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△-15N OF CHLOROPHYLL PIGMENT AS AN INDICATOR TO INTERPRET THE N-CYCLING IN THE PAST OXYGEN MINIMUM ZONE IN CENTRAL BENGUELA UPWELLING SYSTEM

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The Benguela Upwelling System (BUS) is one of the four major eastern boundary upwelling systems of the world, situated off the west coast of Africa between 15 ºS - 37ºS and spanning three countries of Angola, Namibia and South Africa. There is year-round coastal upwelling, supplying coastal area with sufficient nutrients for phytoplankton growth for fish grazing. Besides, the upwelling water transported to coastal area is suboxic, and intense primary production resulted in further oxygen consumption, then leads to annual hypoxia (DO < 2ml/L) conditions in coastal water column, which in turn endanger the fish industry.
Under the background of global warming, Bakun's theory proposed an enhanced upwelling happening in the major eastern boundary upwelling systems. Long-time series development pattern of eastern boundary upwelling system indicates the boundary forcing variation at northern and southern of BUS. The biogeochemical response is carried and transferred by N isotope of nitrate transported by the corresponding upwelling activity. This signal may undergo amplification by denitrification along with the formation of OMZs at central BUS shelf. Hereby, my study proposes a compound specific δ15N-based method to check the biogeochemical feedback signal to upwelling variation at central BUS both historically and contemporarily under a regional sea surface warming trend by analyzing the δ15N of chlorophyll pigment in surface and dated core sediment at northern boundary and central upwelling area.
My study will focus on the following research objectives:
1) To uncover the upwelling activity variation in northern Angola Benguela Front (ABF) boundary and the corresponding fluctuation in central Namibian coast;
2) To unveil the N-nutrient (nitrate) inputs and utilization from ABF to central BUS, its long-time variation and predict it future development.
3) To build up the long-term variation N-loss activity in OMZ of Central BUS, and build up its connection with global warming;

My study is based on analytical method of determination of compound specific δ15N of pigment, which means the separation and purity of pigment is essential to the final results. Beside, how to control the exogenic nitrogen contamination to the pigment samples is another important issue. Finally, the temporal development hydrography in BUS is a key to help to explain and understand the long-time pattern of nitrogen cycling. However, the lack of long-time series of in-situ observation of wind intensity, upwelling activity, seawater temperature and salinity at different water depth result in the complexity of understanding the currents circulations in BUS, which leaves open questions to many researchers.