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SEQUENCE STRATIGRAPHY OF EUROPEAN BASINS

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ABSTRACTS VOLUME

SOURCE ROCKS AND LIASSIC SEQUENCE STRATIGRAPHY IN LORRAINE (EASTERN PARIS BASIN, FRANCE).

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GEOLOGICAL FRAMEWORK

Our data become from outcrops and boreholes scattered within a classical area for Liassic stratigraphy. The area, 200 km long north-south and 100 km wide east-west, comprises two parts (fig. 1) separated by the Metz synsedimentary flexure. The northern area corresponds to the most subsiding part. The southern area is characteristic of platform conditions with a much lower subsidence rate (550 m against 200 m not decompacted for the whole Liassic). Within the southern area, the central Lorraine has been submitted to more terrigenous influx than the southern Lorraine, due to the relative proximity of the Ardenne and Eifel Variscan Massifs. All were submitted to open marine conditions since Hettangian times (Liasicus zone).

VERTICAL EVOLUTION OF ENVIRONMENTAL CONDITIONS

The Liassic sequence can be divided into two major units (fig. 2) dated: (1) Hettangian to Domerian and, (2) Toarcian. Each of them corresponds to a long-term transgressive/regressive facies cycle (second order, *sensu* Vail). In Lorraine, the transgressive terms typically display towards the basin carbonaceous limestones and/or shales. The regressive terms show first thick series of marls, that grade upwards to silty marlstones, and even siltstones/sandstones or grainstones indicating the infilling of the basin. The first long-term regressive phase includes within its upper part a higher-frequency transgressive/regressive cycle dated Domerian. The maximum transgression of the whole Liassic sequence is reached with the Schistes carton dated Early Toarcian .

SOURCE ROCKS

Source rocks are located close to the lower part of such transgressive-regressive cycles. They develop during the transgressive phase, and reach their higher TOC content at the peak transgression, where values of subsidence rate and water depth are maximum. Exception is for the Argiles à Amalthées during the higher frequency Domerian transgressive phase where the input of silt and sand probably diluted the organic matter, if any. Regarding the Hettangian to Sinemurian carbonaceous layers, the organic production during the transgressive phase has been probably high enough for partial preservation in spite of shallowness of environment and slowness of burrial.

SEQUENCE STRATIGRAPHY

Our second order cycles have been divided into third order ones (*sensu* Vail), on the basis of lithological variations, stratonomy, disconformities (Hanzo *et al.*, 1987), biostratigraphy (Alméras and Hanzo, 1991) and comparison with neighbouring regions.

Backstepping highstand systems tracts (= transgressive) as well as forestepping highstand systems tracts at a third order scale show significant organic contents of marine origin, only around second-order peak transgressions. TOC values observed in the various systems tracts of the regressive part of the second-order cycles are never high and never proceed of marine origin (low HI).

HANZO M., HILLY J., GUERIN-FRANIATTE S. & MANGOLD C. (1987). -Durée des discontinuités et des séquences: exemple du passage Hettangien-Sinémurien dans la région d'Hettange. -*Bull. Soc. Géol. France*, 8, III, 6, pp. 1107-1112.
ALMERAS Y. & HANZO M. (1991). -Les Rynchonellidés du Calcaire à gryphées d'Hettange (Sinémurien, Nord-Est France): étude des peuplements et enregistrement des variations du paléo-environnement. -*Paleogeog. Paleoclim. Paleoecol.*, 86, pp. 313-329.

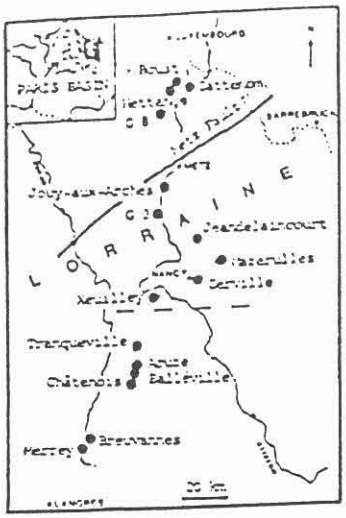


Fig. 1 - Location map of outcrops and boreholes

Fig. 2 -Sources rocks and Sequence Stratigraphy in the Lorraine Liassic.

Fossil s : @ , @ , | , ⌒ , • = pebbles ; Ph = phosphates

F = Faciès

T.ck = Thickening upwards

D = Disconformity

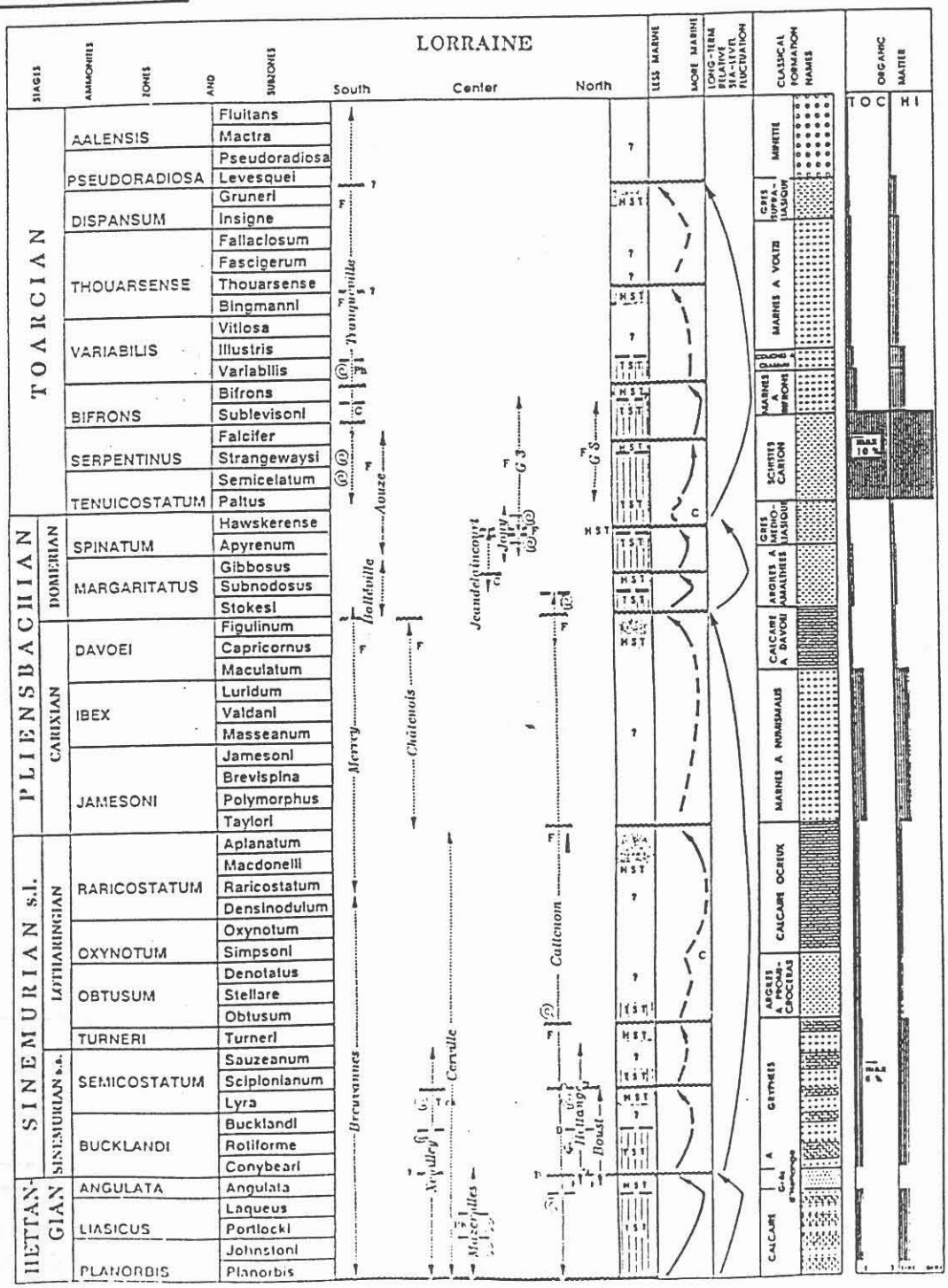
C = Comparison with neighbouring regions

TST = Transgresive system tract ; HST = Highstand system tract

↗ = Evolution of Sequence

TOC = Total organic carbon (%) : mean value/formation

HI = Hydrogen index (mg HC/g TOC) : mean value/formation



LIASSIC SOURCE ROCKS AND SEQUENCE STRATIGRAPHY IN LORRAINE (EASTERN PARIS BASIN, FRANCE)

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