Understanding the changing dynamics of Arabian Sea monsoon eddy systems in an ocean warming environment

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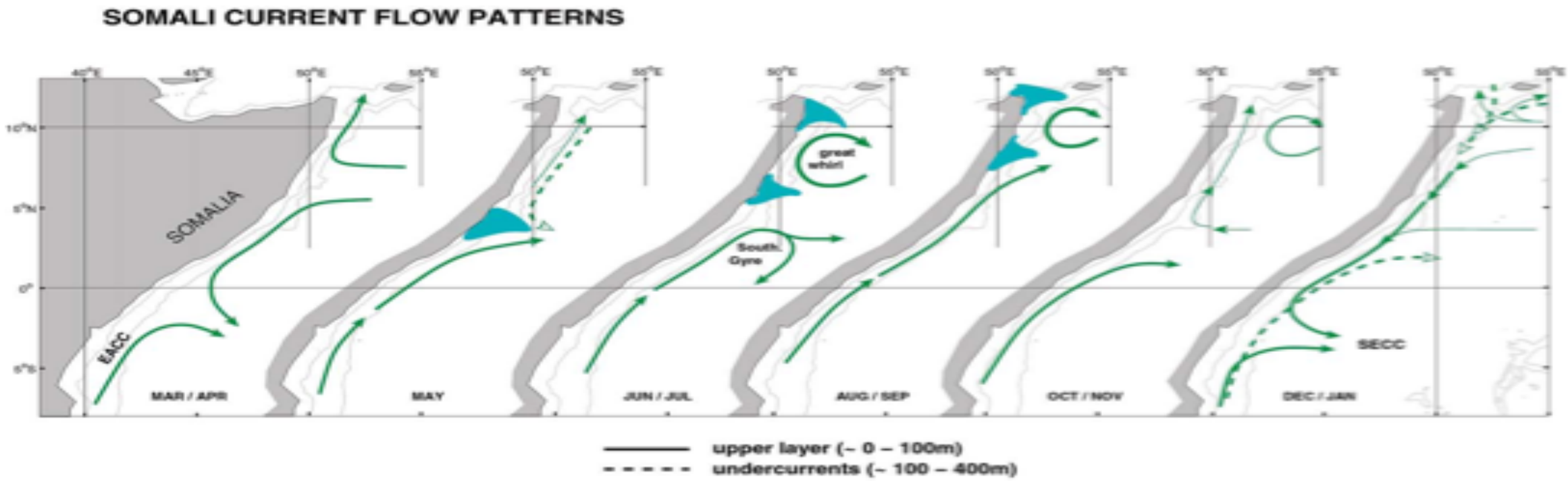
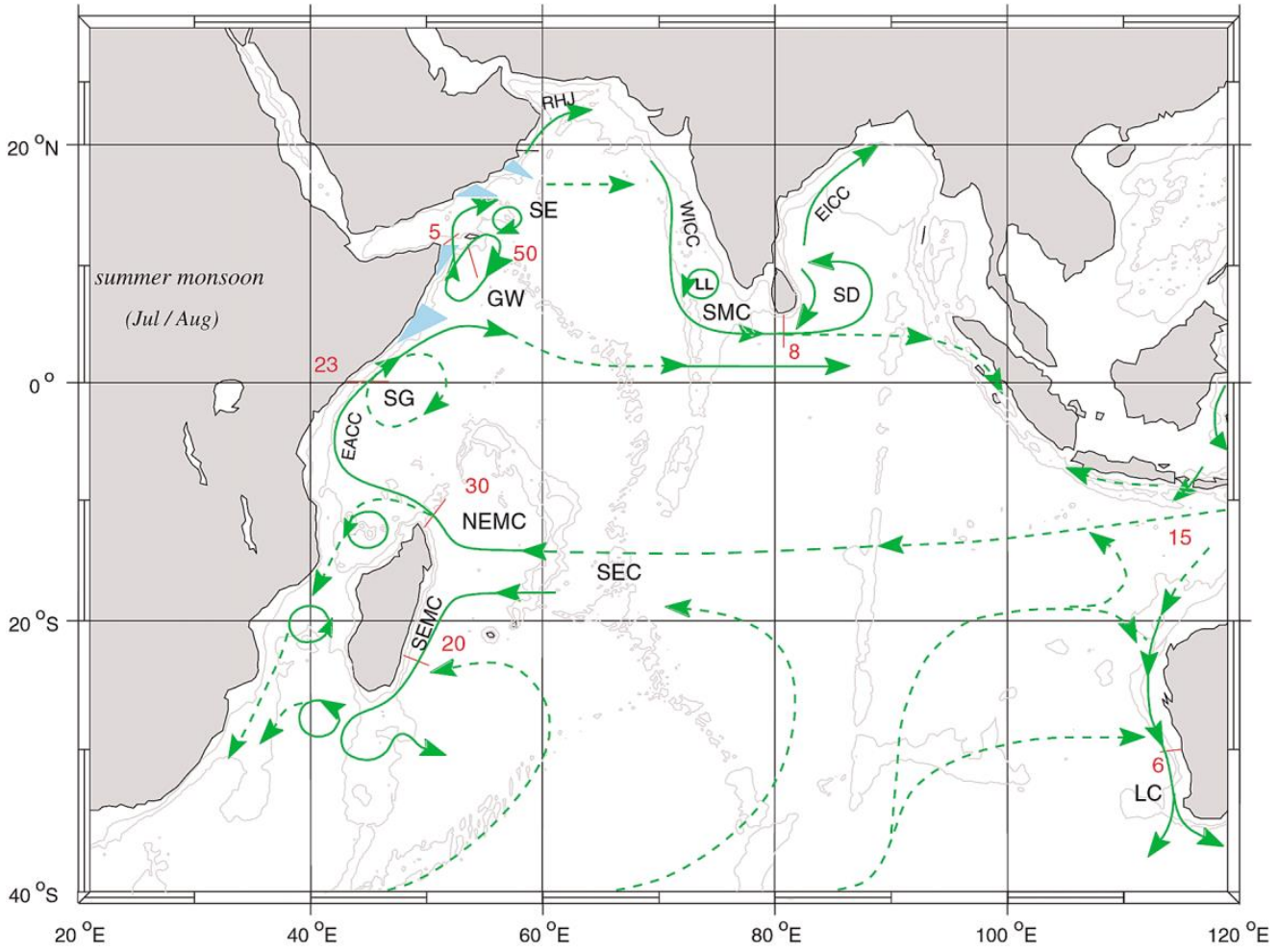
Schott & McCreary, 2001



- ***March–May***: Before the onset of the monsoon the southern Somali Current is an extension of the East African Coast Current (EACC) that flows northward across the equator to about 3–4°N. There, it turns offshore, and a cold wedge develops along its shoreward shoulder.
- ***June–July***: With the monsoon onset in June, the 'Great Whirl' develops from 4–10°N, and a second cold wedge appears at the latitude where it turns offshore (10–12°N).
- The cross-equatorial flow continues during June-July. It leaves the coast south of 4°N, where part turns eastward and part flows back across the equator in a circulation pattern referred to as the 'Southern Gyre'. The fraction of the direct cross-equatorial offshore return flow in the Southern Gyre appears to vary from year to year (Schott et al., 1990).
- When the Southwest Monsoon dies down, the cross-equatorial Somali Current turns offshore again at 3°N, while the Great Whirl continues to spin in its original position. The Great Whirl is even discernible underneath the developing Northeast Monsoon circulation well toward the end of the year (Bruce, Fieux, & Gonella, 1981)



Summer Monsoon circulation Ref: Schott and McCreary, 2001

- Roxy et al. [2017] showed that the extreme rainfall events are preceded by warm SST anomalies over the northern Arabian Sea, at 2–3 weeks' lead.
- Also, in the view of warming of Arabian Sea may have significant impact on the formation and variability of SG, GW and SE.

- Significant interannual differences in the system of cold upwelling wedges off Somalia and their movements during the course of the Southwest Monsoon have already been reported earlier (Evans & Brown, 1981; Schott, 1983)
- A study on interannual variability and GW dynamics has been carried out by Wirth et al. (2002). Their conclusion was that interannual GW variability is predominantly determined by internal processes, and not by the interannual variations of the wind field.
- Trott et al. [2017] worked on understanding the relationship between the location and strength of the eddy systems and the strength of Indian Summer Monsoon [Trott et al., 2017].

Objectives

- 1. To study the changes in the dynamics of Arabian Sea monsoon eddy systems in an ocean warming scenario.
- 2. To study the changing relationship between the Arabian Sea monsoon eddy systems and Indian Summer Monsoon
- 3. To investigate the possible role of monsoon eddy systems in extreme precipitation events in the Arabian Sea warming scenario.

Project details:

- Project sanctioned under DST-SERB Core Research Grant
- Project until December 2023
- Model work – Workstation using ROMS
- CMIP 5 and CMIP 6 data

Project Stage:

Year	Activity
Year 1	Procurement of data, Analysis (Objective 1)

Expected outcomes

- To understand the changes in Arabian Sea monsoon circulation under ocean warming conditions
- To improve understanding of the dynamics of extreme precipitation events due to Arabian Sea warming.
- To improve our understanding of the relationship between Arabian Sea circulation and Indian Summer Monsoon.

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