



## Reply to Comments by J.E. Cortes on Magnetic signature of the Camarena de la Sierra Jurassic Magmatism in the SE Iberian Chain (Teruel, Spain)

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We thank Dr. Cortés for the opportunity to clarify some of the points that were not totally explained in our manuscript and could lead to misinterpretations:

In the first place we must make a recognition to the very detailed work done by Cortés (2020, 2023) and Cortés and Gómez (2016) that have contributed to shed light on the interesting extrusive magmatism of the Eastern Iberian Chain. We also want to say that we totally agree with the age precissions put forward by Cortés and that generalizations (in our case about volcanic products, trying to include all of them, specifically the lava flows studied by Dr. Cortés) can be misleading. We consider that in this case his precissions are totally welcome.

However, it is necessary to point out some considerations regarding the comments by Dr. Cortés. In the first place, it must be taken into account, that when we talk about magmatism in the eastern part of the Iberian Chain we are referring to the big picture of the geodynamic context. Paradoxically, when defining the tectonic setting, intrusions are more reliable than volcanic rocks, whose flow direction can also be controlled by topography, especially those lava flows associated to volcanic cones. We think that the statistical analysis of flows presented by Cortés (2020, 2023) could also give very valuable information to be compared with the results obtained in our work. In the same way, when considering the large-scale tectonic frame, our Fig. 7 must be also interpreted this way. It is self-evident that magnetic anomalies indicate the possible location of all causative bodies (probably high-susceptibility or remanence igneous rocks) of all possible ages, but in our opinion, the alignment of these anomalies can give hints about their origin and can also be interpreted as a whole as associated with large-scale faults..

In the second place, one could think in first instace that the Triassic and the Jurassic magmatisms in the Eastern Iberian Chain are different because they

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correspond to different periods of Earth's history separated by significant faunal changes. However, from the point of view of the geodynamic processes occurring in this Mesozoic basin or basins, the tectonic context is not too different. After the Early Triassic, in which subsidence was associated with narrow basins limited by steeply-dipping faults (at least when approaching the surface (Sopeña et al., 1988; Arche and López-Gómez, 1996), the wide, slow-subsidence basins of the Middle-Late Triassic and the Early-Middle Jurassic are similar when considering subsidence mechanisms (with perhaps some exceptions at the beginning of the Jurassic, but probably only at the basin borders, Aurell et al., 2009). The same can be applied (in our opinion, but it is an issue open to discussion) to the thermal anomaly (probably beyond the crustal or lithospheric scale) linked to the generation of the studied magmatic bodies. It is in this way that our considerations must be understood. Beyond this point, which is the age frame of the studied rocks? We think that the formation of a sill needs at least a minimum thickness of the sedimentary cover on a competent level overlying the low-strength level in which the magmatic rocks are intruded (see e.g. Menand, 2008 and references therein), and therefore, and taking into account all the uncertainties in this statement, the studied sill must be post-Triassic, and intruded when some (undetermined) thickness of Jurassic limestones overlaid the Upper Triassic Keuper facies. Paleomagnetic data (see our supplementary materials) also point to this age for the studied magmatic body ([file:///Users/boliva/Downloads/SM\\_boliva\\_acasas-1.pdf](file:///Users/boliva/Downloads/SM_boliva_acasas-1.pdf)) (if the link does not work, please, go to <https://figshare.com/> and look for oliva-urcia, you'll find two files, the one posted on 2025-09-10 "Supplementary Material B Oliva & A Casas" is the file we are referring to) (Oliva-Urcia, 2025). If we consider the paleomagnetic directions obtained in these rocks, despite the relatively small number of demagnetized samples, and considering that the intrusive rocks have suffered little deformation afterwards, we obtain a paleomagnetic direction (Declination, Inclination): 344, 35, which is similar to the direction interpreted for the Jurassic in Palencia-Ortas et al. (2010), Dec, inc: 346, 32 (averaged from Jurassic volcanic and volcanoclastic rocks of the Sierra de Javalambre). These directions are considerably different from the Late Triassic reliable direction obtained for the SE of the Iberian Chain during the PhD investigations of García-Lasanta (2016), unpublished result, Dec, inc: 352, 18.

In summary, we acknowledge very much Dr. Cortés's considerations, that we will take into account when defining future works about the Triassic?-Jurassic magmatism and their mechanisms, in our case from the point of view of the contribution of magnetic fabrics.

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## Declarations

**Competing interest** The authors declare no competing interests.

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