Analysis of hydrologic conditions and currents in Gulf of Guinea from *in situ* observations

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PLAN

➢ INTRODUCTION

➢ DATA

➢ RESULTS and ANALYSIS

➢ CONCLUSIONS and PROSPECTS
WHY WE STUDY OCEANIC CIRCULATION AND ITS VARIABILITY?
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surface (full arrow) and subsurface (dash arrow) Circulation in Gulf of Guinea in summer and winter. [KOLODZIEJCZYK, 2008]
IN THE NORTH OF 2°N → FEW KNOWLEDGES ABOUT CIRCULATION

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6 OCEANOGRAPHIC CRUISES

2 EGEE cruises per year in 2005, 2006 & 2007

⇒ seasonal variability
  (Egee1&2, 3&4, 5&6; early summer & fall)

⇒ interannual variability
  (Egee 1 & 3 & 5, Egée 2 & 4 & 6)

⇒ intra-seasonal variability (Egee 3)
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**3 VERTICAL TRANSECTS:**

- R1, R2, R3

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[Map showing the routes of the cruises]
Data acquisition

- CTD-O₂ (conductivity, temperature, dissolved oxygen and pressure measurements... )
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- VM-ADCP (current velocity measurements)
CURRENTS MEASUREMENTS (Master2 works)
deep branch of South Equatorial Current (nSEC)
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Guinea Current (GC)
Guinea Counter Current (GCC) (name adopted because of its opposite direction relatively to GC)
GUIinea UNDERCURRENT (GUC) (name adopted because flow under GC)
4 ZONAL CURRENTS MEASURED

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deep branch of South Equatorial Current (nSEC)

GUINEA UNDERCURRENT (GUC) (name adopted because flow under GC)
ORIGIN OF GUC (Master2 works)
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GUC is observed along R1, R2 and R3 during EGEE period and characterized by a relative maximum of salinity (~34.8) and dissolved oxygen (120μmol/kg)

GUC origin hypothesis:

- Local recirculation?
- North Equatorial UnderCurrent (NEUC) extension?
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Tracklines in Gulf of Guinea used in this study between 1982 and 2007
SEASONNAL VARIABILITY and CURRENT EVOLUTION: BOREAL WINTER and SPRING
GC (25-70cm/s) is coastal and located above 50m depth
GUC (10-20cm/s) is located northly of 4°N between 80-200m depth, sometime coastal
GCC (20-50cm/s) is coastal, located below GC, linked with nSEC, appear sometime near the surface
SEASONNAL VARIABILITY and CURRENT EVOLUTION: BOREAL SUMMER
GC (15-110cm/s) most high velocity in july 2000 (110cm/s), in offing with appearance of GCC (25-45cm/s) near the surface
GUC (30-45cm/s) getting closer the coast during eastward evolution
GCC and nSEC well separated by GC & GUC eastward flows
SEASONNAL VARIABILITY and CURRENT EVOLUTION: BOREAL FALL
GC (35-60cm/s) most wide, linked to GUC (15-30cm/s)
GCC is located in the subsurface above or north of GUC but at 4°40W
GCC (20-45cm/s) and nSEC well separated by GC & GUC eastward flows
SALT ADVECTION
Underlining westward salt (tracer) advection by nSEC and GCC from GG ground (via recirculation of Equatorial UnderCurrent waters) (KOLODZIEJCZYK et al., 2010)
seasonnal variability partially known
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↔ GUC (with relative max in salinity and O2) extends all along west Africa coast so is not a local current
⇐ seasonal variability partially known

⇐ GUC (with relative max in salinity and O2) extends all along west Africa coast so is not a local current

⇐ insufficient data (particularly hydrologic data) to conclude that GUC is a NEUC extension
Study will be finalized with results from a high resolution (1/12°) numerical model (MERCATOR) during the PhD.
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+ Dedicated cruise?...

SUGGESTIONS:
THANKS FOR YOUR ATTENTION...

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