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Early porosity Development in Carbonate Platforms: the example of the Urgonian Limestone Formation (South-East France)

Early porosity in carbonate platform limestones is primary controlled by three majors factors: (i) mineralogy and crystal structural arrangement of original skeleton grains, (ii) paleoenvironnemental conditions (climate, sea-level changes, tectonics, ...), (iii) early diagenesis. The Urgonian Limestone Formation of South-East France exhibits different types of early porosities and carbonate reservoirs. Porosity occurs early in mainly four strategic locations.

In the inner platform, early porosity is mostly related to Sequence Boundary and is due both to subaerial exposure and meteoric water dissolution processes. Moldic porosities, karstic microcaves and selective solution generate a diagenetic framework, which can evolve later in reservoir. Short periods of emersion are often associated with greater porosity than long intervals of subaerial exposure.

In the outer shelf, early porosity can be observed either on Forced Regressive Wedge, or Basin Floor Fan, or Lowstand Prograding Wedge. *Forced Regressive Wedge settled during falling relative sea-level shows similar subaerial surfaces and early karstifications such as those already described below sequence boundaries. *Basin floor fan is partly composed of carbonate grains coming from platform margin. These grains are exported as well as empty tests or partly dissolved grains from subaerial exposed shelf. The specificity of this porosity is to be a preserved allochthonous porosity transported in basinal environment. *On top of Lowstand Prograding Wedge, porosity is related to beach-rock features, and, then, to dolomitization following first steps of transgression.

In each case, later tectonic events and sea-level changes increase the development of karstification and consequently the reservoir quality.