



## **Ephemeral rivers, geomorphological evolution and mapping. A case study in NE Iberian Peninsula**

**Askoa Ibisate**<sup>1</sup>, J. Horacio García<sup>2</sup>, Alfredo Ollero<sup>3</sup>, Josu Ortiz<sup>1</sup>, Alvaro Gómez-Gutierrez<sup>4</sup>, and Ana Sáenz de Olazagoitia<sup>1</sup>

<sup>1</sup>University of the Basque Country, Geography, Prehistory and Archaeology, Vitoria-Gasteiz, Spain (askoa.ibisate@ehu.es)

<sup>2</sup>Department of Geography, University of Santiago de Compostela, Santiago de Compostela, Spain

<sup>3</sup>Department of Geography and Territorial Planning, University of Zaragoza, Zaragoza, Spain

<sup>4</sup>GeoEnvironmental Research Group, University of Extremadura, Cáceres, Spain

Ephemeral rivers (IRES – Intermittent Rivers and Ephemeral Streams) differ from perennial rivers in that they do not have a base flow, therefore, when direct flow stop, they dry up. This condition is spatially accentuated in the ephemeral streams of arid and semi-arid environments (SAES – Semi-arid Ephemeral Streams). Much of the East of the Iberian Peninsula has a climate and lithological conditions that favour the presence of SAES.

The hydrogeomorphological dynamics of these rivers are controlled by flash-floods, with marked rises inflow, short delay times, and on numerous occasions, a significant sediment load. These characteristics that define them, added to the urban development of recent decades, mean that SAES is not usually part of restoration plans. In addition to the technical-administrative “forgetting”, there is scarce appreciation and lack of social sensitivity towards the SAES.

In this project (CCAMICEM Project from Spanish Research National Plan) we focus on the cartographic development of ephemeral rivers with the aim of knowing the geomorphological evolution of several reaches, and between different dates, as a geoinicator of global change using historical and UAVs images. A diachronic geomorphological mapping has been carried out in six reaches distributed throughout the Ebro River Basin (Tudela, Reajo, Alpartir, Cariñena, Sosa and Seco). The timeframe covers 65 years, from 1956-57 (American Flight B) to 2021 through images taken with an unmanned aerial vehicle (UAV). As intermediate years, images were taken from the mid-1980s, and the latest official orthoimage available (2017). The official images belong to the National Geographic Institute (IGN). An altimetric correction has been made in the first two images.

The categories identified have been active channel, main channel and secondary channel, sediment bars (which can be vegetated, scant vegetated and non-active paleo-bars), the deposits coming from bank failures or tributaries, rocky areas, exhumed old sediment areas, and consolidated or unconsolidated granular bed. The categories were mapped at different scales according to the quality of the image, that is, from a scale  $\leq 1/300$  of the UAV to another scale  $\leq 1/1000$  of the American Flight B. The results achieved are allowing geomorphological changes and basin processes to be related to global change.