Monday, March 26, 2012

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $28 Preregistered members; $35 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

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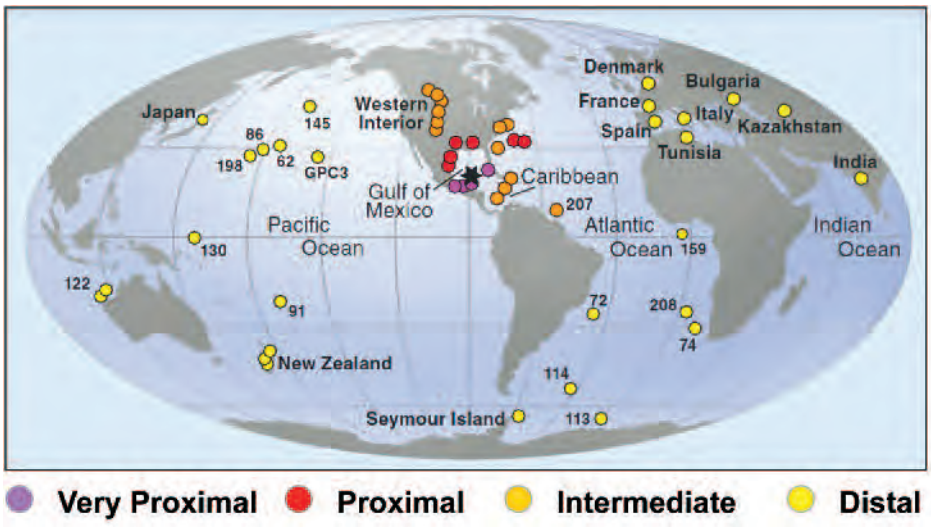
The Effect of Chicxulub on the Deepwater Gulf of Mexico



Global distribution of key K/Pg boundary data locations. Note the locations and proximity to the Chicxulub crater of sites around the Gulf of Mexico. After Schulte et al (2010)

Although numerous academic studies have examined outcrops and DSDP / ODP cores to determine the effects of the Cretaceous / Paleogene (K/Pg) boundary Chicxulub Impact globally and along the margins of the Gulf of Mexico, industry in general has been slower to recognize its extensive impact on the deep-water Gulf of Mexico. Initial penetrations of the Cretaceous were drilled by DSDP in the southeastern Gulf of Mexico. The term Middle Cretaceous Unconformity (MCU) was coined for what was then believed to be an unconformity between the Upper and Lower Cretaceous. The "MCU" is a high-amplitude seismic reflector that has been mapped in many studies of the Gulf of Mexico basin. After identification of the Chicxulub Crater on the Yucatan Peninsula and its purported causal relationship with the K/Pg mass extinction, the DSDP cores were re-examined and it was found that the Upper Cretaceous sediments are a mixture of reworked microfossils and impact-derived materials termed the Cretaceous-Tertiary "cocktail" (Bralower et al., 1998), and that the "MCU" is not a regional unconformity within the Cretaceous, but is an erosional event at the top of the Cretaceous produced by the impact.

A combination of 20 industry wells and seismic has identified an extensive micritic deposit at the Cretaceous / Paleogene (K/Pg) boundary in the deep-water Gulf of Mexico with penetrated thicknesses ranging from 10 to 200 m, and seismically estimated thicknesses of over 1000 m. Evaluation of publicly available biostratigraphic data from nine wells found a mixture of Lower Maastrichtian and Upper Campanian calcareous nannofossils with rare uppermost Maastrichtian to Aptian specimens, similar to the Cretaceous / Tertiary "cocktail" assemblage identified in Gulf of Mexico and Caribbean DSDP cores. No succession of bioevents is discernible within the deposit, and preservation is generally poorer than is found in sediments directly underneath the deposit. The basinal deposit is a relatively uniform micrite with an overall fining- upwards character, similar to the tsunami-derived "homogenites" of the Mediterranean and the K/Pg boundary Penalver and Cacarajicara formations of Cuba. Seismically, the deposit is found throughout the basin floor, typified by a concordant, parallel couplet of high-amplitude reflectors with little interior character, which is also typical of the Mediterranean "homogenites". It thickens to over 1000 m in paleo-lows, while on paleo-highs it is relatively thin and often truncates older horizons. An unconformity is found at the base of the deposit at all locations, removing the Maastrichtian and Upper Campanian in the basin, and down to as old as the Jurassic on the paleo-slope, suggesting substantial slope instability induced by earthquakes and tsunami waves produced by the Chicxulub impact. This basinal deposit is interpreted to represent locally-derived mass transport deposits overlain by a single, thickly-graded bed produced by the settling of pelagic components (re)suspended into the water column.

Investigation of seismic data in the northern Gulf of Mexico shows anomalous sedimentary wedges of high amplitude reflectors situated at the top of the Cretaceous section. These events have been calibrated to well penetrations and are interpreted to be the deposits that result from the mass-transport flows and suspension

HGS North American Dinner *continued on page 31*

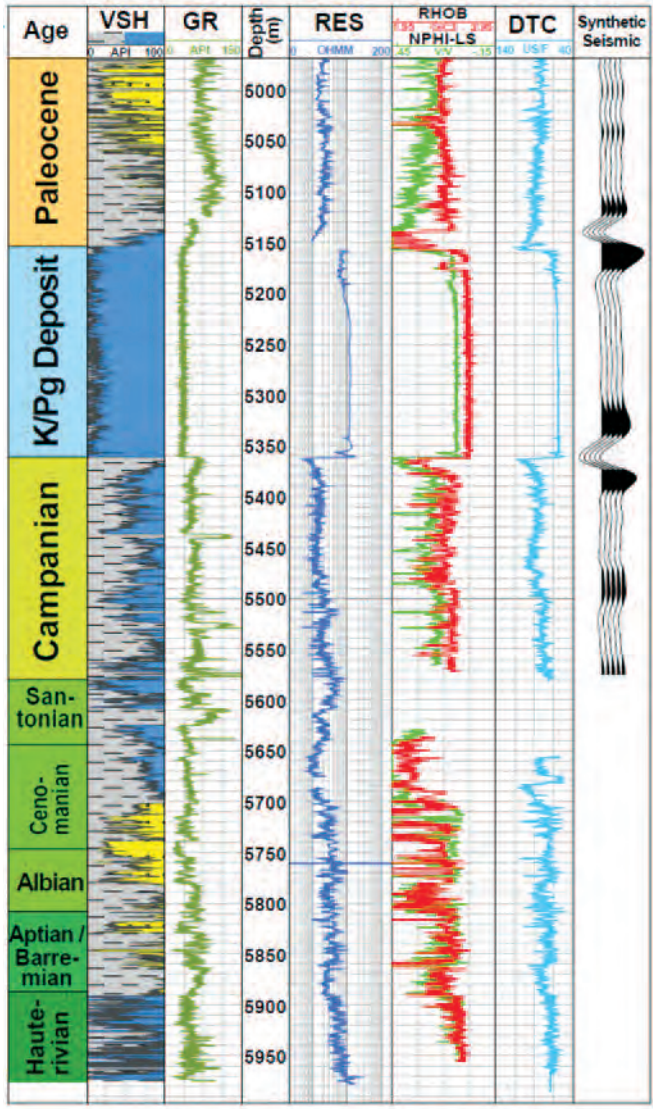
HGS North American Dinner continued from page 29

fallout initiated by the impact. At the end of the Cretaceous, the northern Gulf of Mexico underwent allocthonous salt movement from the Jurassic-aged Louann Salt that was expressed in numerous salt highs defining potential clastic sediment fairways. The sediment redistribution caused by the Chicxulub impact filled in the available accommodation space around the salt highs, on the highs themselves, and altered the seafloor topography across the northern Gulf of Mexico. At this time there existed an efficient transportation pathway from shelf to deep water that likely influenced the sedimentation patterns of the subsequent sediment gravity flows of the Wilcox Group. ■

Biographical Sketches

Erik Scott currently is the Chief Geologist, Gulf of Mexico, for Marathon Oil Corporation in Houston, Texas, who works on a wide variety of projects in both exploration and production. Over his career, he has engaged in stratigraphic analyses of numerous areas, that include the Gulf of Mexico, North Sea, offshore West Africa, and the eastern Mediterranean. He received a Ph.D. in geology from Louisiana State University in 1997, studying under Dr. Arnold H. Bouma, with whom he investigated the influence of tectonics on deepwater sedimentation, based on the turbidite outcrops in the Karoo Basin of South Africa.

Richard Denne is the corporate Biostratigraphy Advisor at Marathon Oil Corporation. He is a graduate of the University of Iowa and Louisiana State University. He began his career as a paleontologist at Exxon Company, USA and Exxon Exploration Company, and then consulted for 12 years with Applied Biostratigraphix before joining Marathon. He has published extensively on the paleoecology of benthic foraminifera, sequence biostratigraphy, and the biostratigraphy of calcareous nannofossils.



Log characteristic of the K/Pg deposit in the deep water Gulf of Mexico.