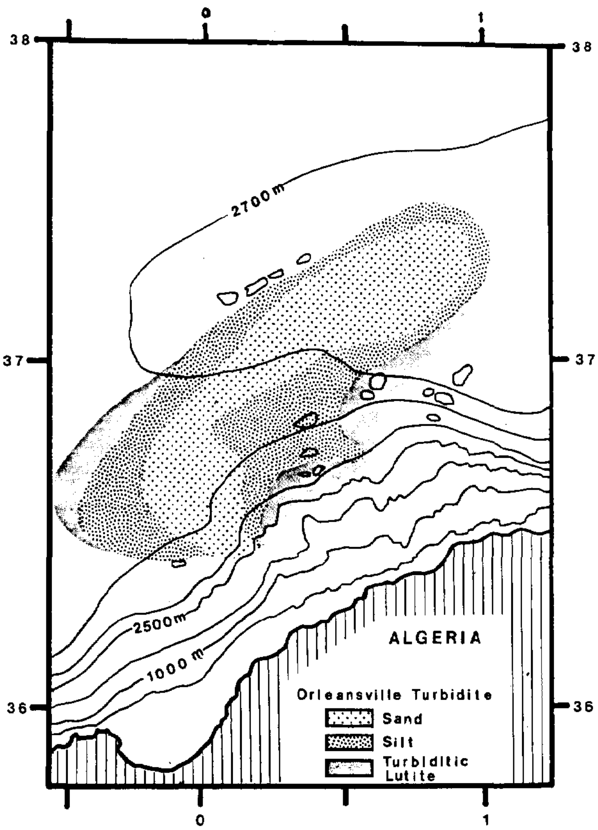
The distribution of the various cement types within the reefs can be linked with the shallowing-upward nature of the limestone sequence as there is a predominance of early marine cement fabrics in the middle and upper parts of the reefs, particularly in the algal biofacies. The spatial and sequential nature of the various carbonate diagenetic fabrics show that the Hogklint reefs went through four main diagenetic events.

Microstalactitic cements, vadose crystal silts, grain-contact cements, and pseudofibrous isopachous cements are developed within cross-bedded peloidal grainstones at the top of the shallowing-upward sequence and indicate cementation within the freshwater vadose zone and intertidal and/or marine phreatic zone.

WEBBER, LAURIE, and ORRIN PILKEY, Duke Univ., Durham, NC

Orleansville Turbidite

The Orleansville earthquake in 1954 produced a turbidity current on the Algerian Mediterranean margin and adjacent South Balearic basin sea floor which broke five telephone cables. The report of this event represented a cornerstone in the evolution of turbidity current theory. The resulting turbidite has been mapped on the Balearic abyssal plain for the purpose of relating flow paths and turbidite size, and areal extent to cable break locations. This study is based on 50 gravity cores.



The Orleansville turbidity current actually consisted of two currents which arrived simultaneously on the basin plain via two canyon mouths separated by 30 km. The merged turbidity currents flowed 170 km out on the basin-plain floor and covered an area of 8,000 km^2. The turbidite is a tongue-shaped sediment body, 50 km wide, oriented northeast-southwest. It consists of a central band of 5-cm thick sand with a fringing 2 to 3-cm thick band of coarse to fine silt. Two of the cable breaks occurred on the abyssal plain at the extreme edge of the turbidite where the sediment is only 2 cm thick. An underlying turbidite of very similar dimensions to the Orleansville turbidite is separated from it by a 10 to 15-cm pelagic sequence. The consistent spacing between these two events indicates that although the Orleansville turbidity current broke telephone cables at its extreme margins, it caused no detectable erosion on the basin-plain floor.

WEBSTER, R. L., Univ. North Dakota, Grand Forks, ND

Analysis of Petroleum Source-Rocks of Bakken Formation (Lowermost Mississippian) in North Dakota

The Bakken Formation consists of upper and lower, black, organic-rich shales separated by a middle siltstone member. The sediments of the Bakken are marine in origin.

The middle member consists of very fine-grained sandstones, siltstones, silty limestones, and shale. The middle member generally has low porosity (1 to 5%) and permeability (<0.1 md), except where fracturing is present, as at Antelope field in McKenzie County. The lithologies, fossils, and sedimentary structures of the middle member are indicative of a nearshore marine depositional environment.

The black shales were deposited in quiet, poorly circulated, anaerobic waters. In thin section they exhibit a high degree of orientation of mineral particles and a high kerogen content. Thin-section and chemical analyses show the mineral matter of the shales to be predominantly quartz.

Pyrolysis, total organic carbon determinations, vitrinite reflectance, optical kerogen typing, and chromatography of extractable organic matter were used to determine the depth of onset of hydrocarbon generation, amount of generated hydrocarbons, thermal maturity, kerogen types present, and distribution of organic matter in the black shales of the Bakken Formation. These are extremely rich source rocks, because they contain high amounts of algal kerogen, a prolific source material of oil. Organic carbon values for the black shales average about 13 wt. % and extractable hydrocarbons are typically 4,000 to 5,000 ppm.

WEBSTER, ROBERT E., AMAX Petroleum Corp., Dallas, TX

Persimmon Creek Field—Anatomy of a Morrow Stratigraphic Trap

Persimmon Creek field in T20N, R22W, Woodward County, Oklahoma, on the northern shelf of the Anadarko basin, produces gas and condensate from upper lower Morrow sandstone. The field occurs above a prominent southward-plunging structural nose on the Chester limestone. This and similar noses nearby appear to be paleotopographic highs that strongly influenced subsequent Morrow deposition. A thicker Morrow section overlies Chester lows or paleovalleys and a thinner sequence occurs above the noses.

In this area, the Morrow contains an upper shale section and a lower sand-shale sequence containing four major sandstone units, each of which may contain one or more discrete sandstone beds with interbedded shale. The basal Morrow "Hamilton" sandstone strikes west-northwest, but filling of the subjacent Chester paleovalleys has caused local thicker sand accumulations with good porosity to trend north-south. The overlying "Yellow" sandstone has similar characteristics. In the "Brown" sandstone, this relationship is reversed, and the thickest sand accumulation and best porosity development occur above the plunging Chester noses. The uppermost "Fritzler" sandstone is more erratic in character, showing little relationship to Chester paleotopography.