CONGO-ZAIRE DETRITAL SUPPLY VARIABILITY DURING THE LAST 200 KA: A POSSIBLE EXPLANATION FOR THE LONGITUDINAL MIGRATION OF THE ZAIRE FAN DEPOCENTERS



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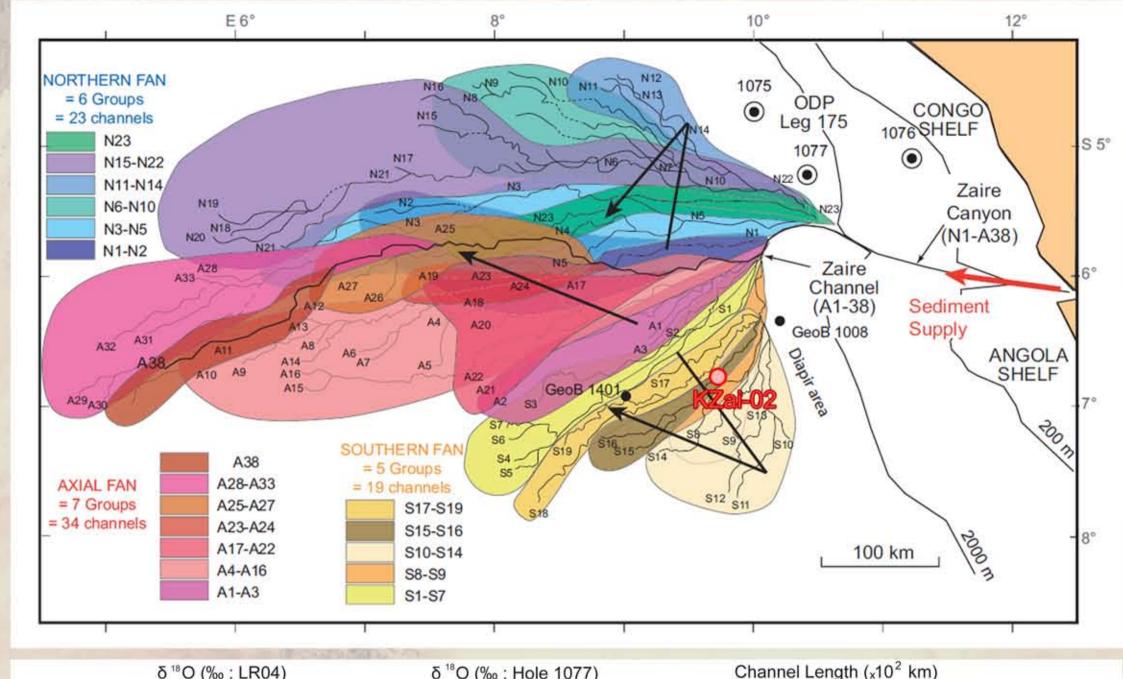
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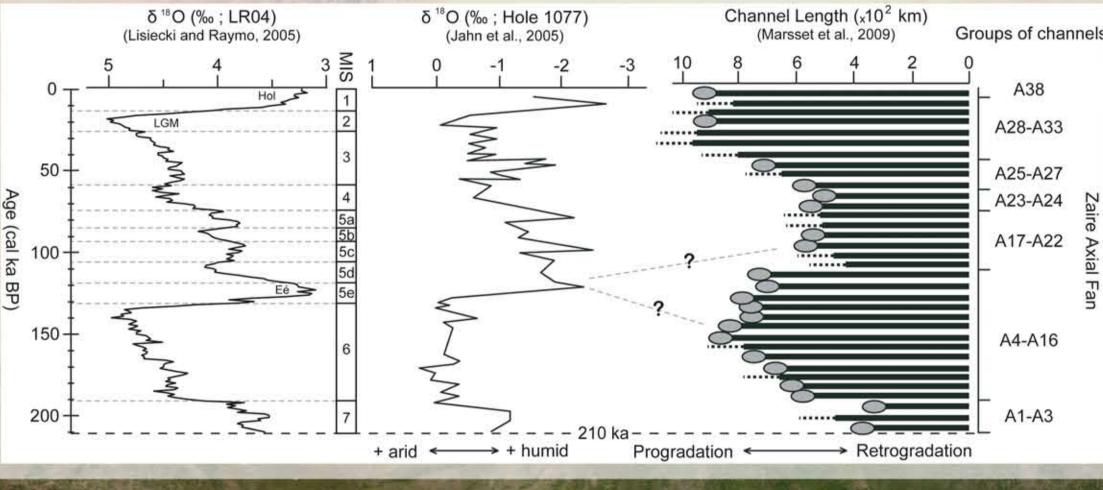
1. INTRODUCTION

A recently published geophysical study of the Zaire Fan architecture points out a longitudinal migration of depocenters which shows a cyclic organisation through time, better expressed in the Axial Fan (210 ka BP-actual), with cycles of down-fan and up-fan movements reflecting prograding-retrograding cycles (Marsset et al., 2009). These cycles seem to correlate amazingly with the contemporaneous humidity fluctuations that affected the western tropical African continent (Jahn et al., 2005).

Could climate changes be considered as a major forcing factor for the channel lengths and the avulsion process?



nels. The groups are referenced chronologically from the oldest (bottom) to the youngest (top) for each individual fan (Marsset et al., 2009).



Correlation between the length of Zaire axial fan channels (Marsset 2009) and oxygen records from the Congo Shelf (Jahn et al., 2005) and the open ocean (Lisiecki and Raymo, 2005).

2. CLAY MINERALOGY

In order to test this hypothesis, a clay mineralogical study, using X-Ray Diffraction methods (Gingele et al., 2001), has been realized on hemipelagic sediments contemporaneous with the deposition of the Zaire Axial Fan (core KZai-02, 249 samples). It allowed us to specify the variability of detrital transfers from the western African continent toward the Zaire Fan, in relation with climatic fluctuations through the last 200 ka.

3. CLAY MINERAL CONTINENTAL SOURCES

NE Trade winds: kaolinite (K) from sub-Saharan area (during glacial periods)

Congo-Zaire River:

Mainly kaolinite (K) then smectite (S) and illite (I)

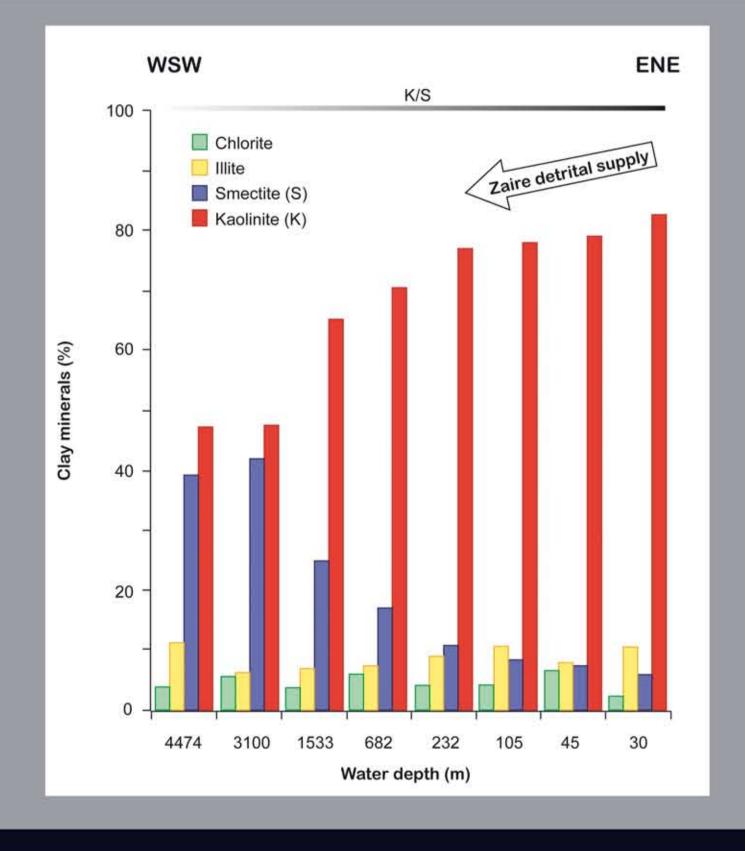
SE Trade winds: illite (I) and chlorite (C)

I (Al rich)

4. CLAY SEDIMENTATION

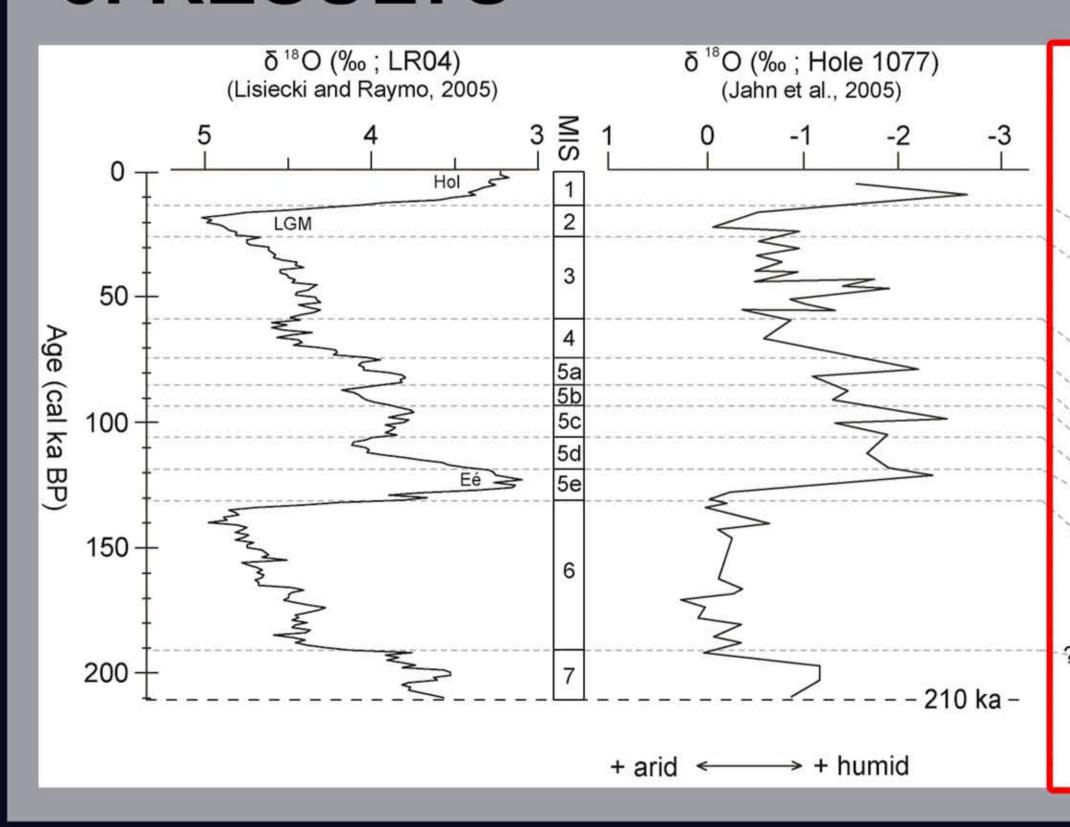
Presence of a selective sorting of the main clay minerals from the Zaire River mouth to the deep-sea fan (Gingele et al., 2001).

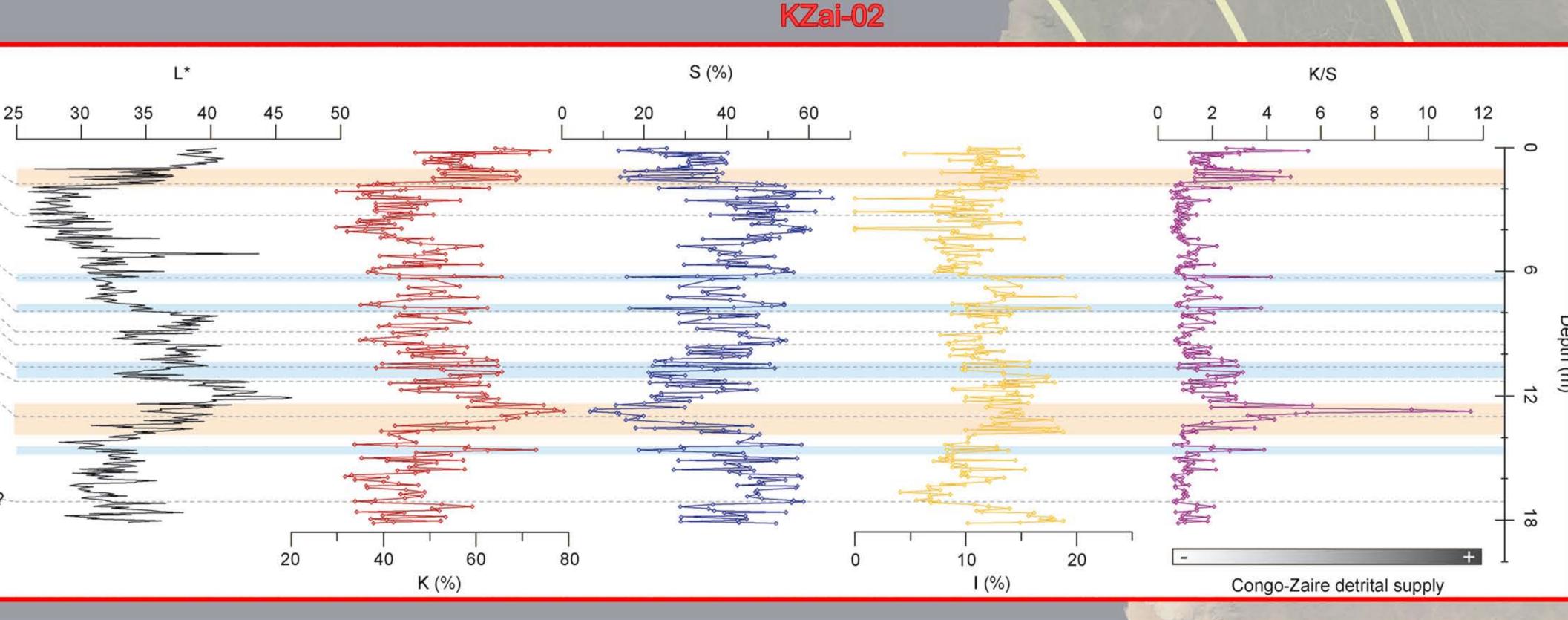
the Kaolinite/Smectite ratio (K/S) in the Zaire Fan sediments through time could be interpreted as an intensification of Congo-Zaire detrital supplies



I (Mg rich)

5. RESULTS





6. INTERPRETATIONS

- (1) Absence of chlorite and illite mainly Al rich
- little to no contribution of the SE Trade winds
- detrital sediments mainly supply by the Zaire River
- (2) Important increases of K/S (red rectangles) contemporaneous with climatic transitions from glacial to interglacial periods (MIS6-Eemian, MIS2-Holocene)
- continent
- raise of rainfalls that provokes fluvial floods

- (3) Decrease of K/S during warm periods
- Zaire River detrital supplies may have less impact
- influence of both the rising sea level and developed continental vegetation that favors infiltration vs runoff
- (4) Small increases of K/S (blue rectangles) during cold and arid periods
- enhanced NE Trade winds contribution or influence of the fall of the sea level
- Influence of climate changes on detrital supply variability

Gingele, F.X. et al., 1998. Palaeogeography, Palaeoclimatology, Palaeoeco-Jahn, B. et al., 2005. Geological Society of London, Special Publication, 247,

Lisiecki, L.E. and Raymo, M.E., 2005. Paleoceanography 20, doi: Marsset, T. et al., 2009. SEPM Special Publication, 92, 89-106.