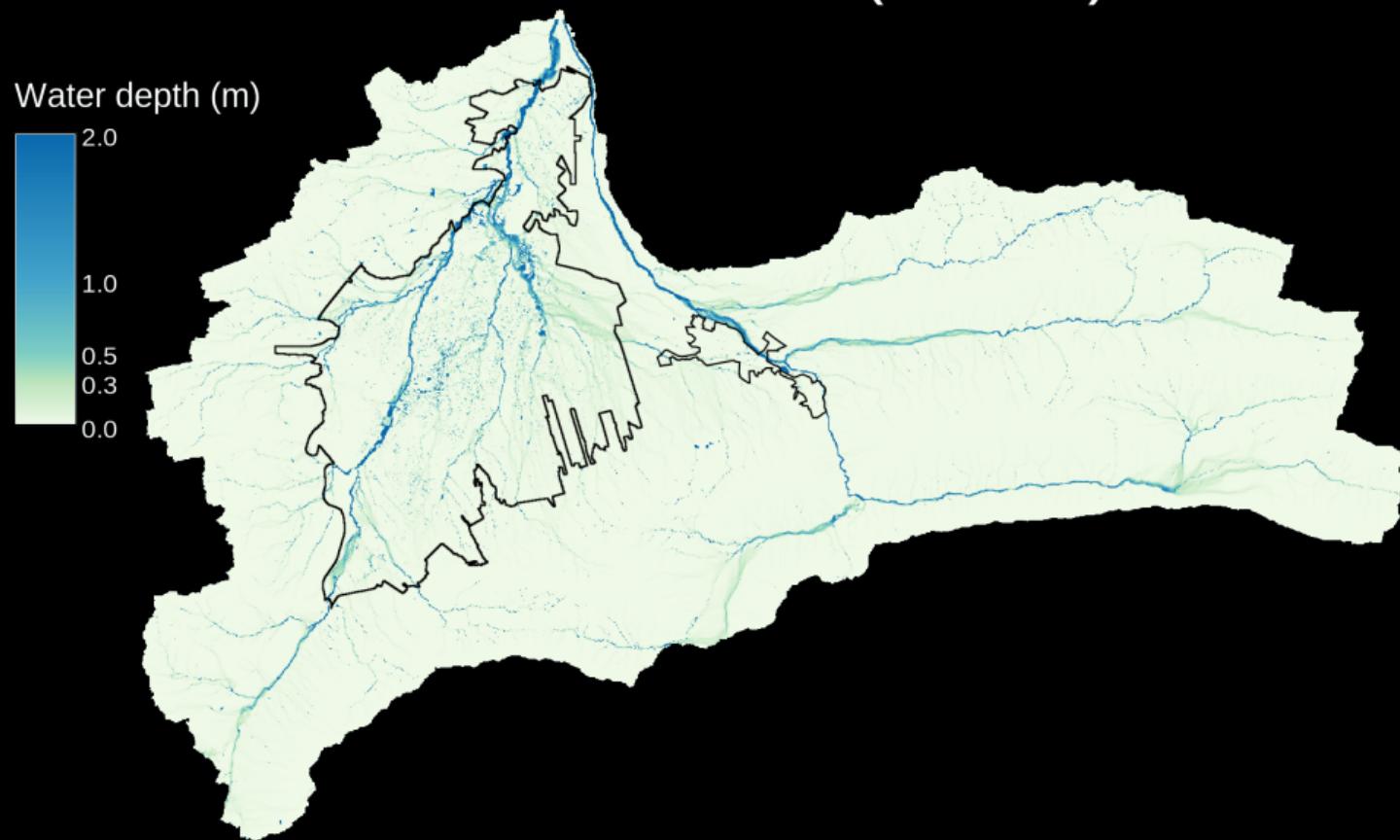
# Flat catchment (Reynosa): ASTER



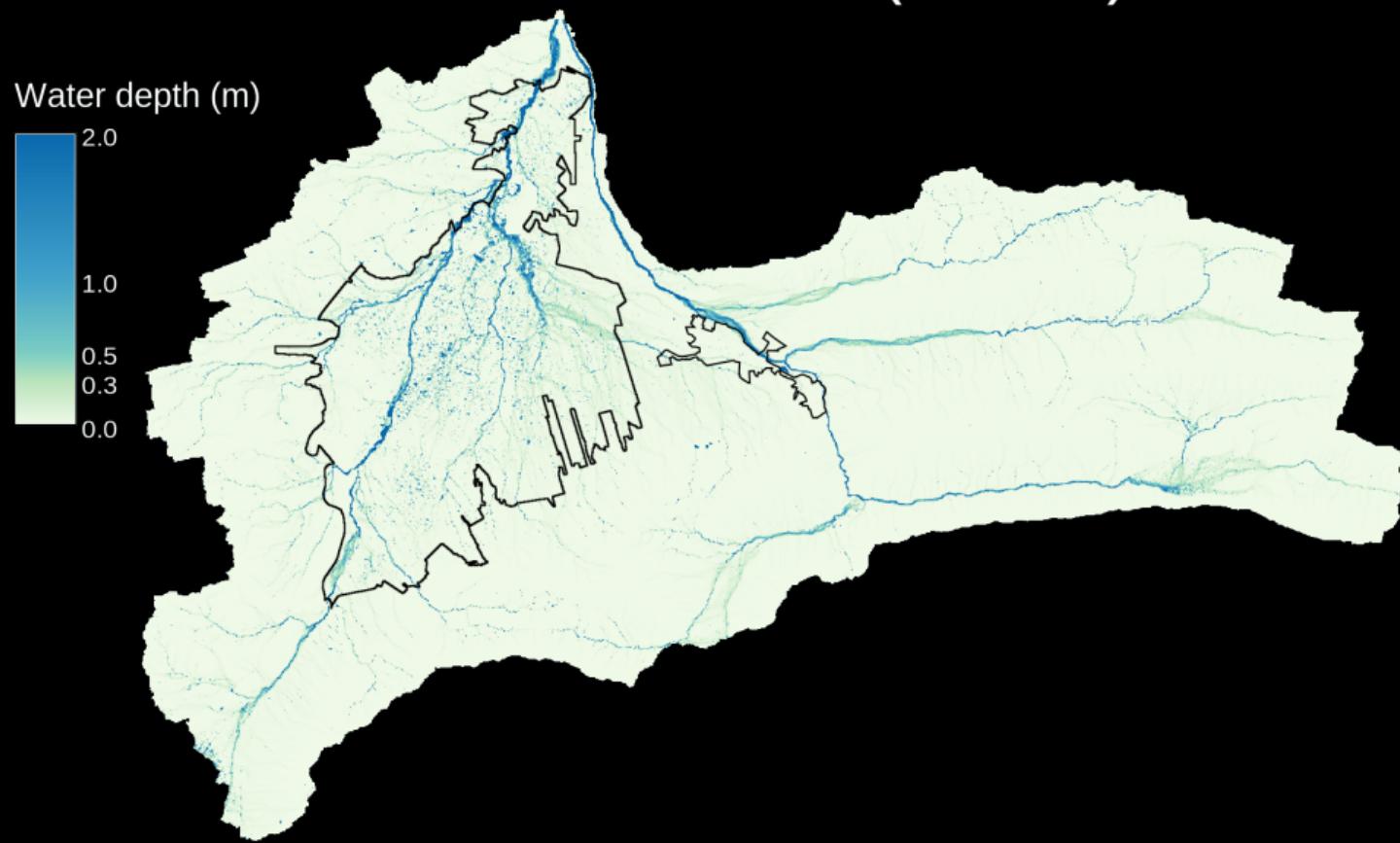
# Mountainous catchment (Saltillo): lidar DTM



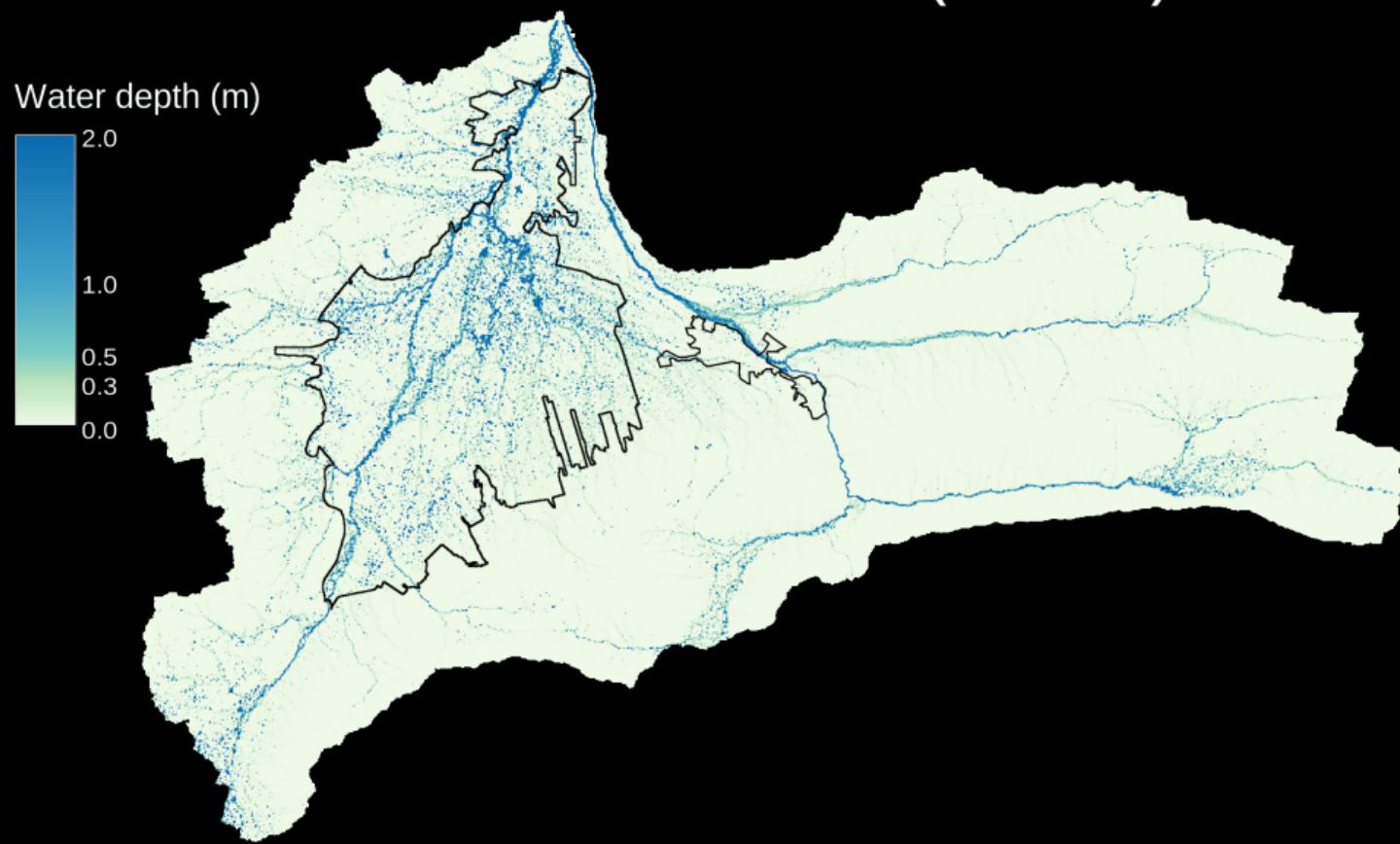
# Mountainous catchment (Saltillo): lidar DSM



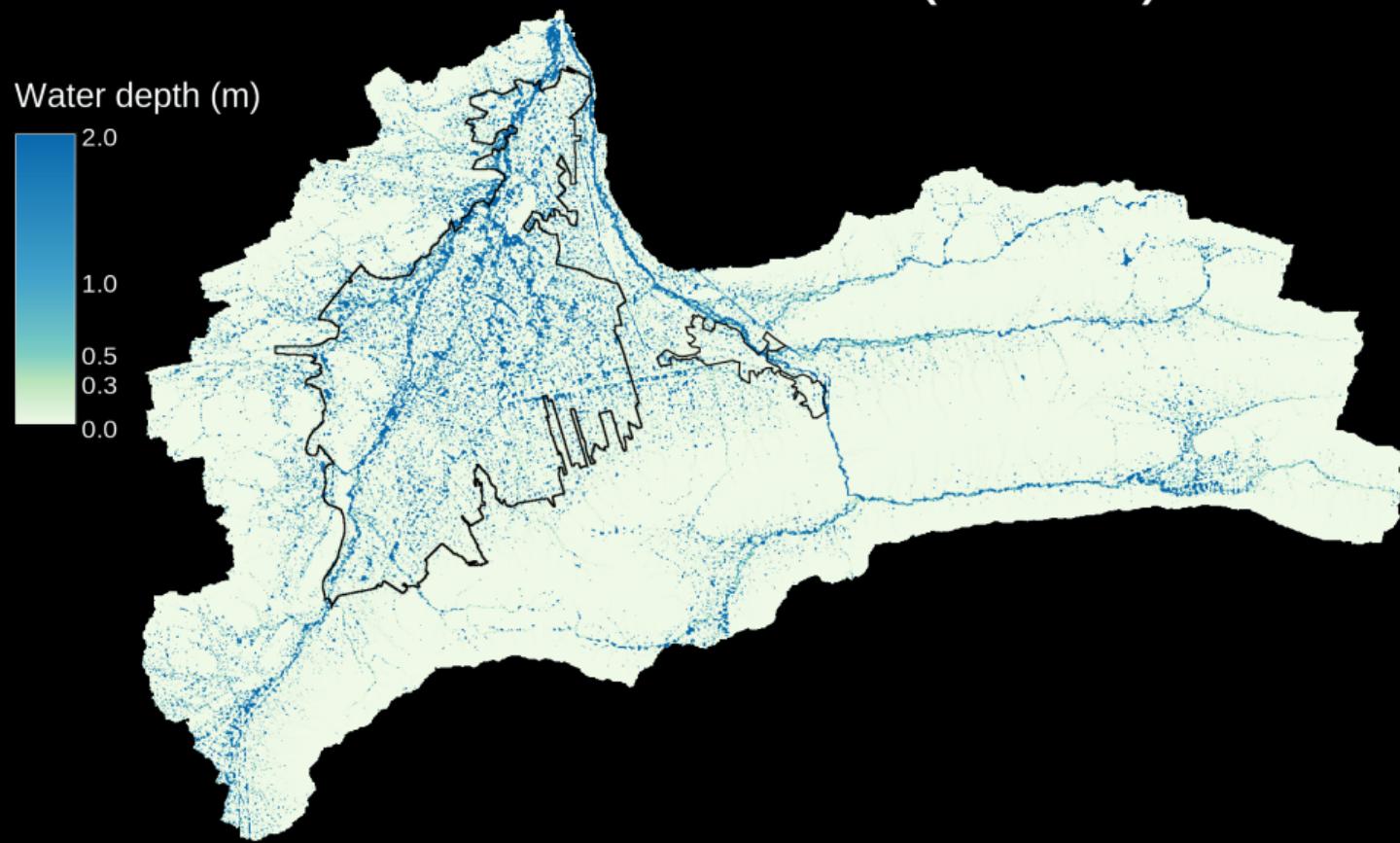
# Mountainous catchment (Saltillo): AW3D30



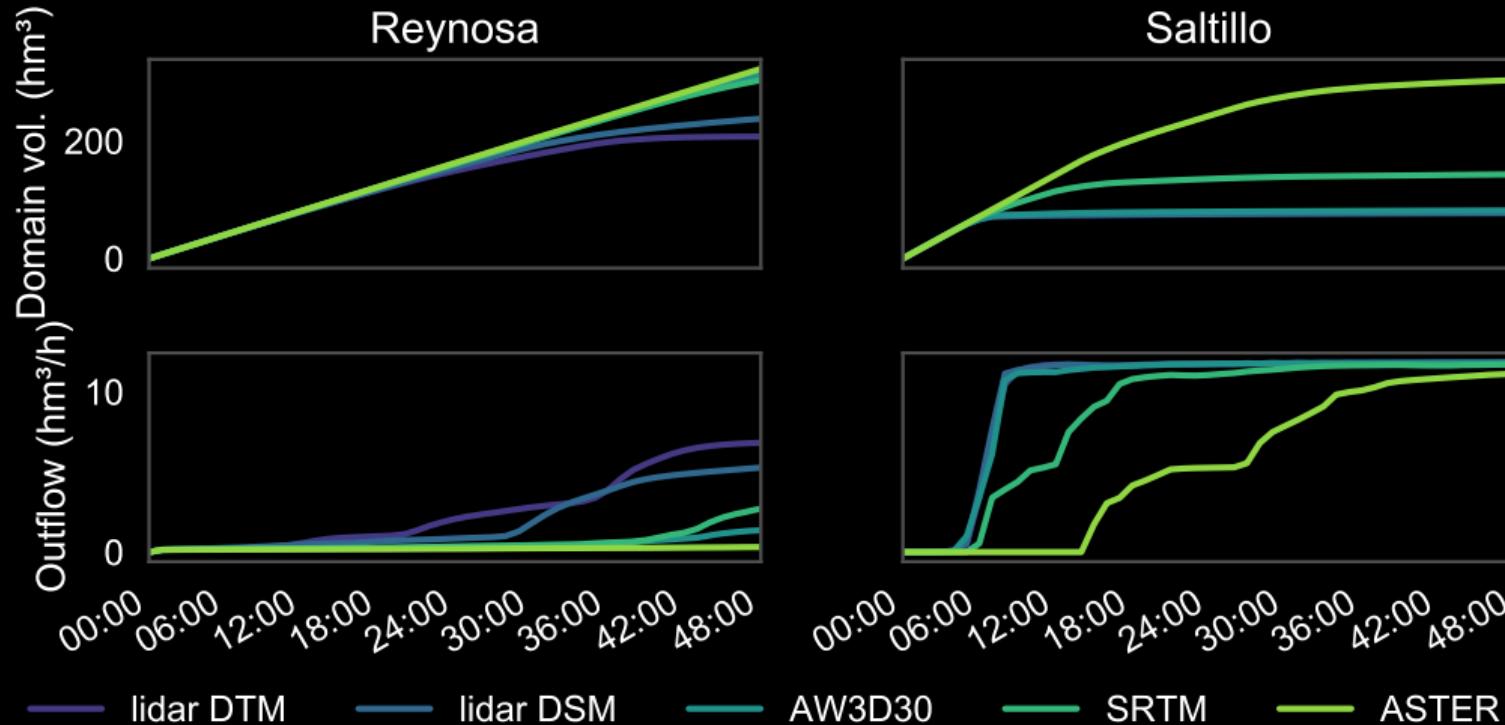
# Mountainous catchment (Saltillo): SRTM



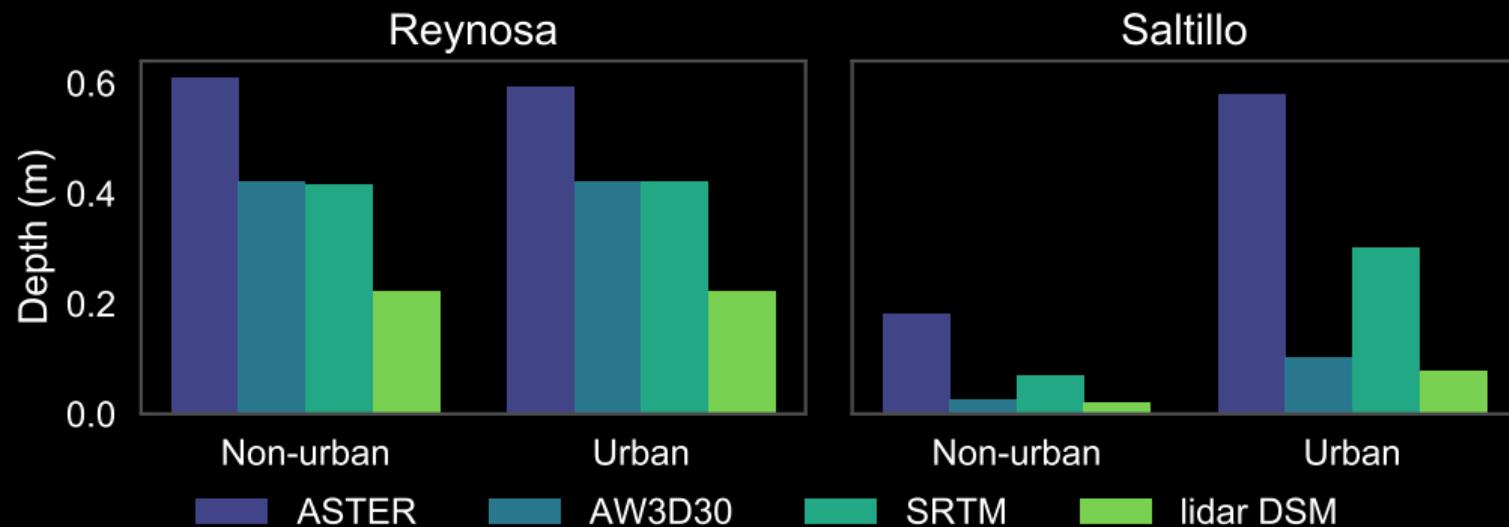
# Mountainous catchment (Saltillo): ASTER



# Evolution of the water volume in the domain



# MAE against results with lidar DTM



A high-angle aerial photograph of a desert or semi-arid region. The terrain is characterized by a dense network of dry, brown, branching riverbeds that converge towards the center of the image. Small, isolated clusters of buildings and vegetation are scattered across the landscape, particularly along the riverbeds. The overall color palette is dominated by earthy tones of brown, tan, and beige.

## Conclusions

- ▶ AW3D30 > SRTM
- ▶ Evaluation in other regions are needed
- ▶ AW3D30 might be a good base for hydraulic conditioning

# Thank you

Preprint available:



DOI: 10.5281/zenodo.885572

Article submitted to Remote Sensing of Environment



lcourty@ii.unam.mx



@LaurentCourt

Background photography by NASA on Unsplash

# Bibliography

- Courty, Laurent Guillaume, Adrián Pedrozo-Acuña, and Paul David Bates (2017). "Itzī (version 17.1): an open-source, distributed GIS model for dynamic flood simulation". In: *Geoscientific Model Development* 10.4, pp. 1835–1847. DOI: 10.5194/gmd-10-1835-2017. URL:  
<http://www.geosci-model-dev.net/10/1835/2017/>.
- Hu, Zhihua et al. (2017). "Evaluation of Recently Released Open Global Digital Elevation Models of Hubei, China". In: *Remote Sensing* 9.3, p. 262. ISSN: 2072-4292. DOI: 10.3390/rs9030262. URL:  
<http://www.mdpi.com/2072-4292/9/3/262>.
- Santillan, J. R. and M. Makinano-Santillan (2016). "Vertical Accuracy Assessment of 30-M Resolution Alos, Aster, and Srtm Global Dems Over Northeastern Mindanao, Philippines". In: *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* XLI-B4.July. ISSN: 2194-9034. DOI: 10.5194/isprsarchives-XLI-B4-149-2016.