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Transition to ecosystem-based governance of the Benguela Current Large Marine Ecosystem

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ABSTRACT

The signing of the Benguela Current Convention in March 2013 ushered in a new era of south–south collaboration between the three southern African countries of Angola, Namibia and South Africa towards the ecosystem-based governance of the Benguela Current Large Marine Ecosystem (BCLME). The three developing countries have collaborated since the 1990s to develop a common vision for improved understanding and management of the priority transboundary environmental problems that threaten the resilience and robustness of the BCLME. What started with modest scientific collaboration developed organically into a holistic approach to ocean management; this was as a result of consistent support from the governments of the three countries and a number of development partners. The result is the signing and ratification of the Benguela Current Convention – the first legal framework in the world to be based on the LME approach to ocean governance. This paper traces the genesis of collaboration between the three BCLME countries in the adoption and implementation of the LME approach to ocean governance.

1. Introduction

The BCLME is situated in the southeast Atlantic between 14°S and 37°S, east of the 0° meridian, encompassing the coastal wind-driven upwelling regime, frontal jets and the eastern part of the South Atlantic gyre (Fig. 1, Parrish et al., 1983; Nelson and Hutchings, 1983; Shannon 1985; Lutjeharms and Meeuwis, 1987). It is influenced by the cold Benguela Current which is one of the world's four eastern boundary upwelling systems. The other eastern boundary upwelling systems are the Humboldt, California and Canary currents. A strong, wind-driven coastal upwelling system, with its principal upwelling centre located off Lüderitz (27°S, southern Namibia) dominates this ecosystem which is highly variable at seasonal, annual and decadal scales (Shannon and O'Toole, 1998', 2003; van der Lingen et al., 2006). The primary production in the Benguela is in excess of 300 g cm^{-2} yr^{-1} (Wooster and Reid, 1963; Parrish et al., 1983; Shannon, 1985) and supports an important global reservoir of biodiversity and biomss of fish, seabirds, crustaceans and marine mammals (Heileman and O'Toole, 2009).

At times, warm, saline, nutrient-poor water from the equator associated with low dissolved oxygen intrudes into the BCLME (De Decker, 1970; Shannon et al., 1986; Boyd et al., 1987; Shannon and Taunton-Clark, 1989; Gammelsrod et al., 1998;

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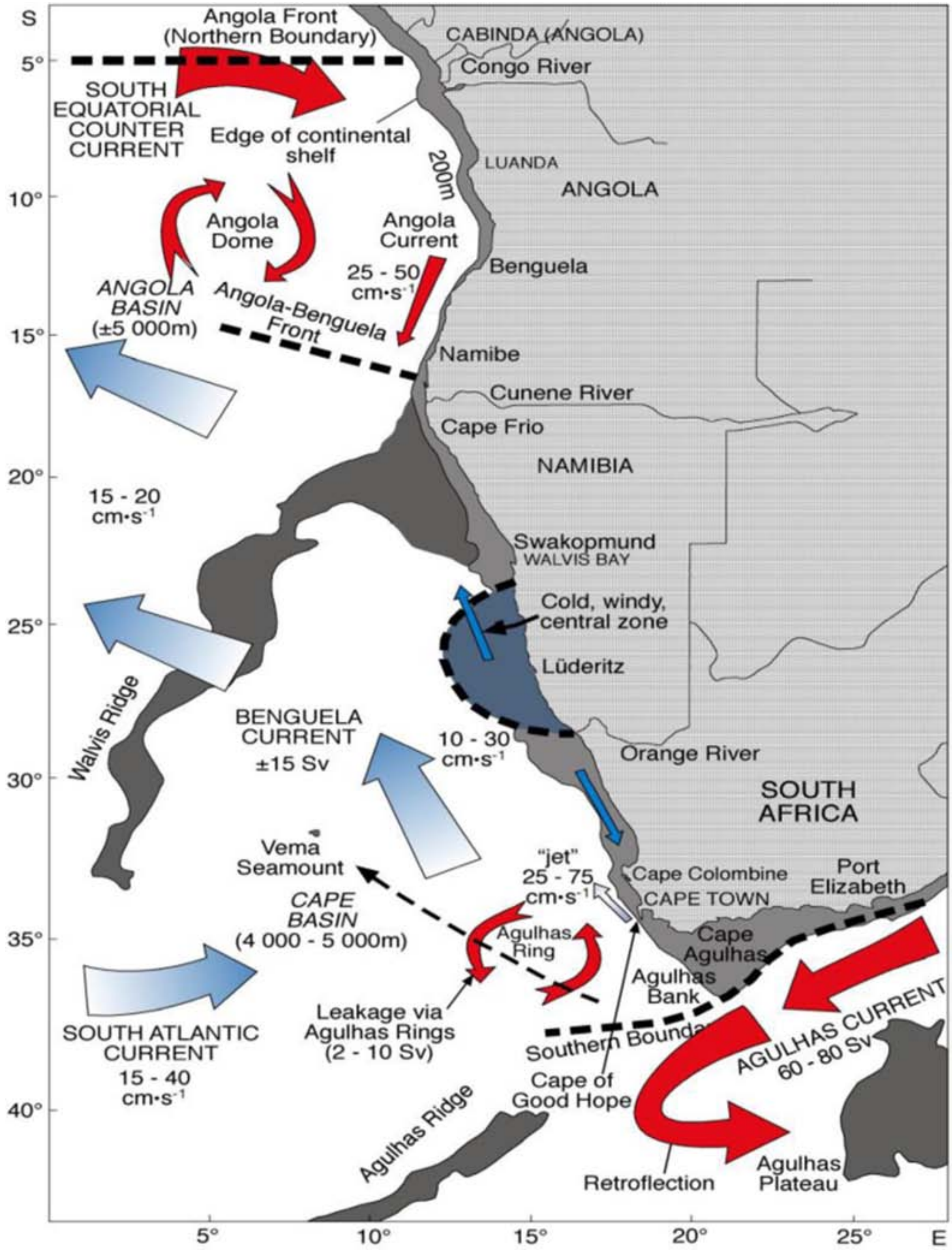

Fig. 1. Main physical features and surface currents in the BCLME (blue arrow – cold current; red arrow – warm current) (Hempel et al., 2008). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Hamukuaya et al., 1998; Monteiro and van der Plas, 2006; Mohrholz et al., 2008), causing displacement (Shannon and O'Toole, 1998, 1999, 2003) and often causes mass mortality of living marine resources, including commercially important shared fish stocks (Smith, 1965; Le Clus, 1985, 1986; Schulein et al., 1995; Hamukuaya et al., 1998). Such phenomena are referred to as Benguela Niños (Shannon et al., 1986). The mean surface temperature in the northern Benguela has increased by 1 °C during the last 30 years (Heileman and O'Toole, 2009).

A sixty-year (1950–2011) time series of variability of oxygen-depleted bottom waters ($> 2\ \mathrm{mL\,L^{-1}}$) in the southern Benguela along the west coast of South Africa has recently been analysed and showed that these waters are generally restricted to bottom depths < 150 m and occur regularly during the austral summer and autumn, albeit with variable severity (Jarre et al., 2015a). In the same area, the sea surface temperature has likewise warmed, with a southwards shift of