Re-calibrating the Late Palaeozoic palynostratigraphy in the basins of the southern domain of the Variscan Belt (southwestern Europe).

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The Late Carboniferous - early Permian was a time-interval of major geological and climatological changes, mostly due to the transition to greenhouse conditions from the maximum glacial coverage (Late Palaeozoic Ice Age or LPIA). This climatic change produced an increase of the extinction rates on land plants and a variation on the constitution and distribution of palaeofloras during this time. The restructuring of ecosystems during Late Pennsylvanian is interpreted as the “collapse of the rainforests”. A replacement of hygrophytic (“Stephanian flora”) by mesophytic and meso-xerophytic flora (“Autunian flora”) that tolerate seasonally dry climate is described.

In the Euramerican Province, the continental vegetation during the Pennsylvania was a hygrophilous flora comprising pteridosperms, marattialean ferns, lycopsids, Calamites and Cordaites trees. At the Late Pennsylvanian-early Permian, the “Carboniferous hygrophilous flora” proliferated in the wet depressions (lowlands) and the mesophilic or even meso-xerophytic flora, grew on the heights (uplands) in the dewatered habitats. Later, this xerophytic flora will be dominant in the landscapes during the middle and late Permian.

There are detailed palynostratigraphic studies that allow precise palynological datings for the Carboniferous period in the Euramerica Province. However, few palynological works have been published relative to the early Permian sedimentary record in this province. In a broad sense, these latter studies only differentiate the early Permian flora (“Autunian flora”) due to the presence of sporomorph taxa as Potonielsporites novicus and Vittatina costabilis, and the middle-late Permian (“Thuringian flora”) mainly characterised by Lueticisporites virkiae and Nuskoisporites dulhuntyi. This lack of precision was probably due to the different sedimentation rates in the intramontane basins and the “border effect” (as a phytogeographic barrier) caused by the Variscan Belt.
The number of works and the wrong use of non-chronostratigraphic terms like “Autunian” and “Thuringian”, making it necessary to re-calibrate the palynological assemblages in the Euramerica Province. A detailed biostratigraphic study allows us to show here, for the first time, a new palynostratigraphic chart derived from palynological studies from some of the best known low-latitude basins radiometrically dated (Pyrenees, Autun, Lodève, Collio and Tregiovo basins) and from basins with well-known internal lithostratigraphic correlation (e.g., the Cantabrian Mountains and the Iberian Ranges).

Based on the results obtained here, the microflora evolution in the early-middle Permian has been described at low latitudes of the Euramerican Province. Furthermore, this study provides a solid base for stabilising the palynozones for the Permian in the southern domain of the Variscan Belt.