Cap Timiris Canyon: A Newly Discovered Channel System offshore of Mauritania

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Cap Timiris Canyon: A Newly Discovered Channel System offshore of Mauritania

Intensive research over the past decades has greatly improved our understanding of processes operating in the deep ocean. There has been a particular focus on continental margins, as sediments deposited in these areas can provide a high-resolution record of past climatic changes, as well as serve to host some of the world's major hydrocarbon reservoirs. However, the exploration and understanding of the deep ocean remains one of the great challenges of the 21st century [*Stow and Mayall*, 2000], and many fascinating features still wait to be found.

The potential for new deep-water discoveries was recently highlighted during Meteor cruise M58/1 (depart Dakar, Senegal, 21 April 2003, return Las Palmas, Spain, 12 May 2003) of the Research Center Ocean Margins at the Universität Bremen in Germany. A spectacular 400-km-long submarine meandering channel system was discovered off Mauritania. In this article, the system is called the Cap Timiris Canyon (Figure 1). Although a series of incisional gullies at the shelf break and uppermost slope have been described before [e.g., *Rust and Wienecke*, 1973], the enormous size and complex morphology of this submarine channel system were previously unknown.

This discovery appears to be the first channel system of this scale—several hundreds of kilometers long and ~300 m deep—to be described from offshore of a desert region. Commonly, large-scale submarine channels occur offshore of major river mouths and form large fan complexes (e.g., the Amazon, Mississippi, Zaire, and Indus Fans), whereas the isolated Cap Timiris Canyon is located offshore of the Sahara Desert within an arid climatic zone. By studying how the morphology and sediment fill of Cap Timiris Canyon have evolved potentially in response to climatic variations, we may be able to better understand how the adjacent desert region has evolved through the past hundreds of thousands of years.

An additional incentive for this study is that flow processes operating in deep-water meandering channels are poorly understood. Most previous studies have assumed that turbidity currents are the dominant means of transporting sediment through these long-distance conduits [*Peakall et al.*, 2000], although studies of distal sections of some meandering channels have revealed that debris flows may also be important [*Schwab et al.*, 1996]. This article uses geophysical imagery of Cap Timiris Canyon, illustrating plan form morphology and vertical evolution, as well as sediment information, to provide insights into the flow processes responsible for generating and maintaining the channel system.

Morphology of Cap Timiris Canyon

The first crossing of Cap Timiris Canyon during the M58/1 cruise came during a transit from Dakar, Senegal to a more northerly study area off Cap Blanc, Mauritania. At 19°15'N, 18°56'W, the ship crossed a ~270-m-deep and 2.5-km-

Canyon cont. on page 423

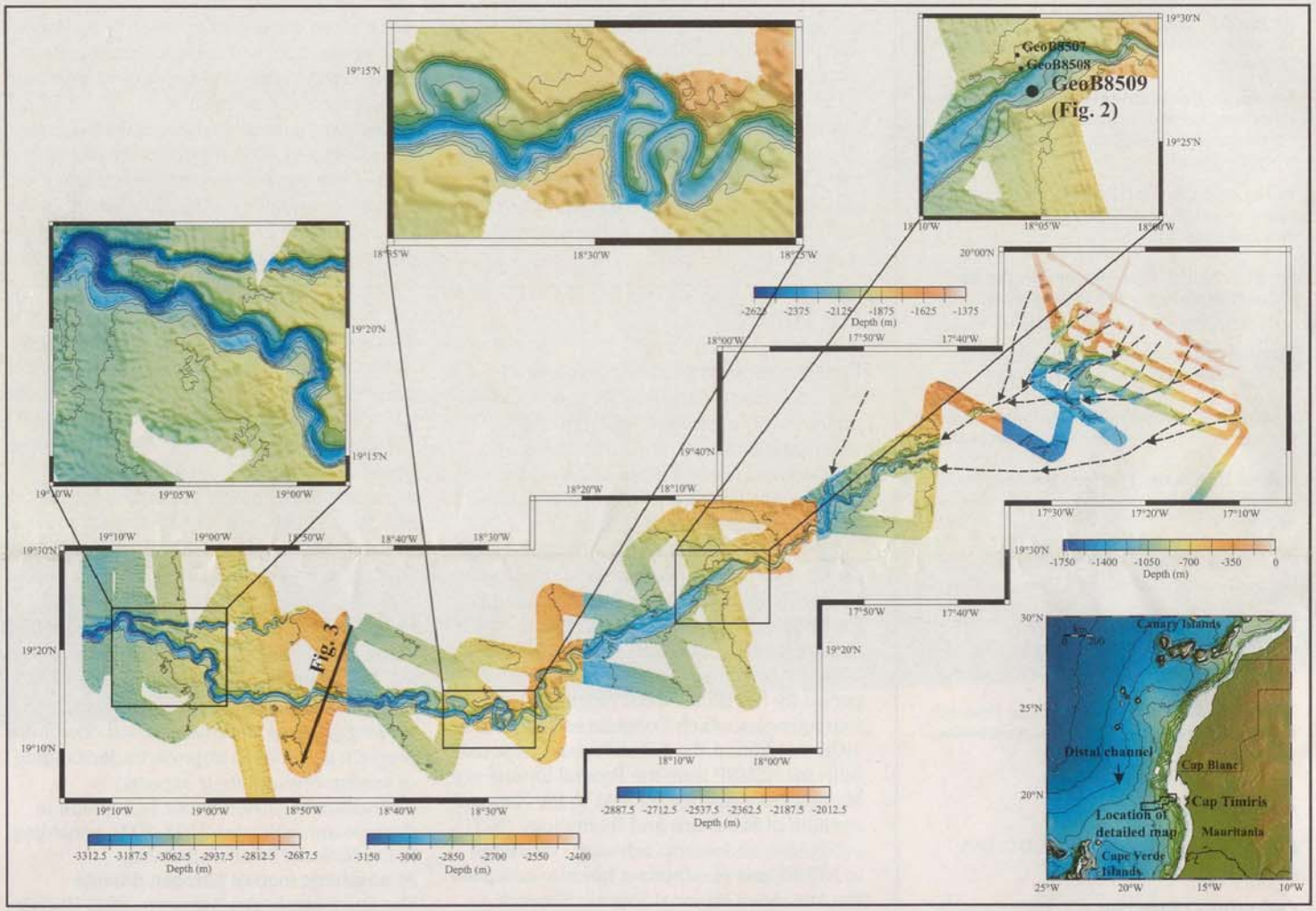

Fig. 1. Bathymetric map of the newly discovered Cap Timiris Canyon off Mauritania. Note the different color scales for various parts of the maps. The overview map in the lower right corner is based on the GEBCO data set. This map shows the continuation of the mapped channel system for at least 250 km. This figure includes references to the core in Figure 2 and the seismic profile in Figure 3.

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