Seminaris de l'IGC

IGC
Institut Geològic de Catalunya

Marc geològic dels sistemes turbidítics: Una comparativa global

Divendres, 26 d'octubre de 2012 a les 12.00 hores

Programa

12.00 Presentació de l'acte
Xavier Berástegui Batalla, Subdirecció Tècnica de l'Institut Geològic de Catalunya

12.10 "Geological setting of turbidite systems: a global comparison"
Berend Van Hoorn, Geòleg consutor
(idioma ponència castellà)

13.10 Precs i preguntes

13.15 Finalització de l'acte

Sala d'actes de l'Institut Geològic de Catalunya
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Professional resume

Berend Van Hoorn is a very experienced geologist with a long history of employment with Shell worldwide spanning a period of over 30 years. These positions include working as an exploration geologist in Oman, Japan, Malaysia, Spain, UK, The Netherlands and the USA. Of particular relevance to deepwater exploration were his assignments as Head of Regional Geology for Shell UK in London, Head of Global Geology for Shell International in the Netherlands, Chief Geologist, Shell Offshore (Deepwater) in New Orleans, and Manager for technical reviews of all global deepwater ventures with a Shell involvement. Berend Van Hoorn has been a Consulting Geologist for the past eight years which has included the development of deepwater and new exploration plays worldwide while maintaining a continued involvement with Shell training as well as conducting peer reviews with third parties. Dr Van Hoorn holds a Masters Degree in Geology and a Ph.D in Earth & Natural Sciences (Geology) (Van Hoorn, 1970) both from Leiden University in the Netherlands. He was Technical CoChairman for the International AAPG Conferences in Birmingham and Barcelona in 1999 and 2003 respectively.

Van Hoorn, B., 1970. Sedimentology and Palaeogeography of an Upper Cretaceous turbidite basin in the South Central Pyrenees, Spain. Leidse Geol. Med., 45: 73-154.

Generalitat de Catalunya
Departament de Territori i Sostenibilitat

"Geological setting of turbidite systems: a global comparison", Berend van Hoorn

Over the last 25 years exploration and production in deepwater (in waterdepth in excess of 500 m) has increased greatly to the point that a considerable amount of today´s industry budget is spent on these activities. Whereas initially little was known about the geological setting of deepwater systems (and few people believed in the presence of sandstone reservoirs beyond the continental shelf edge), we now know that downdip of several Neogene delta´s, major turbidite systems occur with appreciable reserves of oil and gas.

Oil accumulations in turbidite sandstones are not new, in fact production from these reservoirs has been going on in the Mio-Pliocene Los Angeles and San Joaquin pull-apart basins in California before Kuenen coined the term in 1957. Similarly, sizeable accumulations have been found in Upper Jurassic, Lower Cretaceous and Lower Tertiary turbidite sequences in the North Sea in a rift-sag setting.

In the mid-eighties exploration moved into deeper water and driven by successes in the Gulf of Mexico, further efforts focused on the Lower Congo Basin, Campos Basin and offshore Nigeria. A common characteristic of these four basins is that the turbidite depocentres overlie a mobile substrate of salt or overpressured shale which provide a high density of traps with a similar and predictable structural/stratigraphic evolution, stacked reservoir/seal pairs, and an easy access to mature source rocks.

A regional comparison of these basins suggests that in a general sense four structural play types can be defined:
• Immediately downdip from the major deltaic expanders, an area of Inner Folds with large trap closures postdating the emplacement of channelized turbidite reservoirs.
• An area of Mini-Basins where structuration and sedimentation are more or less coeval leading to the emplacement of stacked confined turbidite sheetsands.
• In areas of salt withdrawal, inversion of minibasins with turbidite sheet sands leads to the formation of Turtles.
• An oceanward area of very large Outer Folds which are structurally coupled to deltaic extension updip and where amalgamated unconfined turbidite channels and sheets occur predating trap formation.

Exploration efforts in turbidite basins without a mobile substrate have so far been more limited and concentrated on the Atlantic margins of the United Kingdom and Norway. Typically the density of structural closures is low but individual structures can be very large in areal extent, quite often with a stratigraphic component. Recently, major discoveries in Equatorial Africa have spurred the industry to take a closer look at Cretaceous turbidite systems on both sides of the African continent in what is a very lightly explored play setting. Similarly, major gas discoveries in Tertiary turbidites off Eastern Africa also have indicated that there are still some major frontier deepwater basins worth looking at.

The objectives of the presentation will be to illustrate with seismic and well data the analogies and differences between the different deepwater basins, as well as to draw some high level conclusions on risks and uncertainties in turbidite exploration at a play level.