

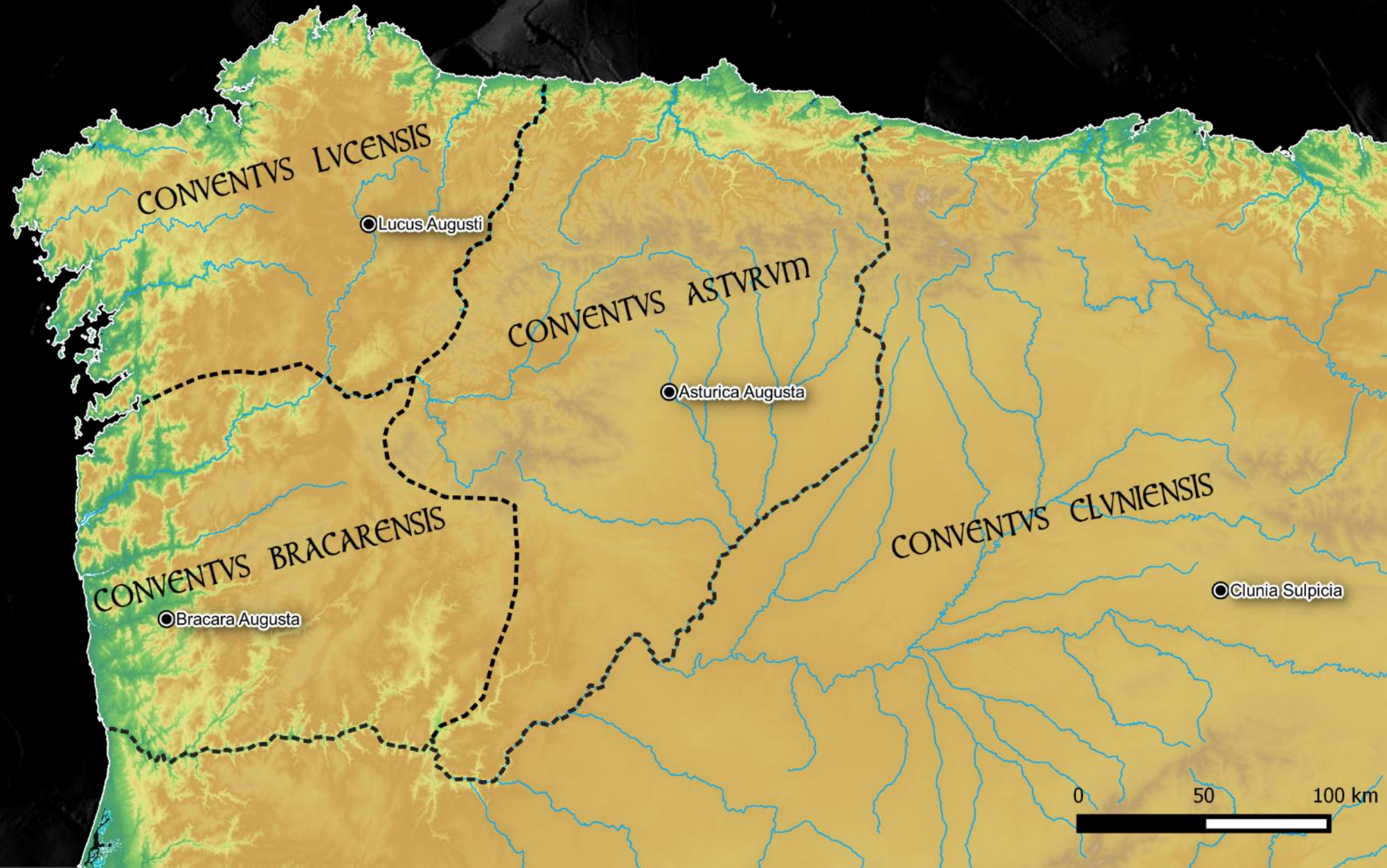


3º Encontro de Utilizadores QGIS Portugal
17-18 de Junho, 2016 - Porto

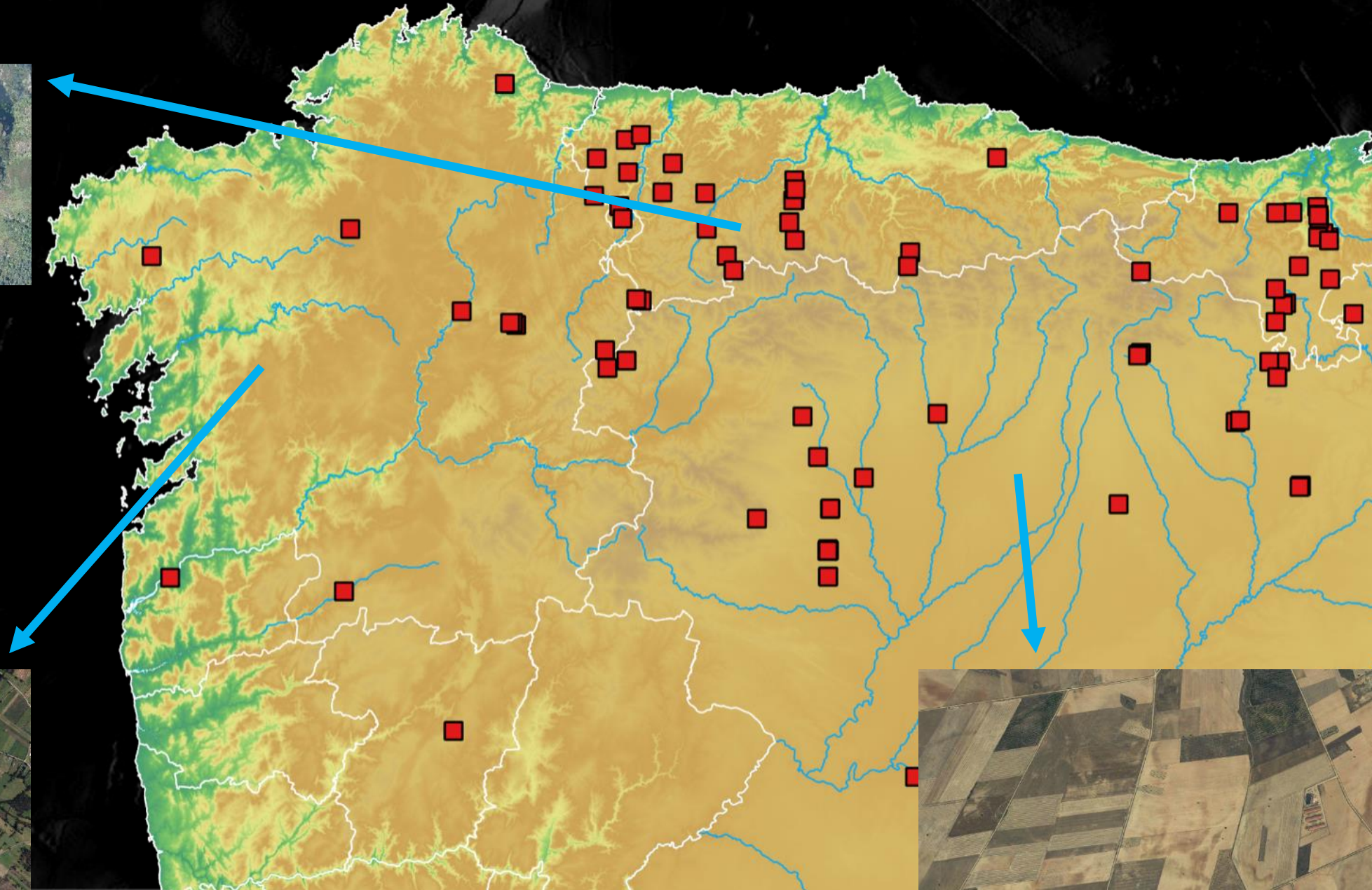
O uso combinado de LiDAR, QGIS e LAStools aplicado ao estudo de paisagens arqueológicas

João Fonte
Luis Gonçalves Seco

Geographical setting



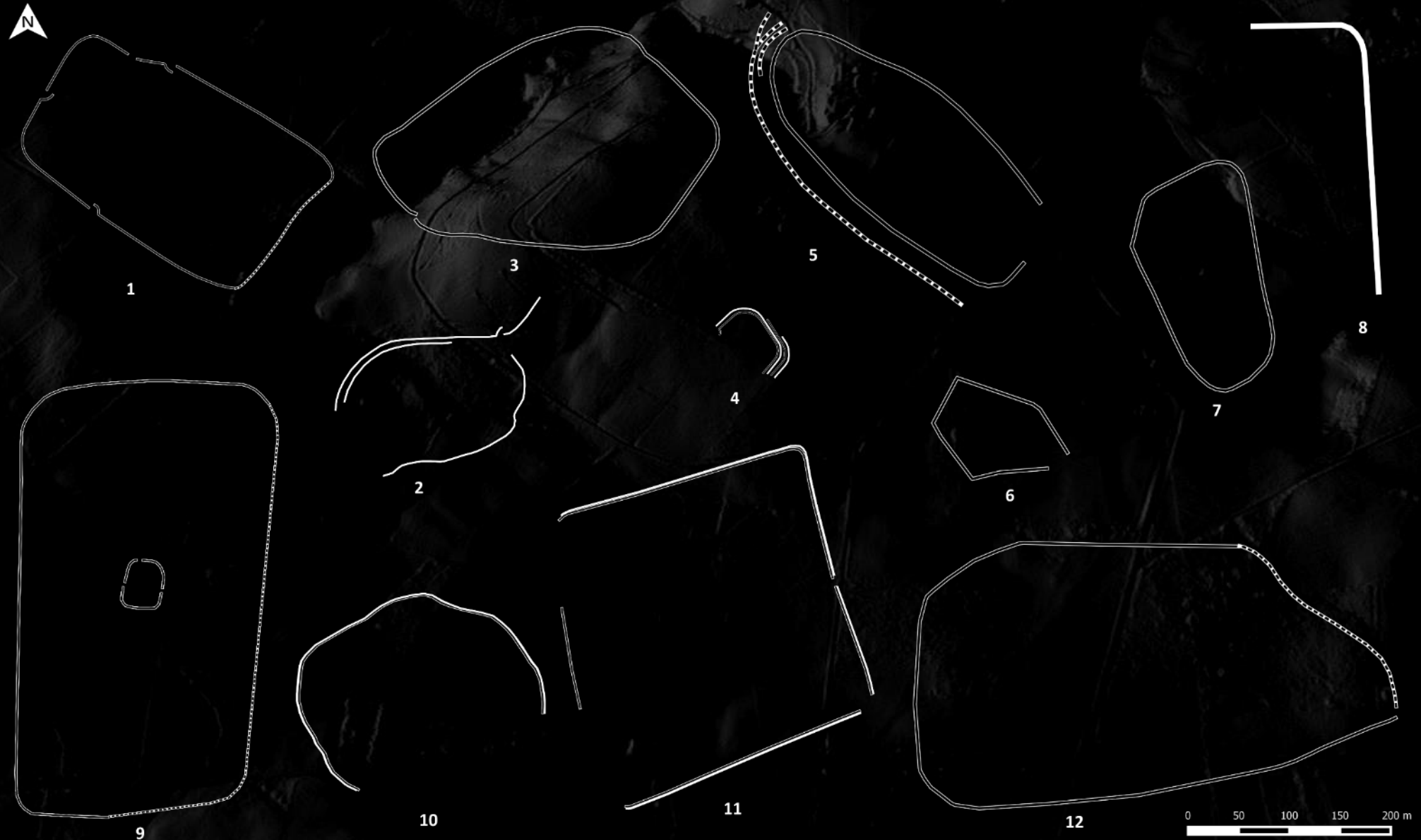
Heterogeneous landscape



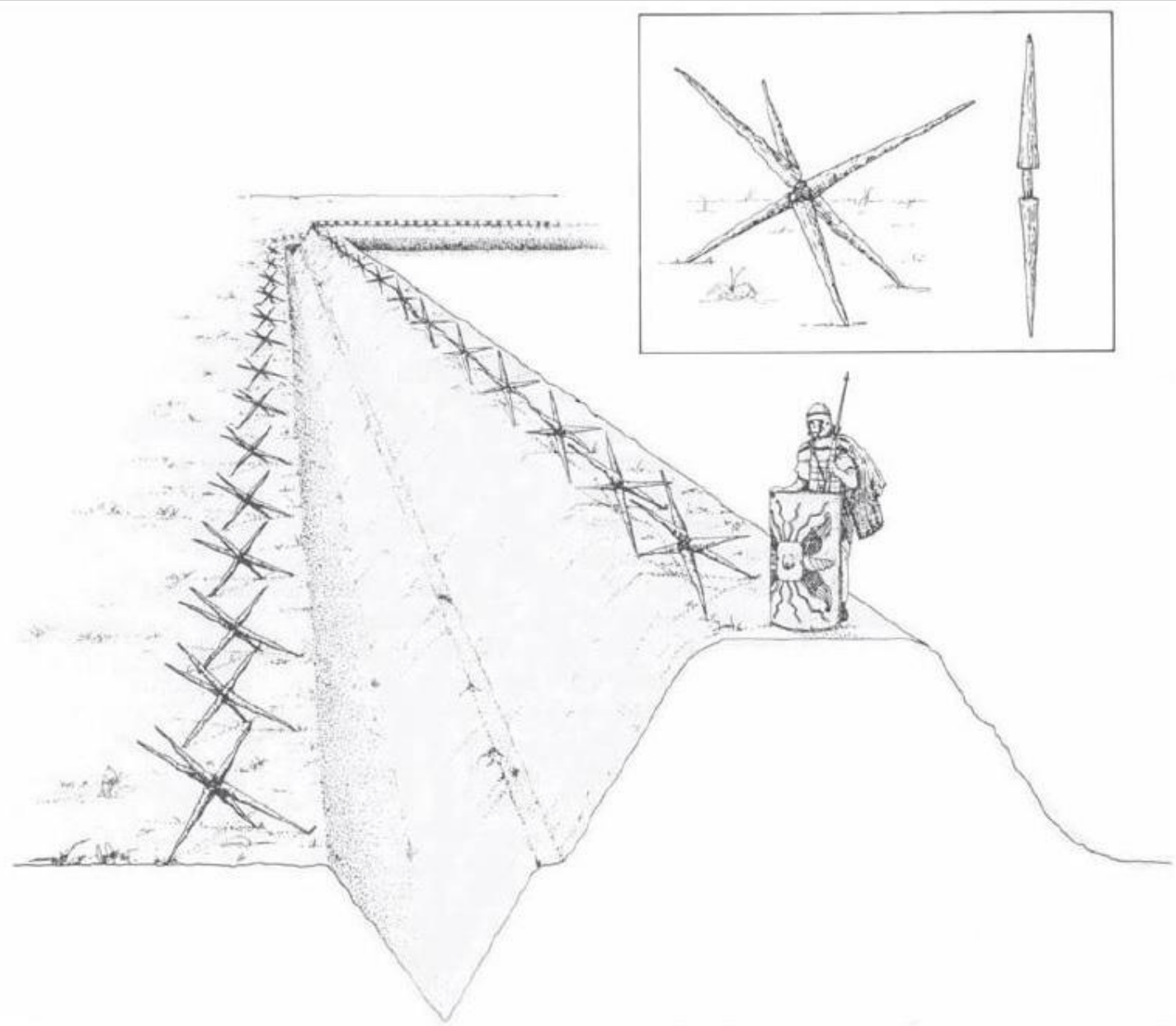
What are we searching for?



What are we searching for?



What are we searching for?

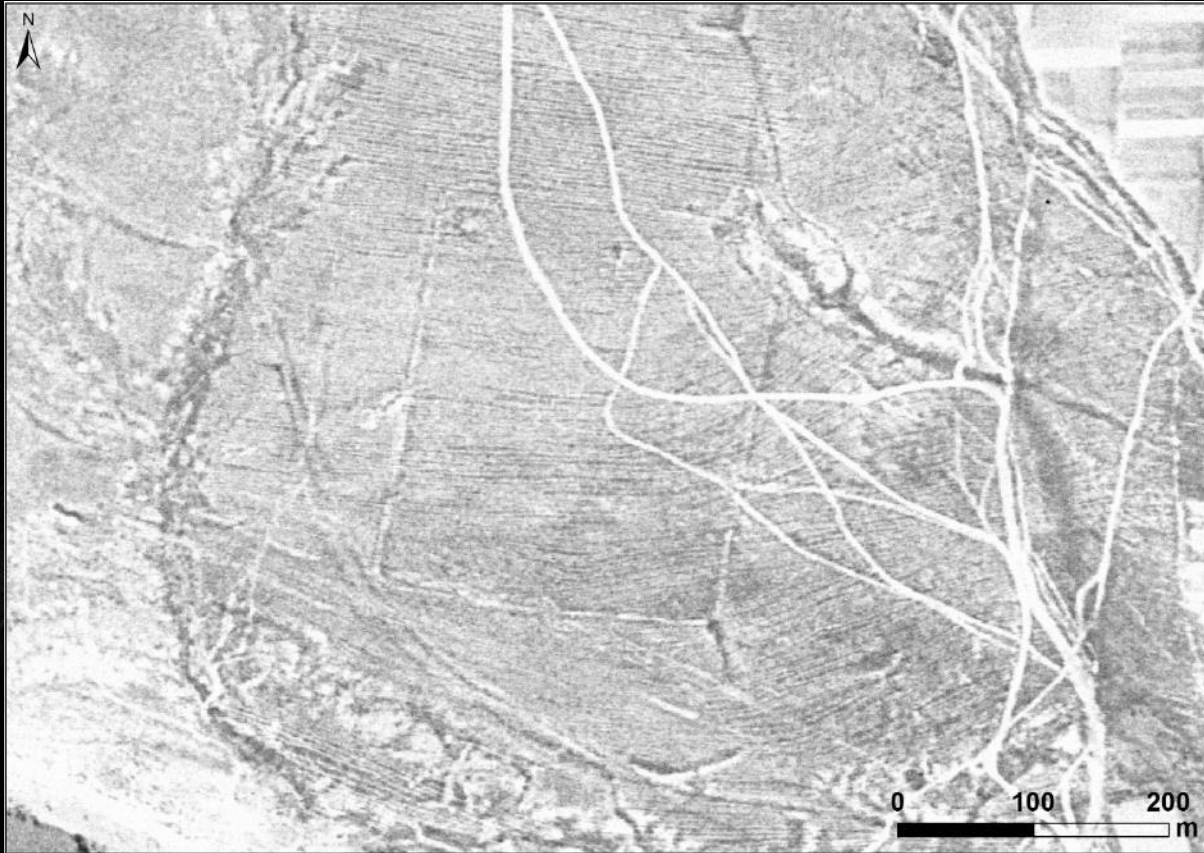


GILLIVER, C.M. 1993. "Hedgehogs, caltrops and palisade stakes", *Journal of Roman Military Equipment Studies*, 4 (p.52).

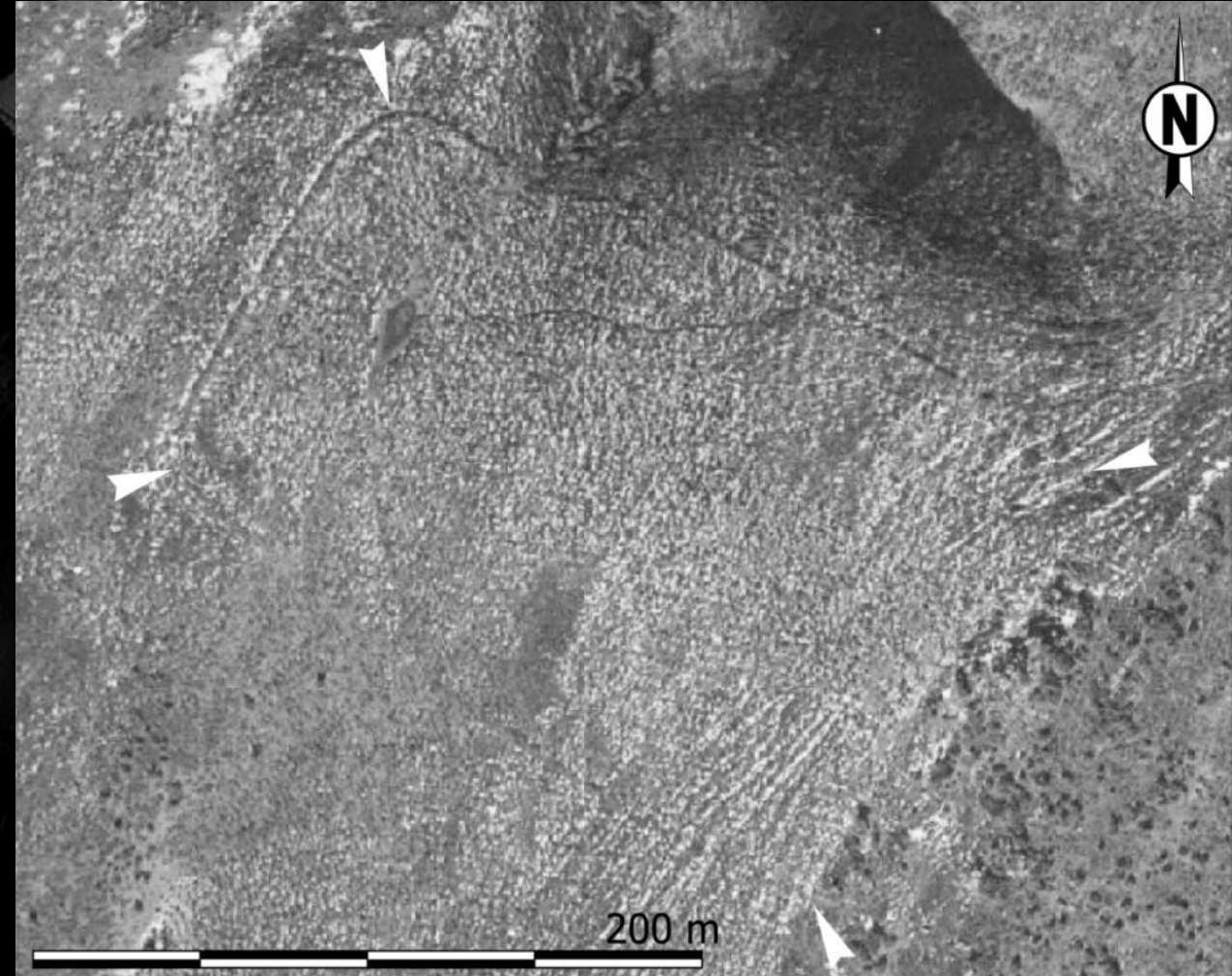
Remote Sensing

Searching for a cost-effective methodology

Historical aerial photos



Valdemedina (USAF-1957)



El Chao de Carrubeiro (Voo Interministerial, 1984)

Spain: Open data (<http://fototeca.cnig.es/>)
Portugal: Need to be purchase (<https://www.igeoe.pt/>)

Aerial photos and satellite imagery



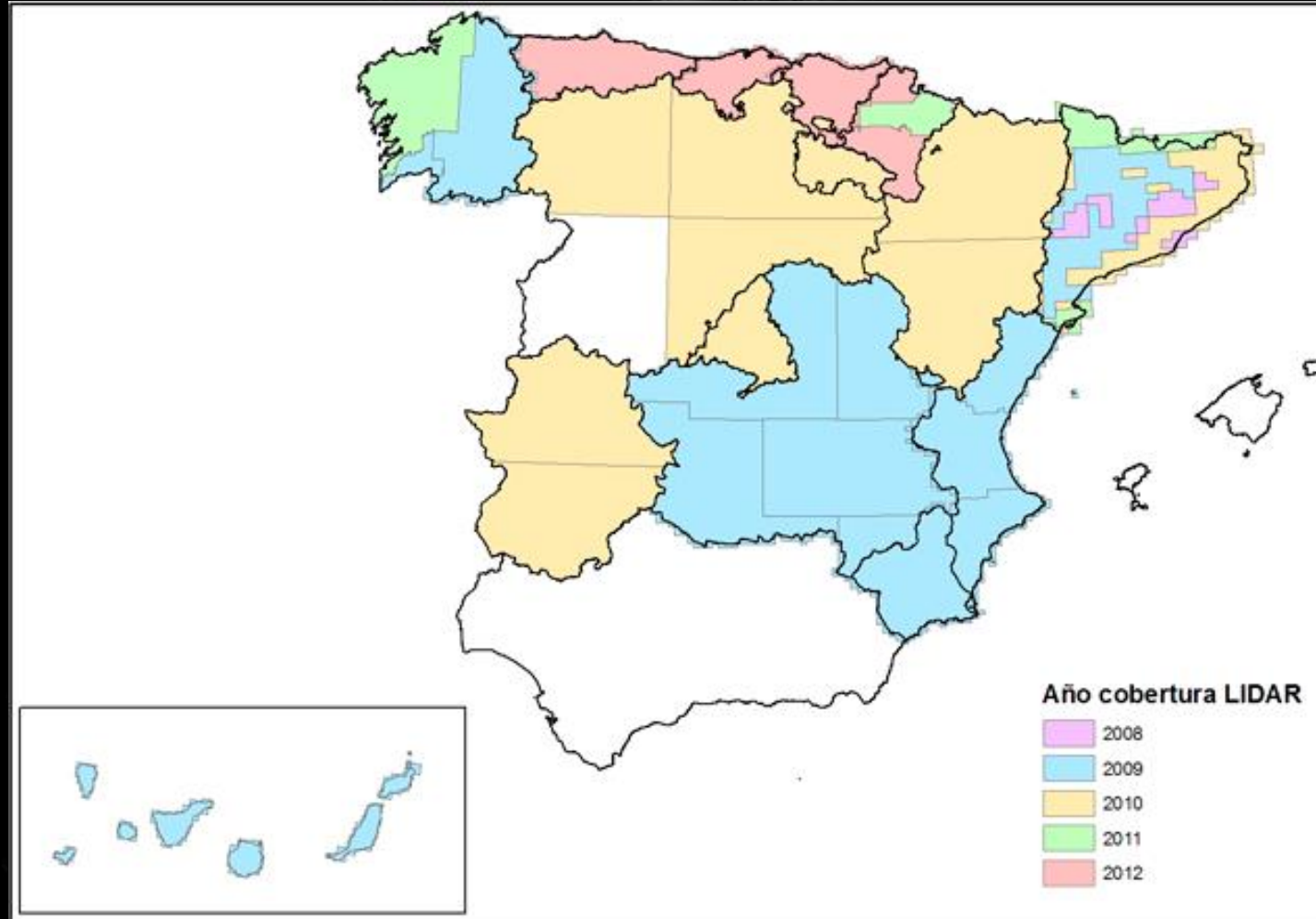
Granda das Xarras (PNOA 2004)



Castrocalbón (PNOA 2008)

Spain: Open data (<http://pnoa.ign.es/>)
Portugal: Open data (<https://www.igeo.pt/>)
and Google Earth, ArcGISEarth...

LiDAR data availability



LiDAR data download

Bienvenido | Welcome | Bienvenue



GOBIERNO DE ESPAÑA



MINISTERIO DE FOMENTO



INSTITUTO GEOGRÁFICO NACIONAL

Centro de Descargas

Centro Nacional de Información Geográfica

📁 N° Archivos: 0

[Presentación](#) | [Catálogo de productos](#) | [Búsqueda en visor](#) | [Búsqueda avanzada](#) | [Equipamiento Geográfico de Referencia Nacional](#) | [Ayuda](#)

Centro de Descargas / Búsqueda en visor



Posicionar en mapa

Localización por Nombre

Localización Avanzada

Seleccionar producto a descargar

Listado de Productos del área mostrada en el visor

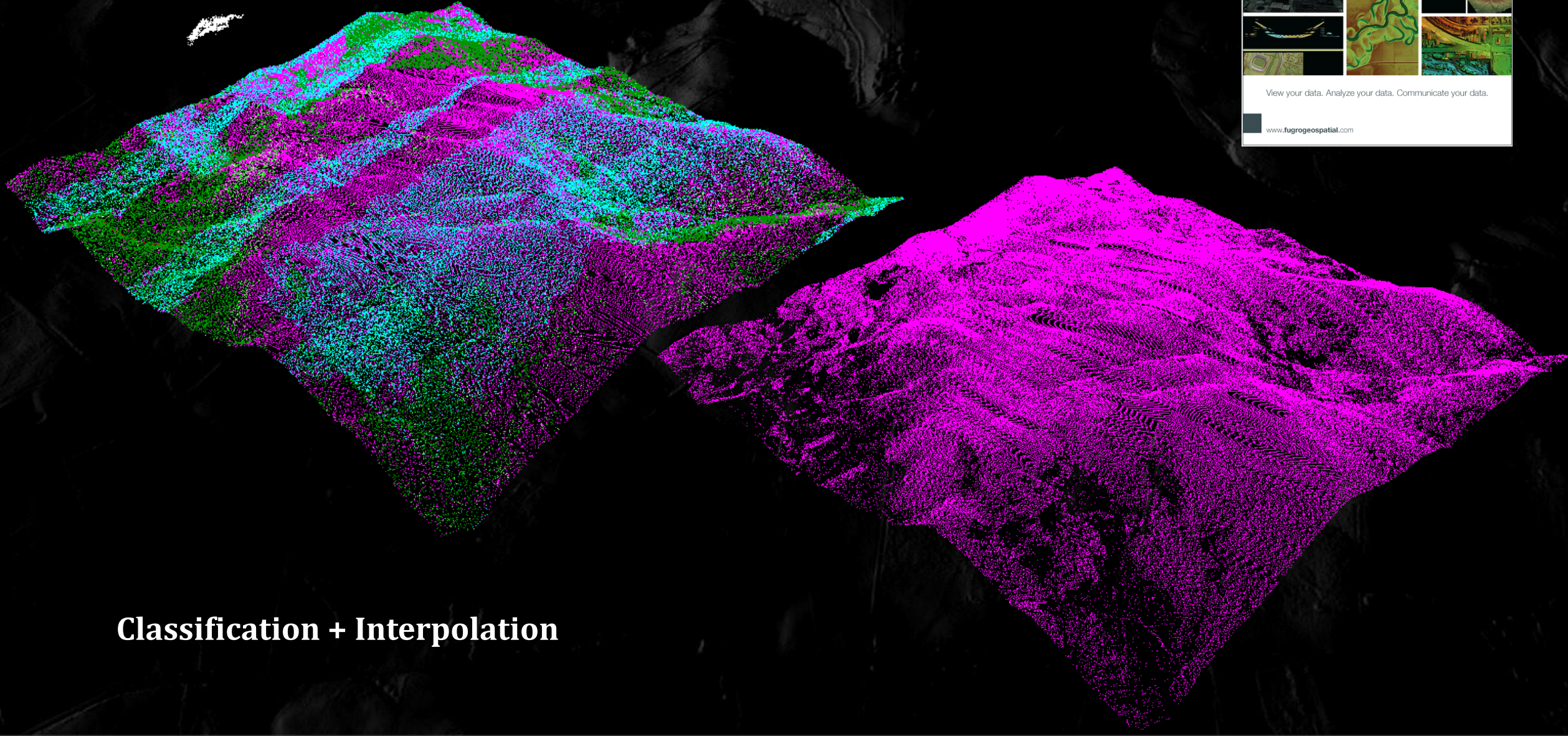
Se listarán los productos incluidos total o parcialmente en el área mostrada actualmente en el visor.

Filtrar por productos:

LIDAR (.laz 2x2 km)

<http://centrodedescargas.cnig.es/CentroDescargas>

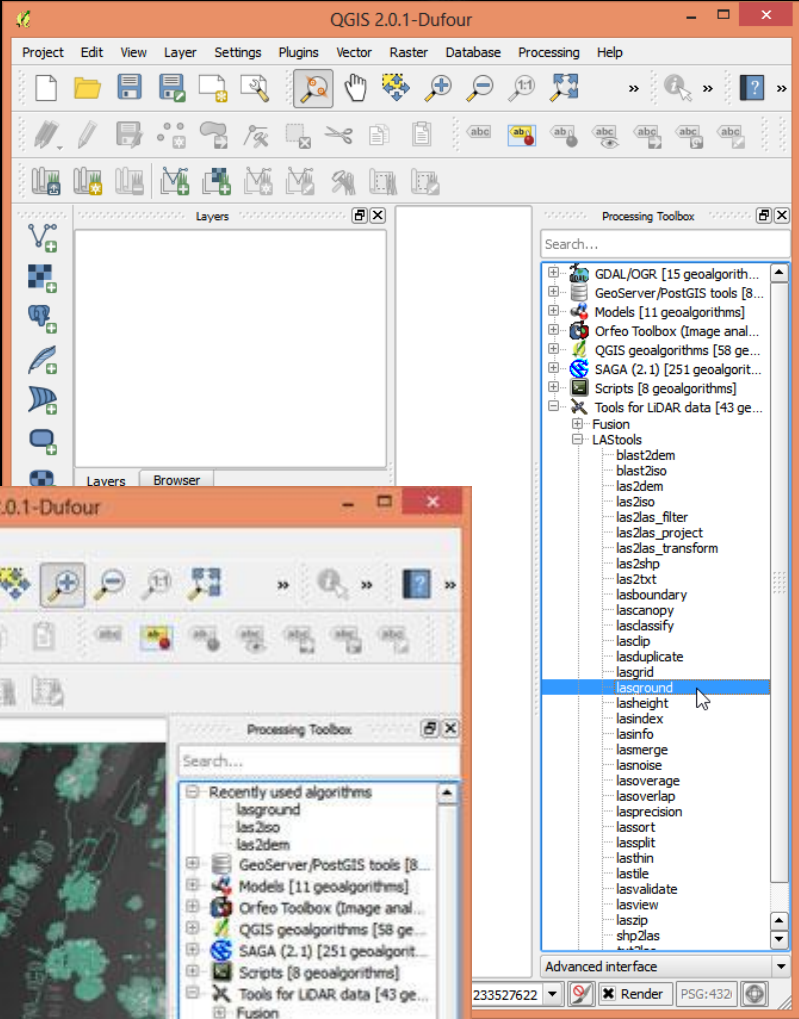
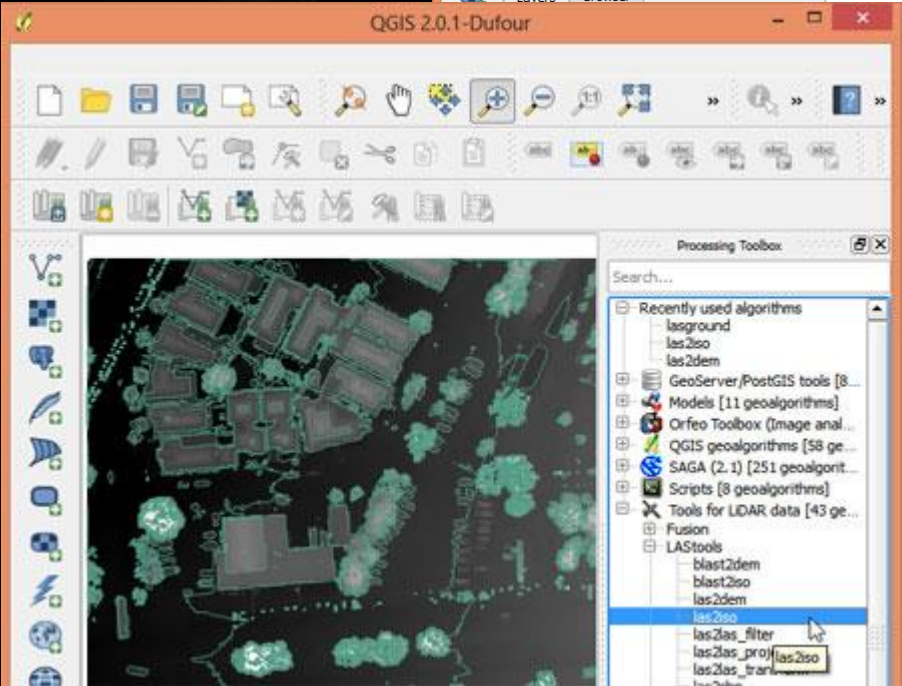
LiDAR data workflow



Classification + Interpolation



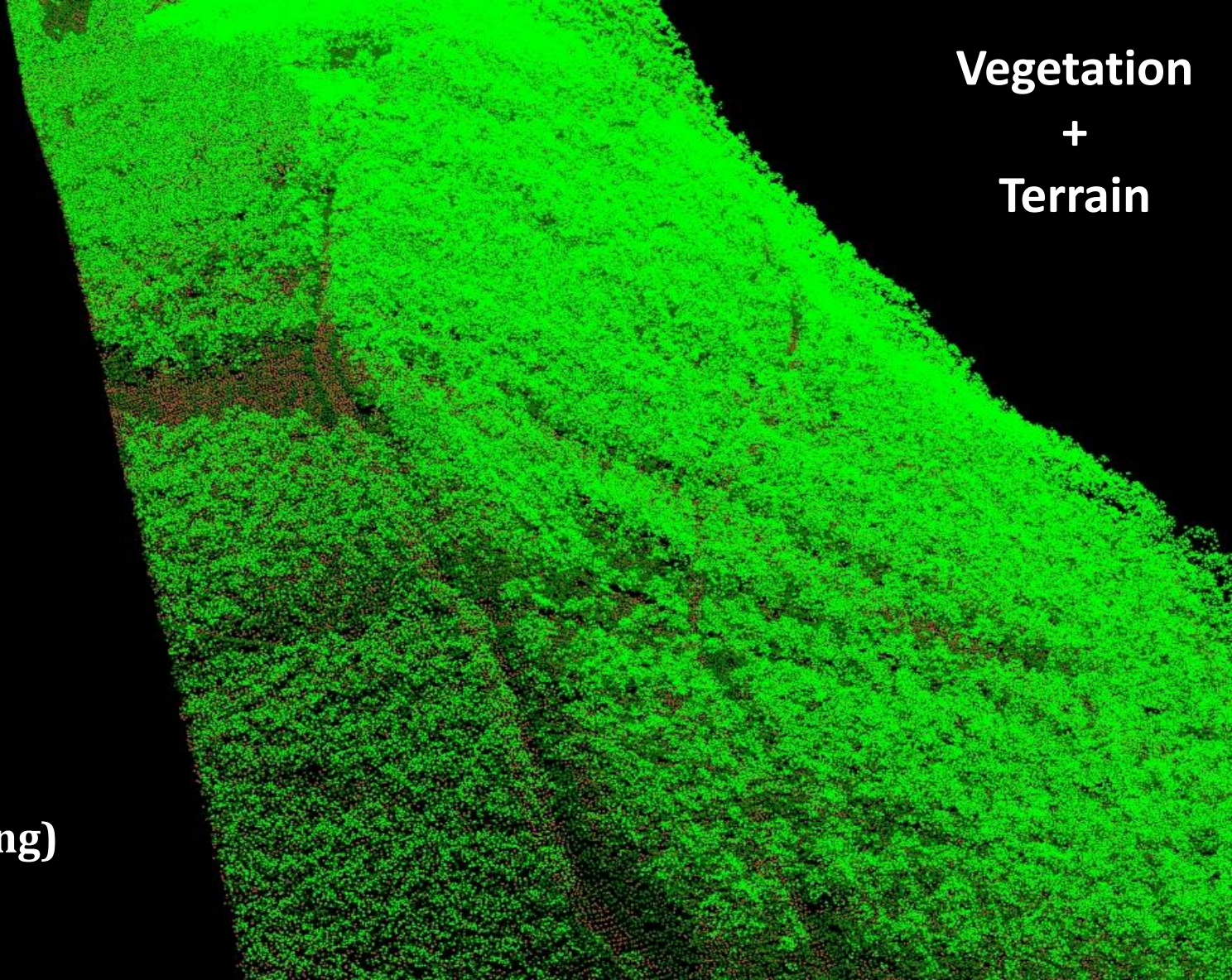
LiDAR data workflow



LiDAR data workflow

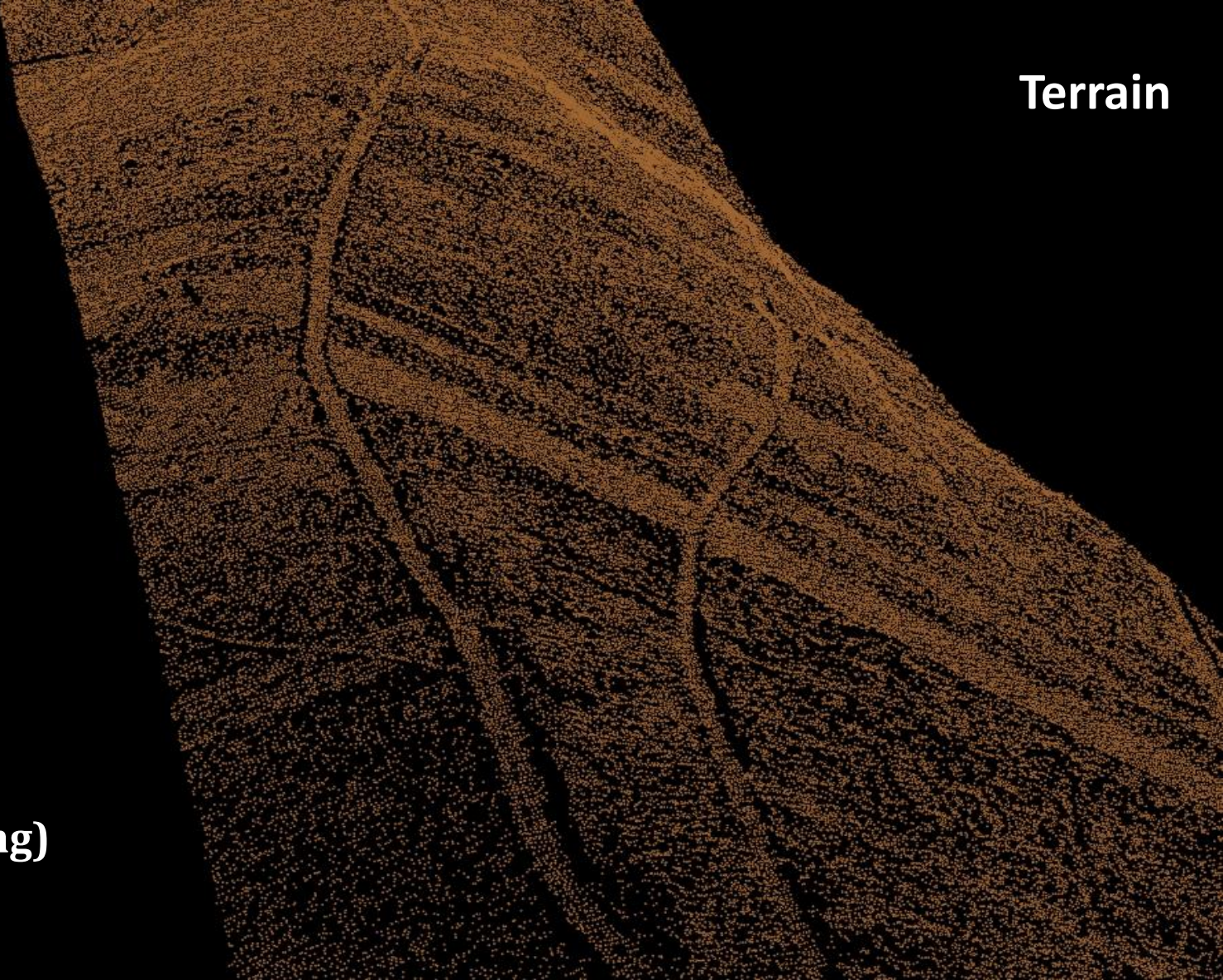
**Vegetation
+
Terrain**

Classification (Filtering)



LiDAR data workflow

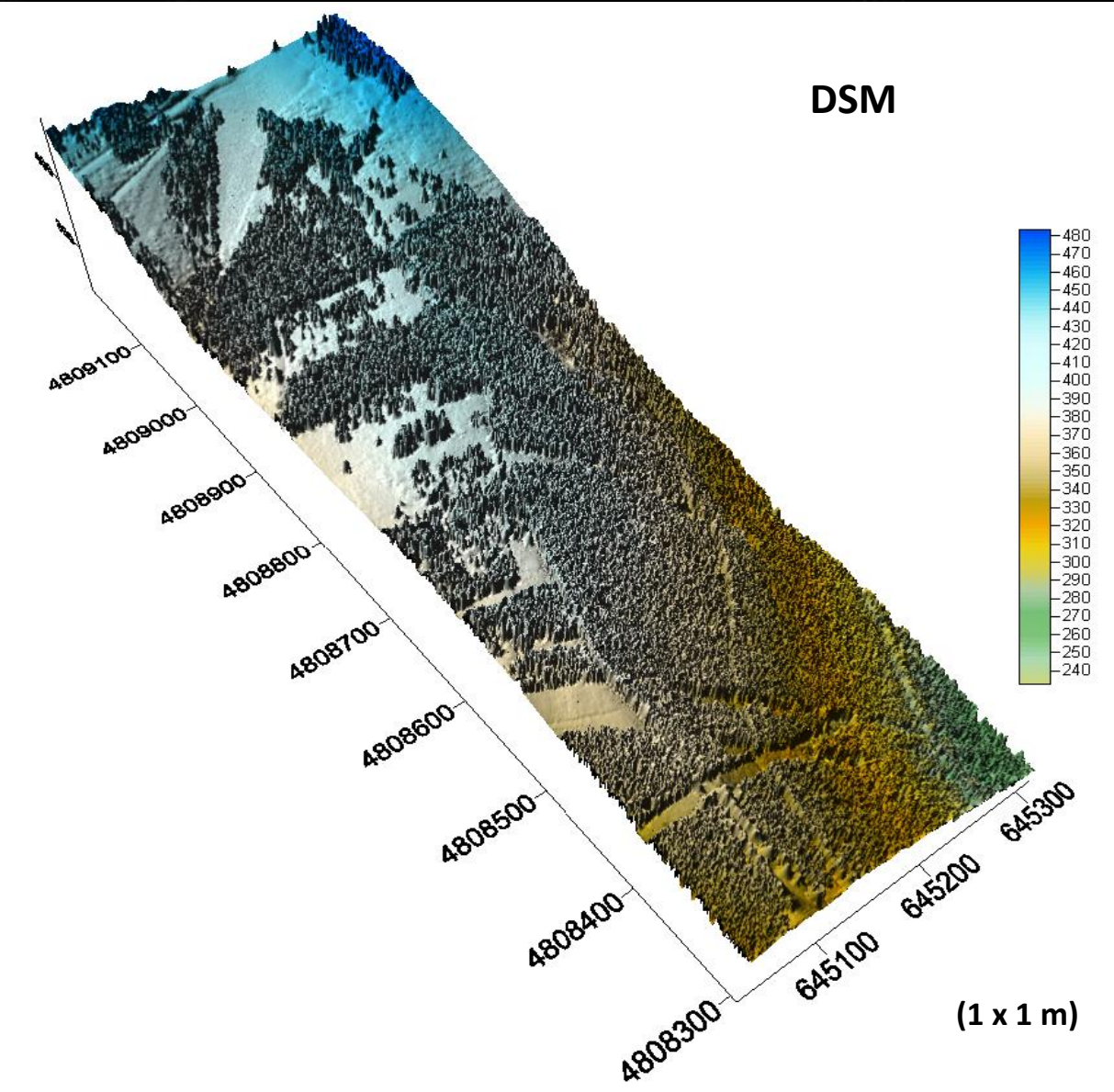
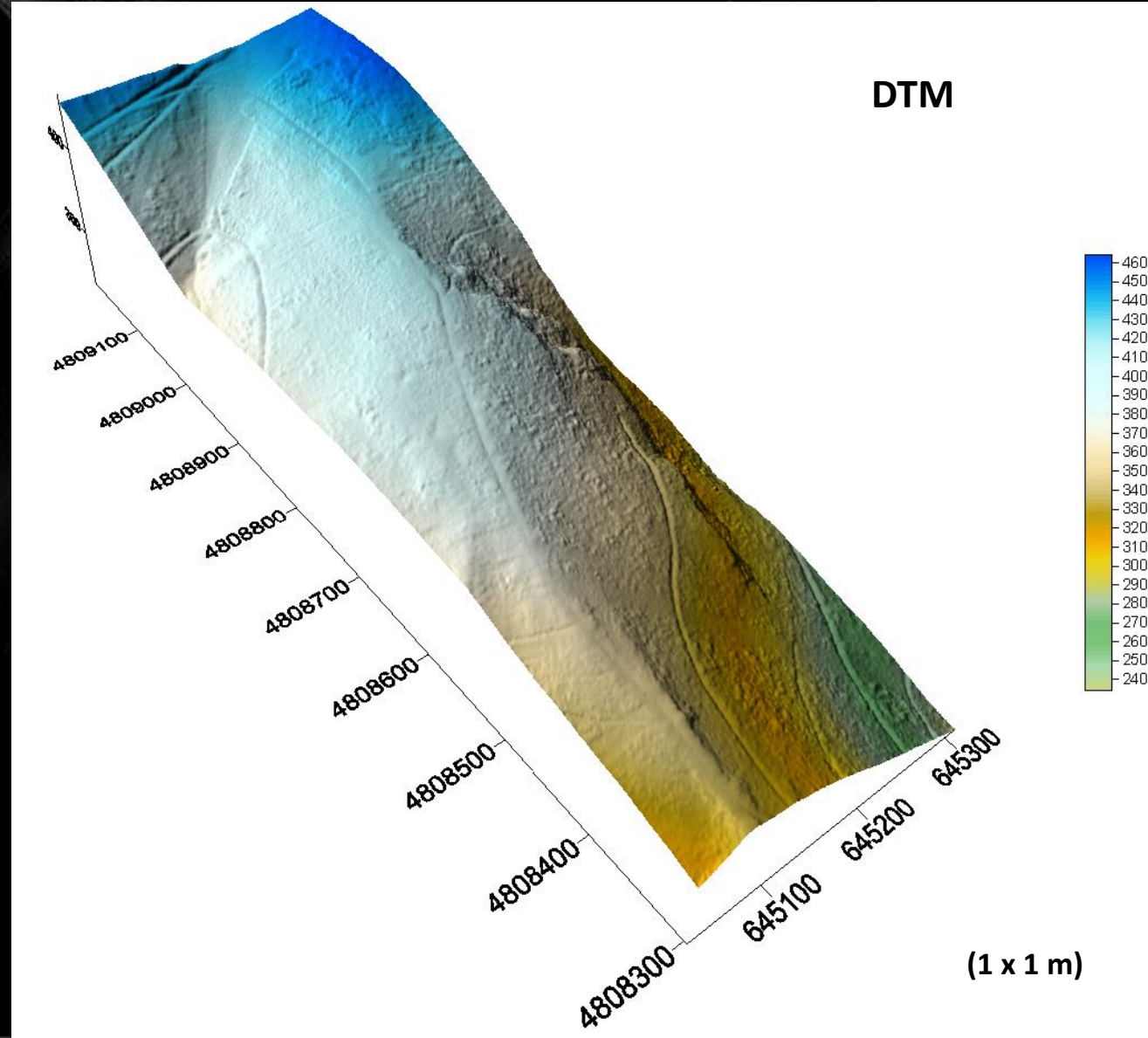
Terrain



Classification (Filtering)

LiDAR data workflow

Interpolation



LiDAR data workflow

Relief Visualization Toolbox, ver. 1.1; (c) ZRC SAZU, 2014

List of currently selected input files:

About

Add file(s) to input list:

Add file(s)

Remove all files

Visualizations

Converter

Mosaic

Vertical exaggeration factor (used in all methods) (min=-10., max=10.):

1.0

Select visualization method(s) and corresponding parameter(s):

☒ Analytical hillshading

Sun azimuth [deg.]:

315

Sun elevation angle [deg.]:

35

☐ Hillshading from multiple directions

Number of directions:

16

Sun elevation angle [deg.]:

35

☐ PCA of hillshading

Number of components to save:

3

Set other parameters in the box above.

☐ Slope gradient

No parameters required.

☐ Simple local relief model

Radius for trend assessment [pixels]:

20

☒ Sky-View Factor

Number of search directions:

16

☐ Remove noise

Search radius [pixels]:

10

level of noise removal:

low

☐ Anisotropic Sky-View Factor

Level of anisotropy:

low

Main direction of anisotropy [deg.]:

315

Select all

Select none

Start

Cancel

A color-coded LiDAR visualization of a terrain. The colors represent elevation and slope, with a gradient from blue (low) to red (high). The terrain shows a mix of flat and sloped areas.

A grayscale LiDAR visualization of a terrain. A prominent rectangular feature is visible in the center, possibly a building or a cleared area. The surrounding terrain is relatively flat.

A color-coded LiDAR visualization of a terrain. A prominent rectangular feature is visible in the center, possibly a building or a cleared area. The surrounding terrain is relatively flat.

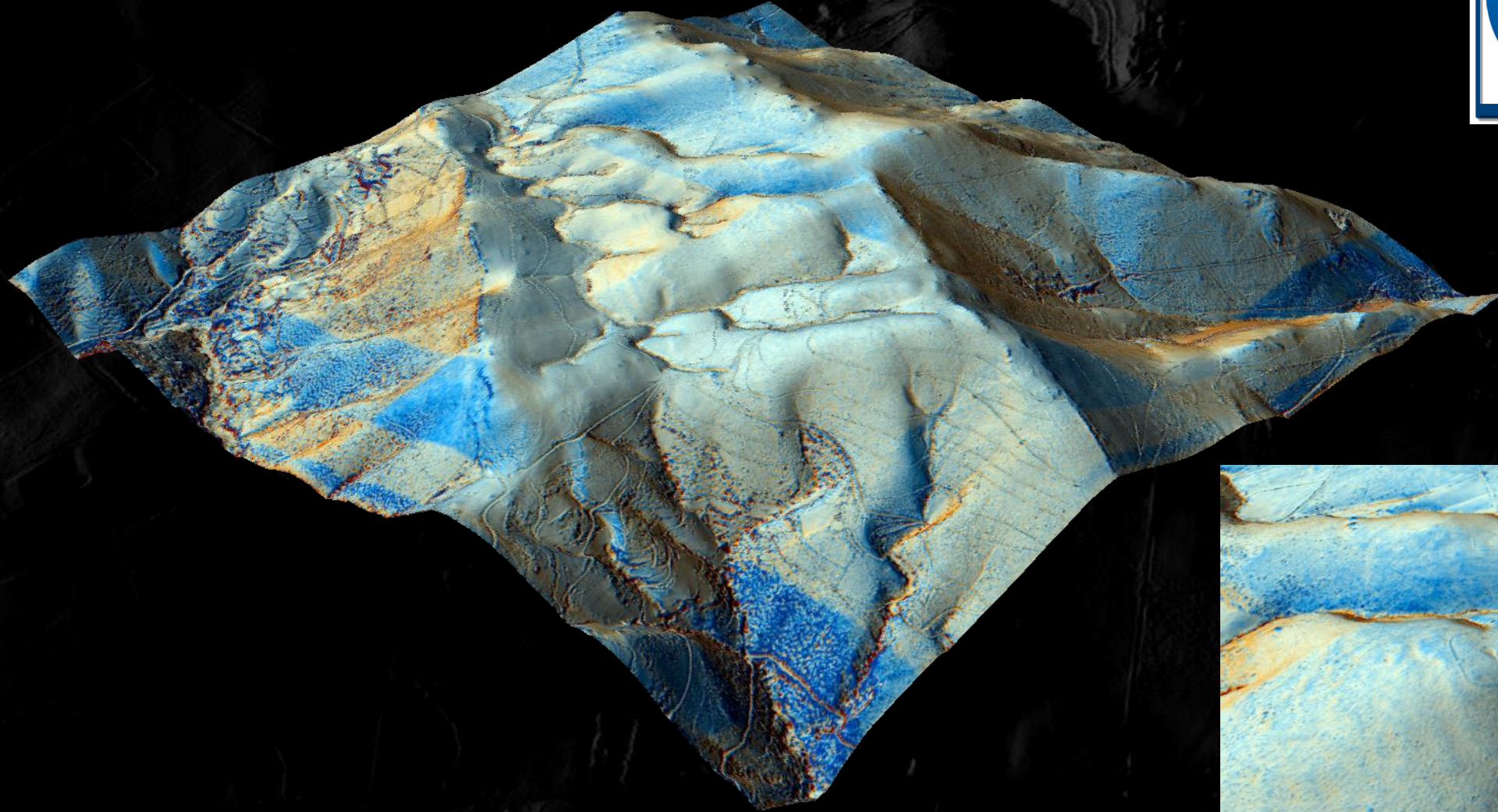
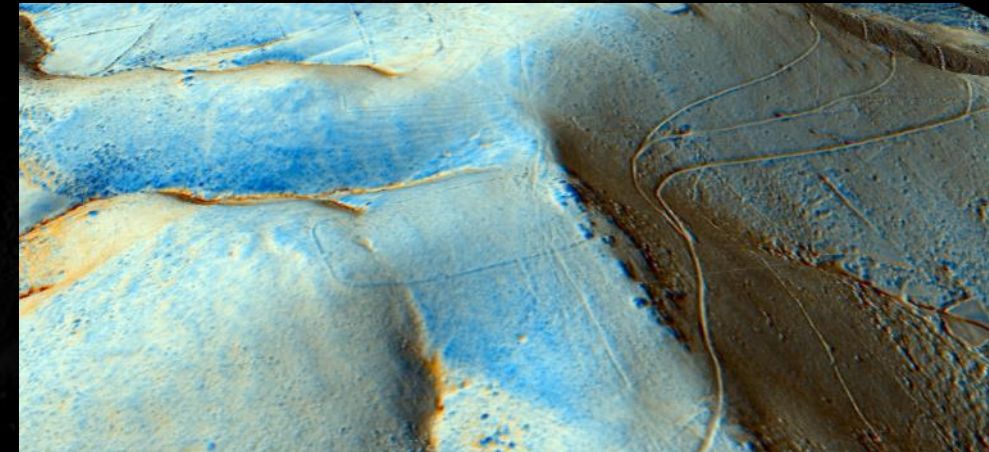
A grayscale LiDAR visualization of a terrain. A prominent rectangular feature is visible in the center, possibly a building or a cleared area. The surrounding terrain is relatively flat.

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Visualization techniques

LiDAR data workflow



Photogrammetry



Prospección

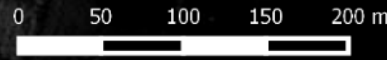


“Al final, siempre tienes que enviar a la infantería”

V. Mayoral

Data combination

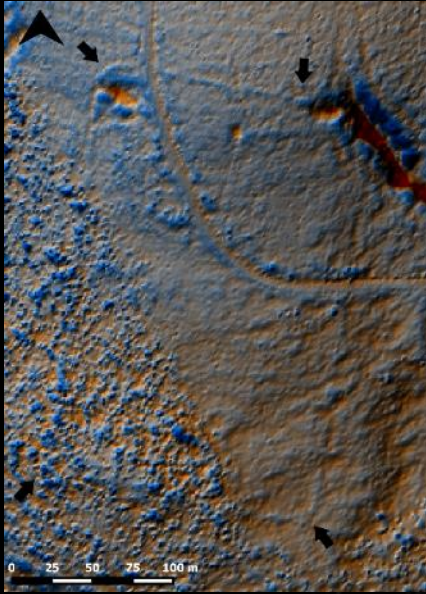
*Morphological and
typological characterization*



Spatial analysis



+



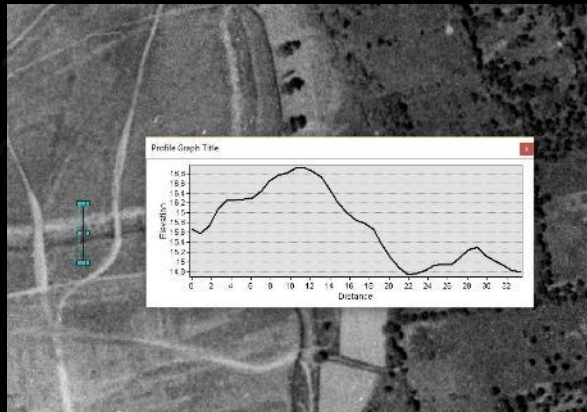
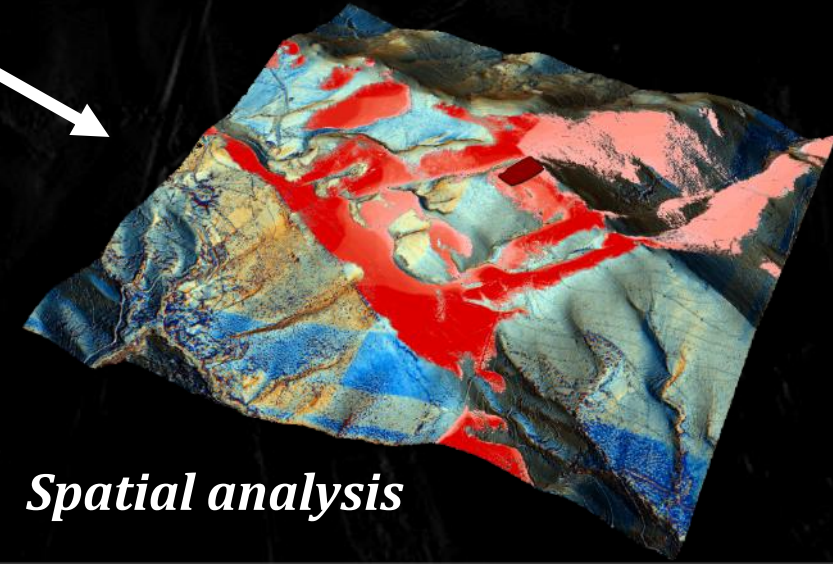
+



+



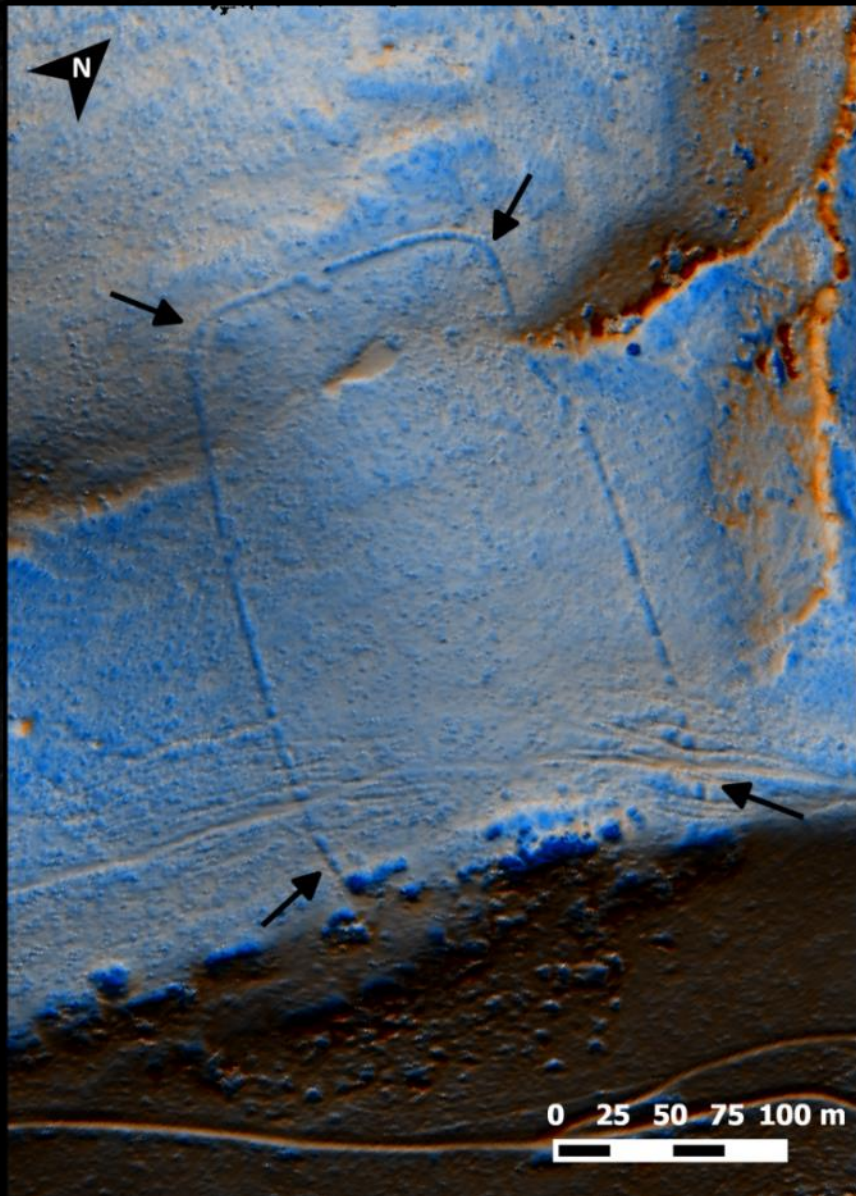
+



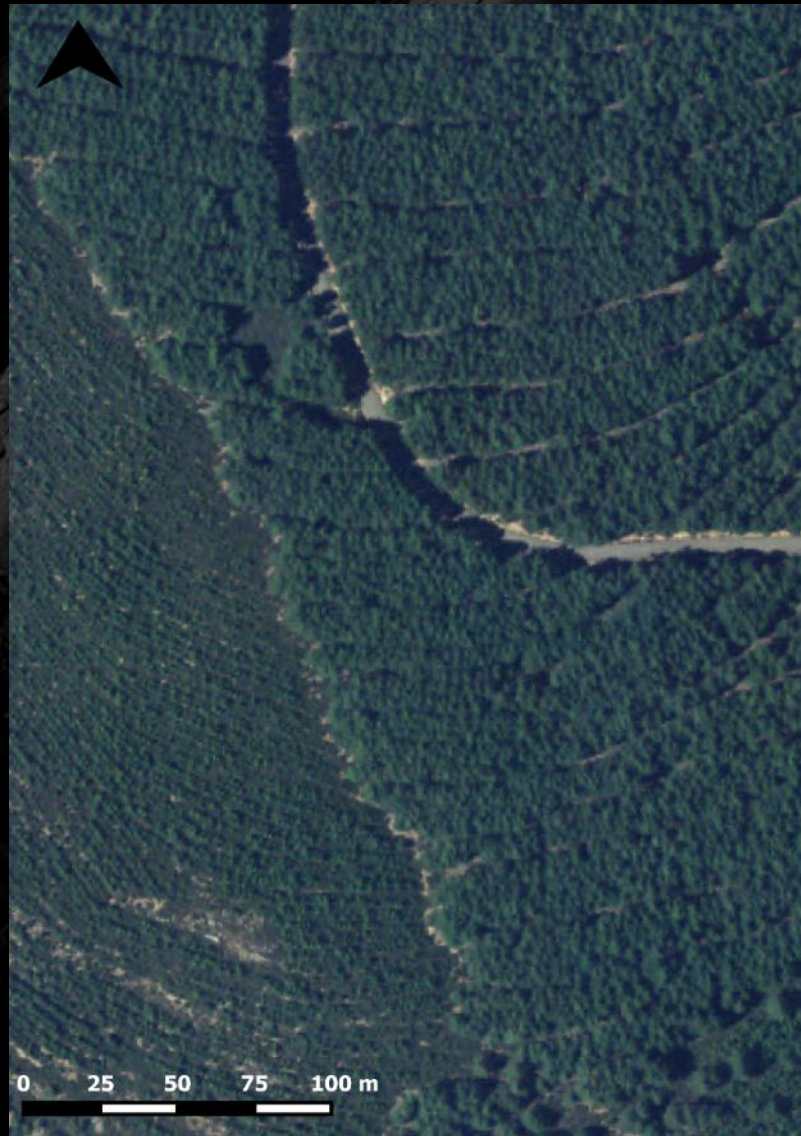
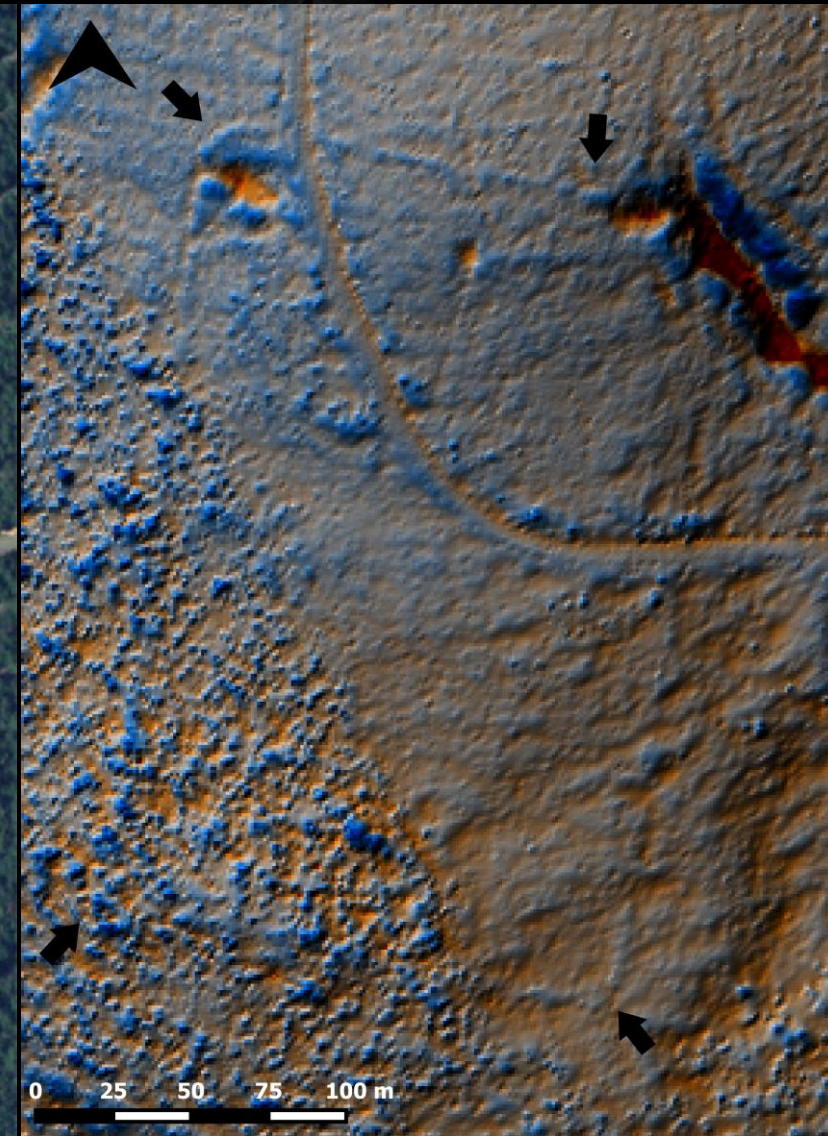


Some brief results

LiDAR

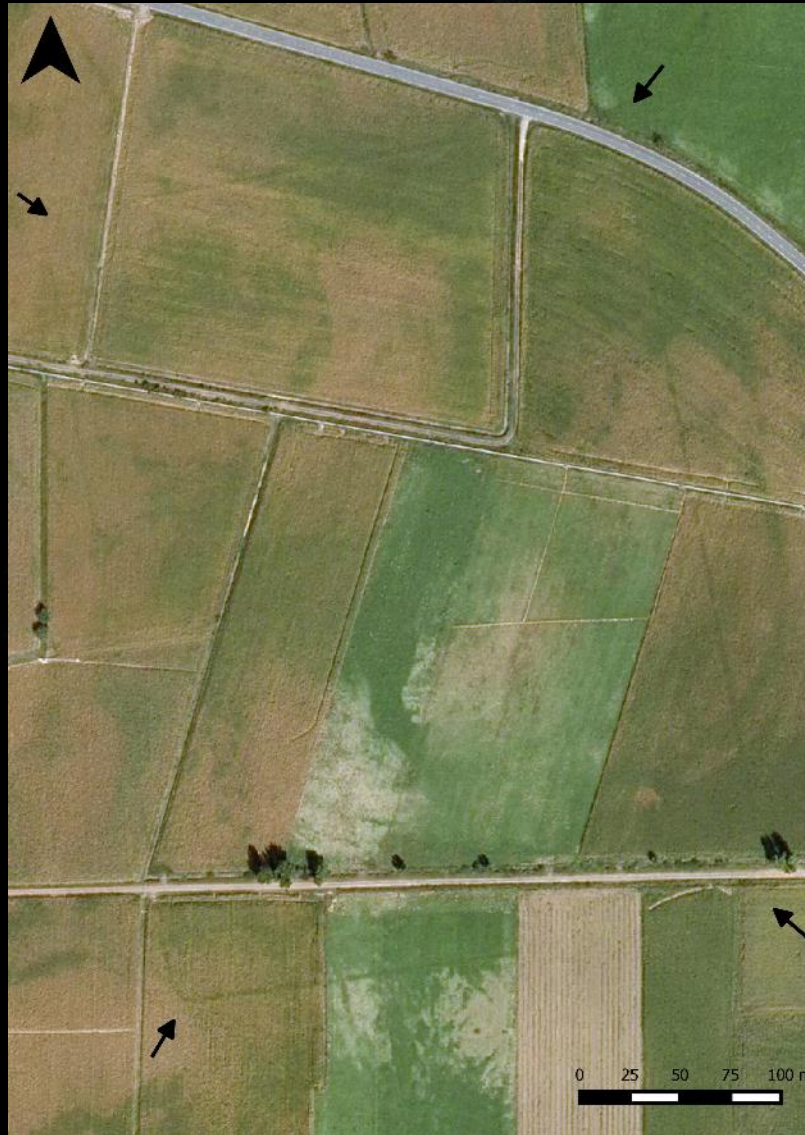
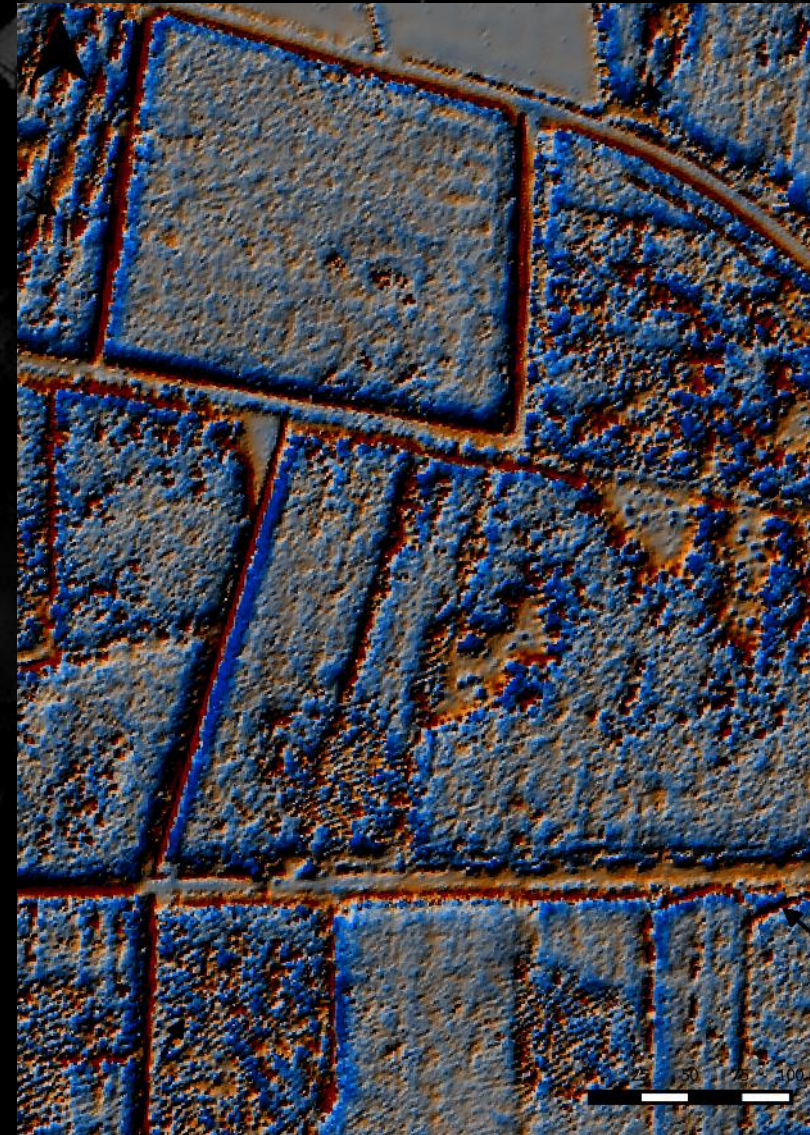


El Chao de Carrubeiro (Asturias)



Valdemedina (León)

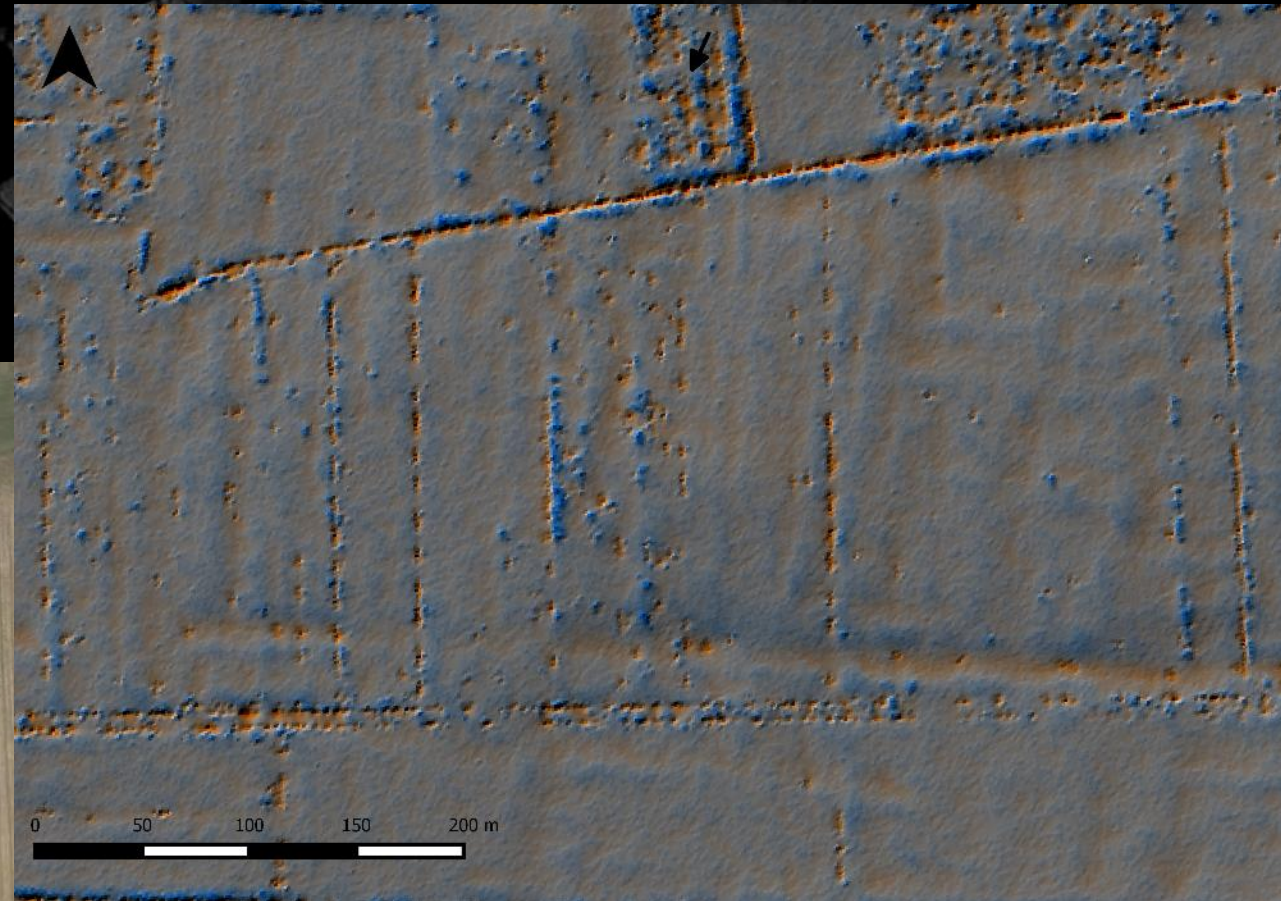
LiDAR?



Huerga de Frailes (León)

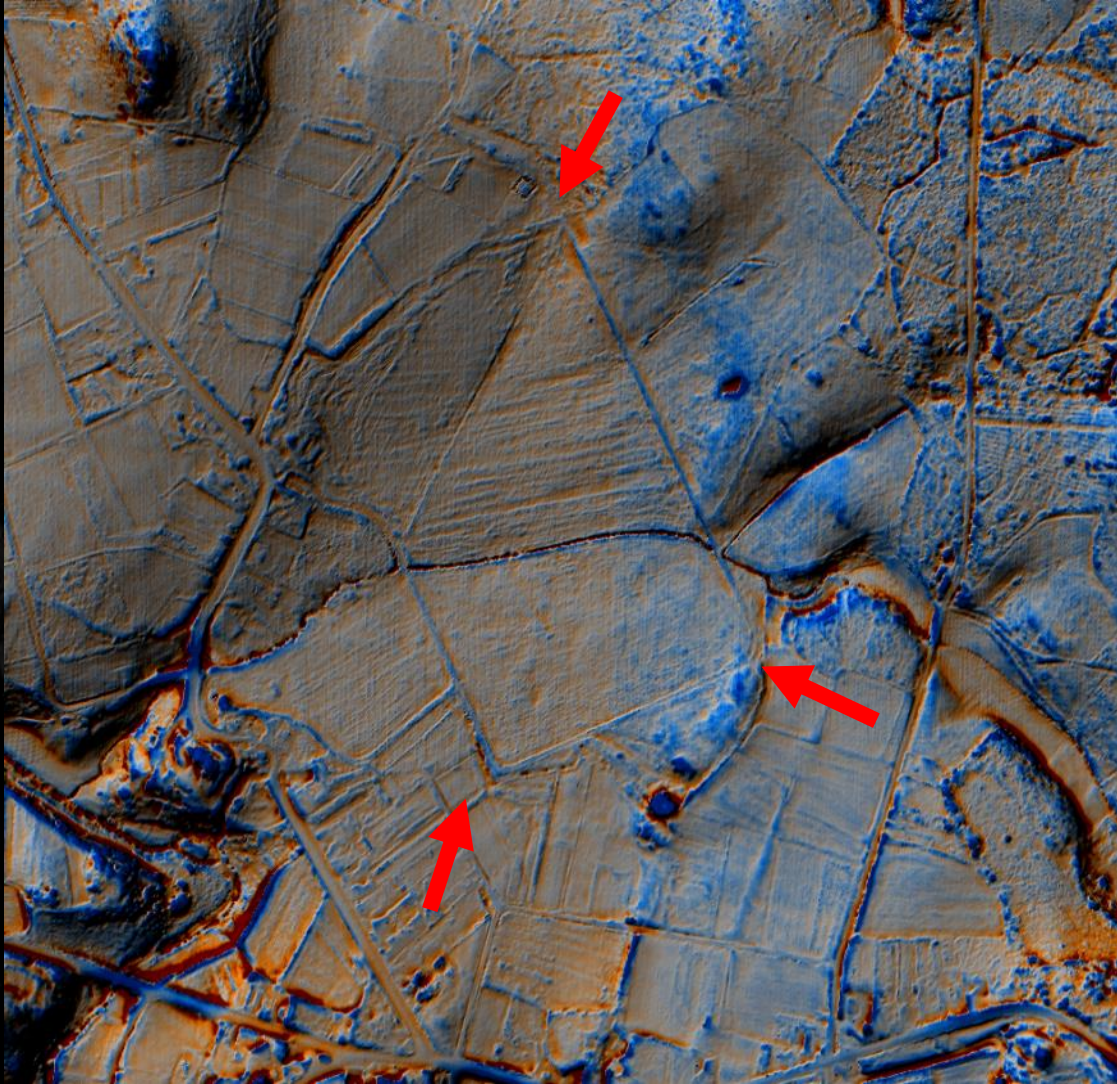
LiDAR?

(Cellís Sánchez et al. 2015)



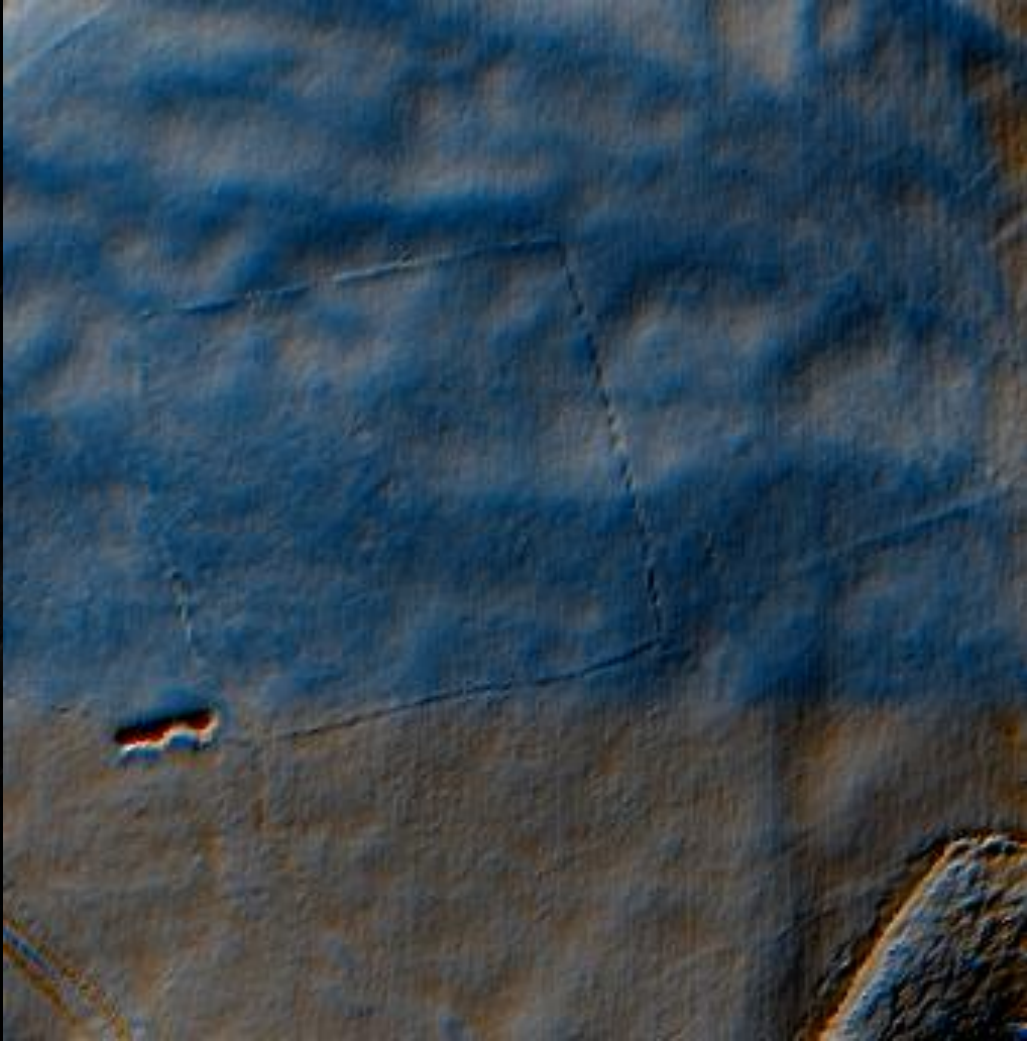
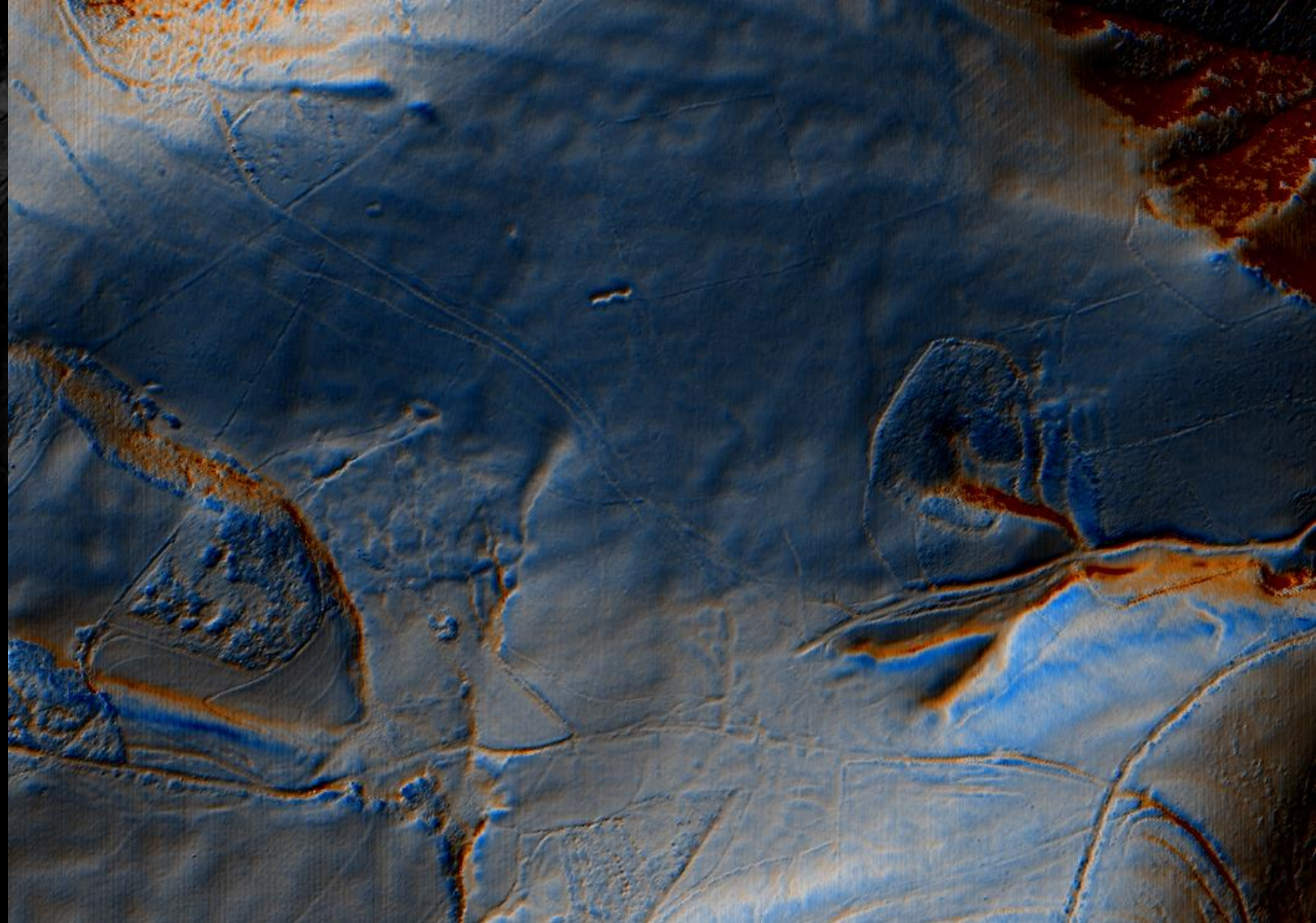
Villamontán de Valduerna (León)

False positives

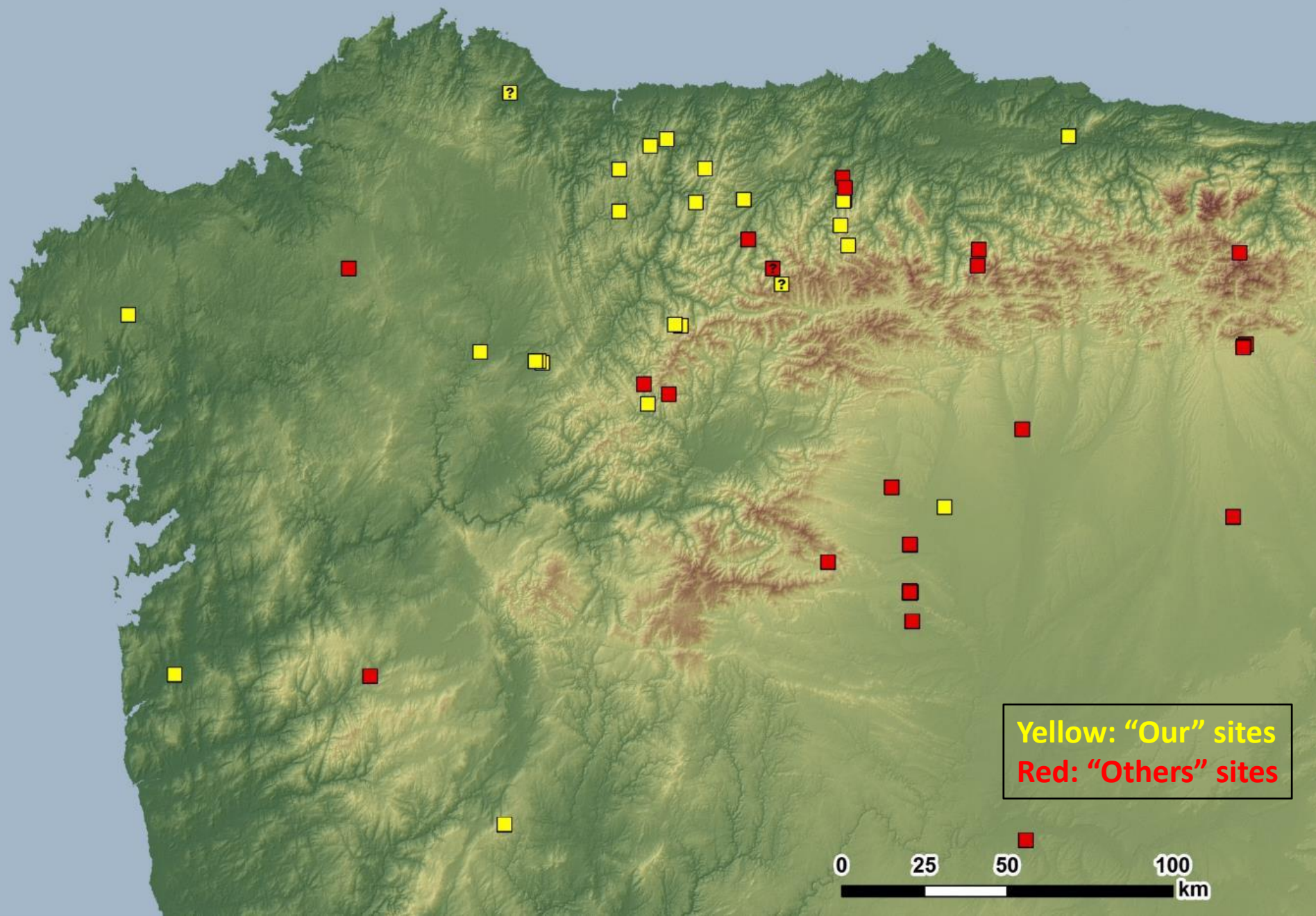


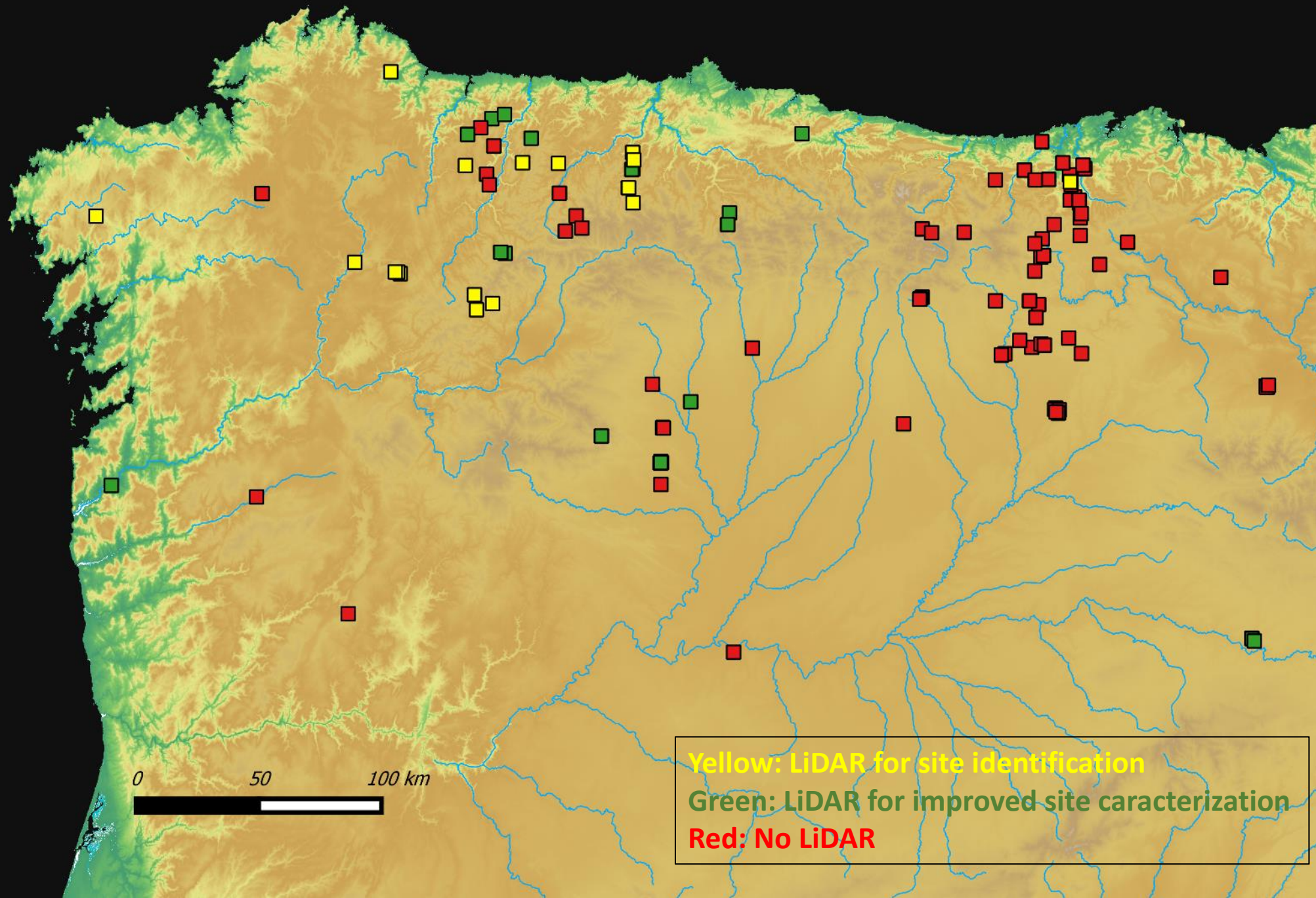
Berdeogás (A Coruña)

False positives



Estelo (Lugo)







[*http://romanarmy.eu*](http://romanarmy.eu)

[*https://www.facebook.com/romanarmynw*](https://www.facebook.com/romanarmynw)