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# Tropical vegetation on a changing planet: the late Carboniferous and early Permian floras of the Lodève-Graissessac basin.

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## Résumé

The end of the Paleozoic was characterized by significant climatic changes, with a transition from icehouse conditions during the Late Paleozoic Ice Age to an extreme greenhouse climate at the end of the Permian period. In the paleotropics of the supercontinent Pangea, stepwise aridification during the late Carboniferous and early Permian led to a significant shift in vegetation. This was marked by the decline of the emblematic coal-forming wetland vegetation - an event sometimes referred to as the 'Carboniferous Rainforest Collapse' - and the emergence of floras dominated by seed plants that were adapted to seasonal, semi-arid conditions. In this talk I will illustrate how this transition is recorded in fossil floras from the Lodève-Graissessac Basin in southern France.

Ghzelian deposits near Graissessac contains one of the best examples of Late Carboniferous intramontane wetland flora in southern Europe. Peat mires were dominated by monospecific stands of the lycopsid tree *Sigillaria*. The tree fern *Psaronius* occurred during the later stages of mire accretion. Sphenopsids (*Calamites*, *Sphenophyllum*) formed thickets in perturbed areas such as distal alluvial fans. Ferns and medullosan pteridosperms occupied different zones of the floodplains, while cordaites dominated higher/drier areas of the landscape.

Asselian to early Sakmarian deposits of the Usclas Formation near Lodève have yielded one of the most diverse plant assemblages known for that period, with over 40 different species reported to date. While some of the plants correspond to Carboniferous taxa that persisted in the early Permian (e.g., *Psaronius* foliage), the assemblage is dominated in terms of abundance and taxonomic diversity by conifers (almost 80 % of the fossils and 10 different taxa). Peltasperms are also abundant (10-15 %) and diversified. The flora also contains several species of ginkgophytes and cycadophytes, two groups that started diversifying at that time. This complete change in vegetation reflects the transition to a drier climate. Younger assemblages from the basin have been less studied but are also dominated by conifers and other seed plants, some with typical drought adaptation such as succulent leaves. This is consistent with a continuous aridification in the region towards the end of the early Permian (Artinskian-Kungurian).

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