INITIAL ECOMORPHOLOGICAL DIVERSIFICATION OF EOSAUROPTERYGIA

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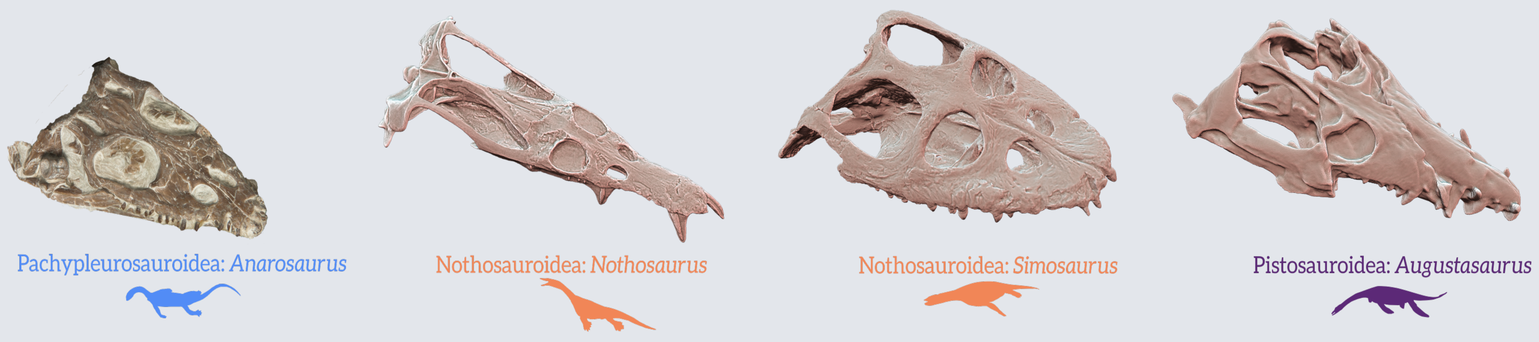
Background

Eosauropterygia, famous for including the iconic plesiosaurs, represents the most speciose and longest-living clade of marine reptiles and its members were key components of marine trophic chains for the entire Mesozoic. Recent studies highlighted that the highest eosauropterygian taxonomical and morphological diversities have been recorded during the Middle Triassic with the co-occurence of small lizard-like pachypleurosauroids, flat headed nothosauroids, and long-necked **pistosauroids**, mostly along the margins of the Tethys Ocean[1-3]. However, these previous studies quantitatively analyzed the disparity of Eosauropterygia as a whole without focussing on Triassic taxa and never investigated any geographical differences in their disparity. As a result, our understanding of the diversification of Middle Triassic eosauropterygians along the Tethys and the pattern of their morphospace occupation is highly limited.

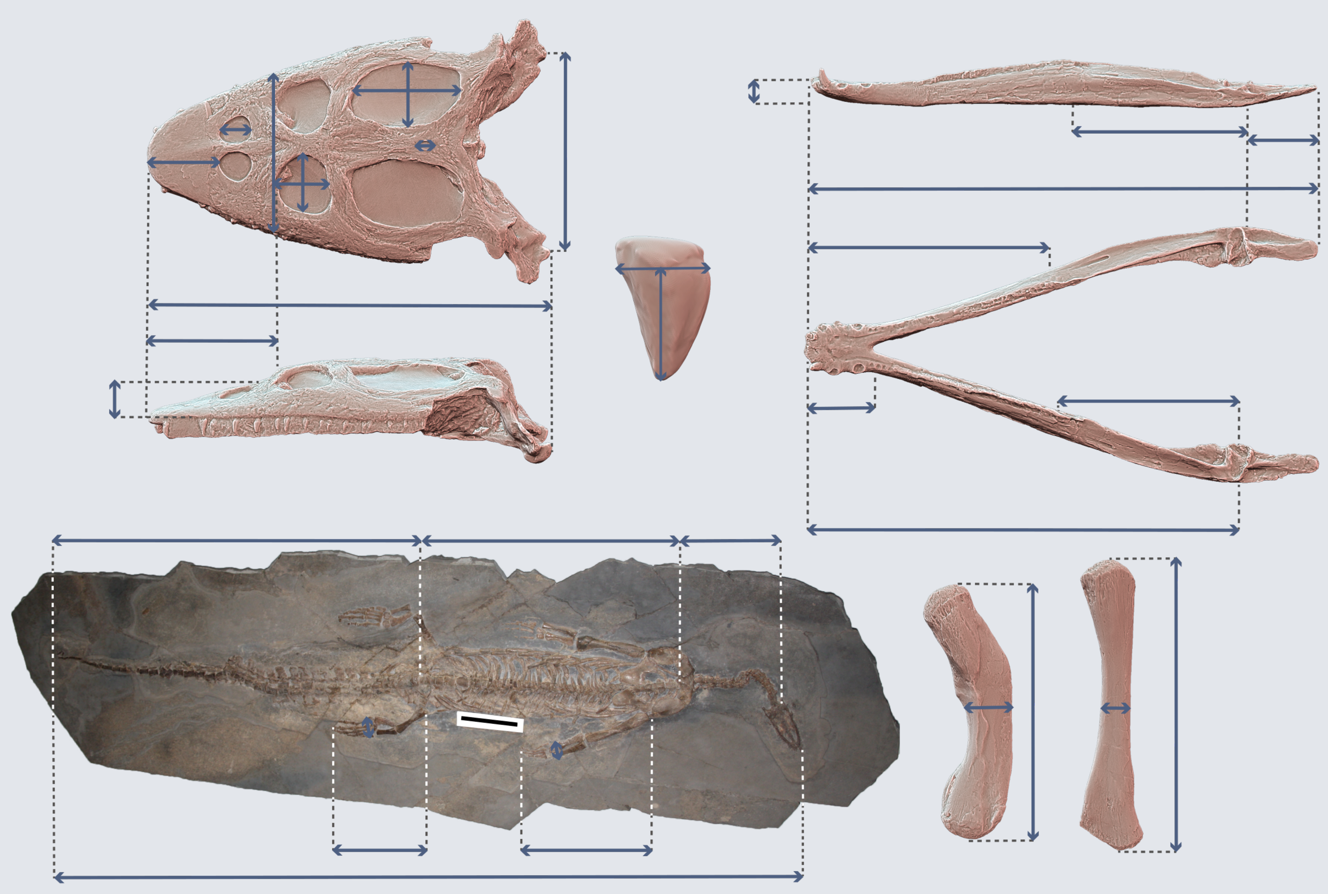


Objectives

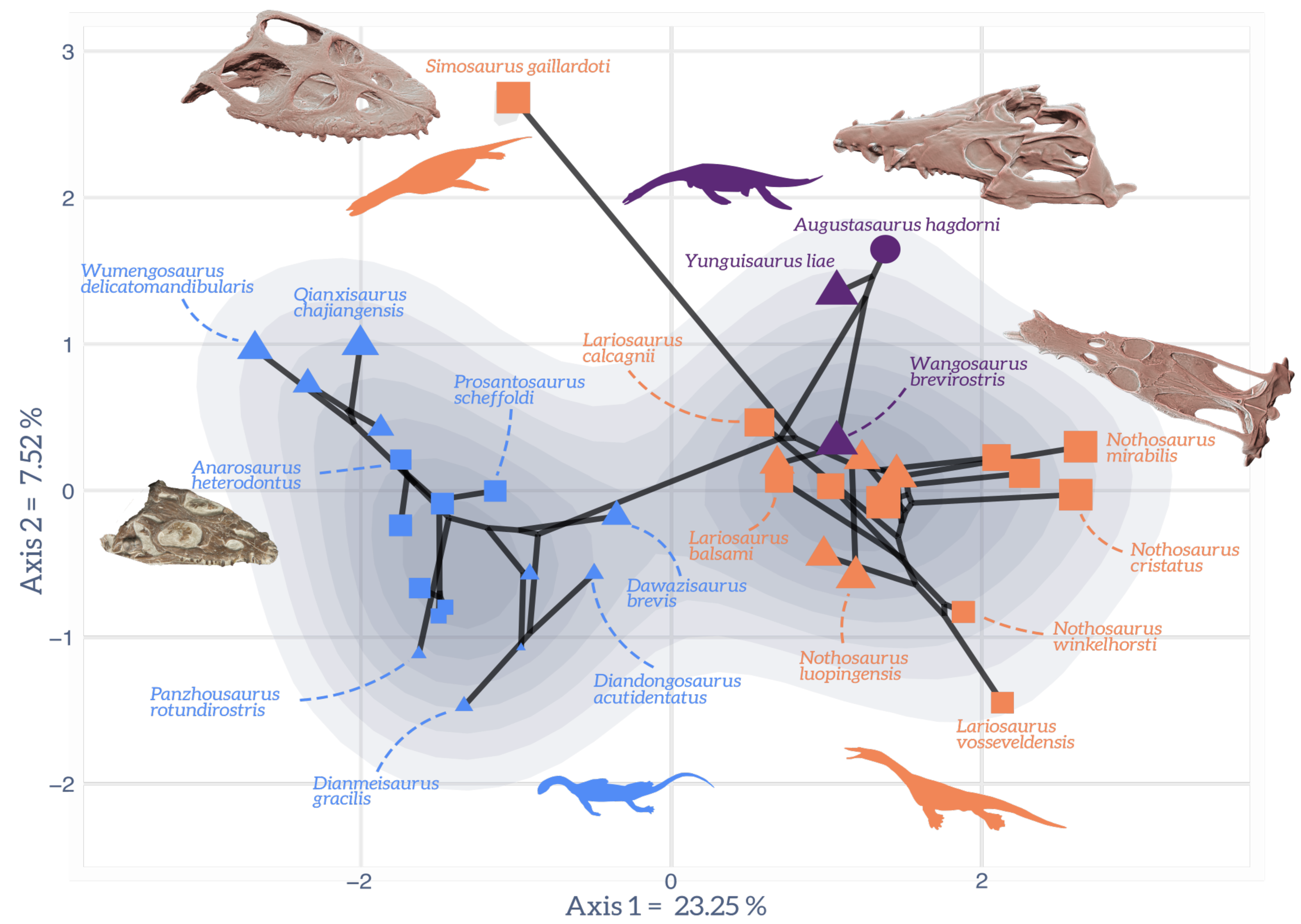
- **Investigate the morphological diversification of Middle Triassic eosauropterygians and explore their pattern of morphospace occupation**
- **Characterize the distribution of disparity between the clades and also along the Tethys Ocean**

Morphological data to create biomechanical-informative traits

We gathered a set of 35 craniodental and postcranial linear measurements on a total of 185 specimens spread over 36 Middle Triassic species. These measurements were used to calculate 27 quantitative morphofunctional ratios with clear biomechanical and architectural implications. 4 discrete traits adapted from [1] has also been added to thorougly characterize the morphology of the teeth and the mandible. Our trait data have been submitted to ordination methods to recreate the evolution of morphospace occupation of Triassic eosauropterygians and the distibution of their disparity per clade but also per geographical region. All analyses have been computed in the R statistical environment.

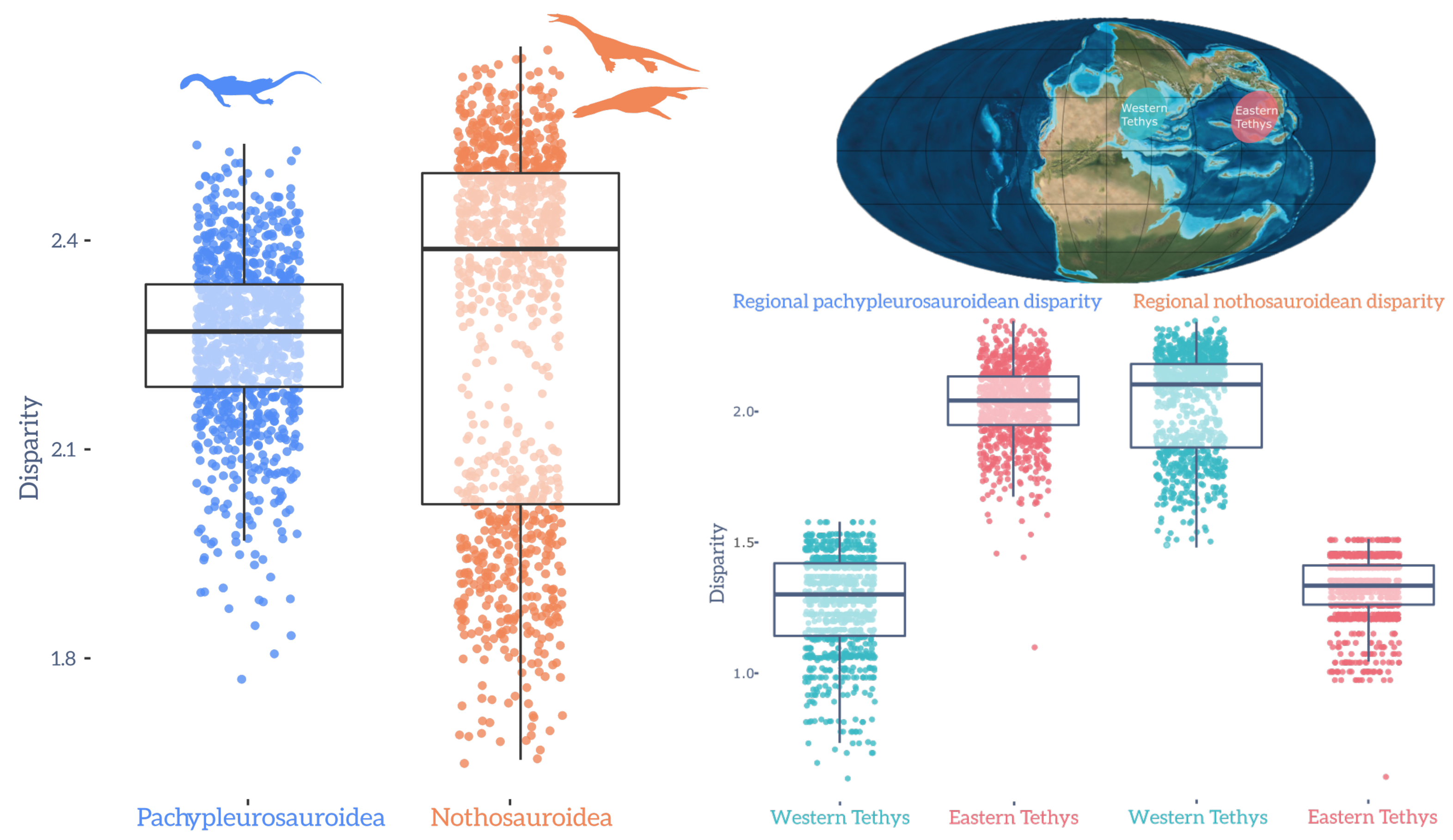


Diversification mainly driven by phyletic heritage



No evidence of important whole-body convergent evolution between the three clades with the exception of the ***Wangosaurus brevirostris***, the most basal pistosauroid which is anatomically closer to nothosauroideans.

Different evolutionary history between pachypleurosauroids and nothosauroids



Simosaurus has a strong influence on the disparity pattern of nothosauroids. You don't believe me? Then, check the QR code...

Conclusions

- **Our multivariate morphometric analyses highlight a clear ecomorphological distinction between the clades, mostly reflecting feeding specialization and suggesting low interclade competition in the Middle Triassic seas**
- **The peculiar craniodental morphology of *Simosaurus* tends to greatly increase the disparity of nothosauroids which appeared less disparate than pachypleurosauroids whitout this species**
- **The strong decoupling in the regional disparity pattern among and between pachypleurosauroids and nothosauroids attests a high phenotypic plasticity from the very beginning of the history of Eosauropterygia**

Acknowledgments

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