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Discussion of the transition of endorheic to exoreic drainage of Cenozoic Basins in Galicia (NW of Iberia), the development of the ancestral transverse drainage to the Atlantic and the later stage of fluvial incision

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The drainage basin of the Atlantic Sil River is located in the central-eastern sector of Galicia (NW of Iberia) (Fig.1). The Sil and its tributaries, especially the rivers Xares, Bibeí, Quiroga, Navea and Cabe, flow through a contrasting relief. Here, the transverse drainage is characterised by an alternance of tectonic depressions preserving Cenozoic sedimentary infills and incised meanders/canyons across mountains of basement [1, 2]. The main tectonic depressions crossed by the Sil River are those of Valdeorras, Quiroga and Monforte (Fig.1). The mountains crossed by the river are mainly located in the Ribeira Sacra sector. The Sil and tributaries mainly run across basement areas, which mainly consists of Palaeozoic metamorphic rocks with minor granites, that are intensely faulted with main directions NNE-SSW, NO-SE and WNW-ESE.

In this work we present a characterization of the geomorphic and sedimentary units recording the geological evolution of the study area during the Cenozoic, under an intraplate compressive tectonic setting, leading to drainage re-organization, development of the Atlantic drainage and later stage of fluvial incision.

In the tectonic depressions, several sedimentary units are preserved: 1) two successive allostratigraphic units (unconformity bounded sequences; UBSs) of arkoses (Paleogene and Miocene); 2) two successive units of alluvial fan deposits, with endorheic drainage, probably recording the upper Tortonian to lower Zanclean (UBS11 and UBS12); 3) an uppermost unit of ocre heterometric alluvial fan deposits (UBS13), the first episode with exoreic drainage, tributary of an ancestral Atlantic river (the Sil River, connected with the Minho River) and with sedimentary record probably comprising the Upper Piacenzian to Lower Pleistocene (ca. 3.7 to 1.8 Ma) [2]; 4) a staircase of fluvial terraces (strath and sedimentary) produced during the later stage of fluvial incision (probably, the last ca. 1.8 Ma), recording the alternance of episodes of down-cutting, dynamic equilibrium and eventual sedimentary aggradation.

Regarding the NW of Iberia, our model for the transition of endorheic to exoreic drainage and the development of transcontinental drainage to the Atlantic Ocean is similar to the one proposed for the genesis of the Douro [3, 4] and the Tejo/Tajo (Tagus) [4, 5] rivers, involving as main mechanism an overflow induced by a major climatic change of increasing humidity by middle Pliocene.

