

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

The Aggradational to Retrogradational Stacking Pattern of the Hugin Formation (Callovian - E. Oxfordian) Southern Viking Graben, North Sea.

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The aggradational to retrogradational part (200 m thick) of the Hugin Formation has been studied in the Sleipner Field in the South Viking Graben, North Sea (Fig. 1). The formation was deposited in the middle Jurassic during the opening and finally drowning of the Viking Graben (Thomas and Coward, 1996)(Fig. 2). The Hugin Formation consists of shallow marine sediments deposited during overall transgressive and aggradational conditions. Regionally, the Hugin Formation represents the termination of the southward retreat of the Brent system.

From 26 cored wells, 17 facies associations have been identified and grouped into 6 genetic depositional sub-environments; coastal plain fines, tidal channel fill and bars, tidal flat, prograding mouthbars, shoreface and offshore mudstones. Interpretation of facies associations in uncored intervals was followed by a detailed well-to-well correlation based on both sedimentological and biostratigraphic evidence. The correlations reveal that the Hugin Formation consists of 8 transgressive/regressive sequences where the transgressive parts of sequences consists of tidal channel fills, tidal bars, tidal flats and coastal plain fines deposits whereas the regressive part consists of coastal plain fines in the form of palaeosols, with associated prograding mouthbars and shoreface deposits. Offshore mudstones occur in both parts as the distal component of the depositional systems (Fig. 3).

The regressive and transgressive parts of sequences have characteristic thickness trends (Fig. 4). The regressive segments of a sequence increase in thickness basinward until a point where the sandstone gives way to offshore mudstone of the Heather Formation. The transgressive segments of the sequences have a minimum thickness in basinal areas and increase in thickness in the landward direction until a point where the sandstone gives way to shales and coals of the continental Sleipner Formation. These thickness trend observations can be explained when considering mass-balance in the depositional profile (Shanley and McCabe, 1994; Willis, 1997). Regression occurs as a result of lack of accommodation space and excess in sediment supply in a landward position that forces the coastline to prograde seaward, so the majority of sediments are trapped in a seaward position. During transgression, the majority of sediments is trapped in a landward position due to an increased accommodation space in that location. Application of this concept to interwell areas provides a powerful predictive tool for the thickness and facies type of Hugin Formation sandstones.

References:

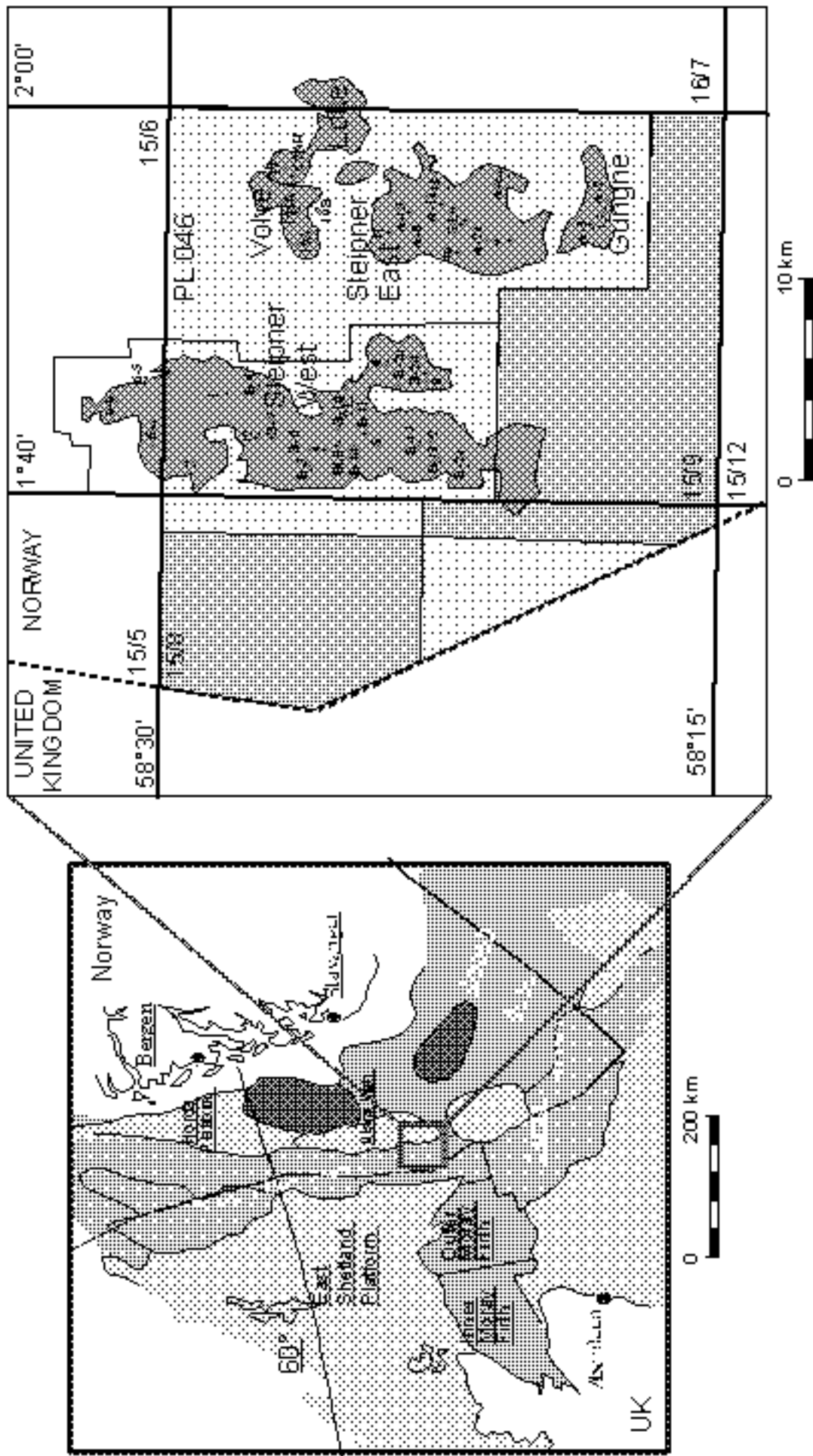
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Location map



Opening and drowning of the Viking Graben in Mid Jurassic

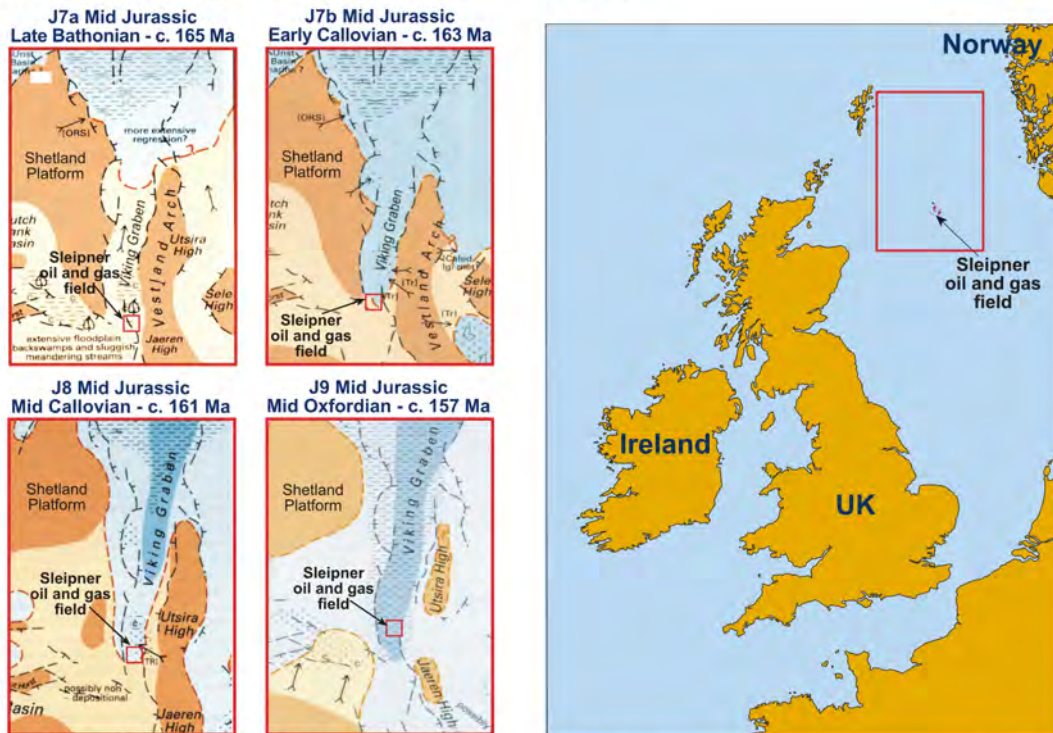
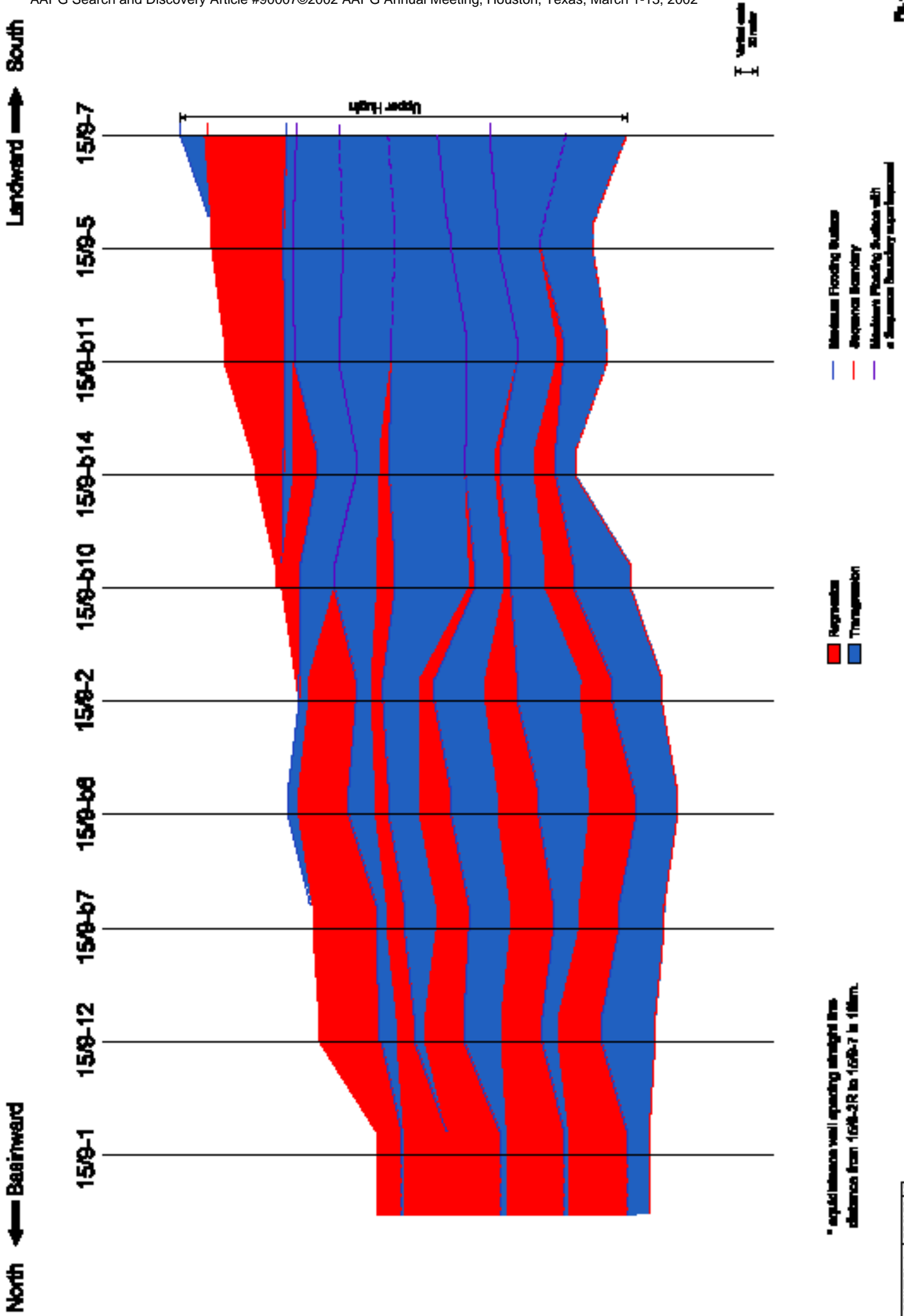


Figure 2

Cope, J. C. W., J. K. Ingham & P. F. Rawson, 1992. Atlas of palaeogeography and lithofacies, The Geological Society of London, Memoir No. 13, 155 pages.

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Sleipner Vest Huglin Fm.
Illustration of the concept of volumetric partitioning



Minimum Flooding Surface
 Sequence Boundary
 Minimum Flooding Surface with
 a Sequence Boundary adjustment

Repression
 Transmission

* equal distance well spacing straight line
 distance from 15/0-2R to 15/0-7 is 1km.