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# The Sargassum Invasion of the Eastern Caribbean and Dynamics of the Equatorial North Atlantic

## Invasión de Sargazo en el Caribe Oriental y la Dinámica en la Zona Ecuatorial del Atlántico Norte

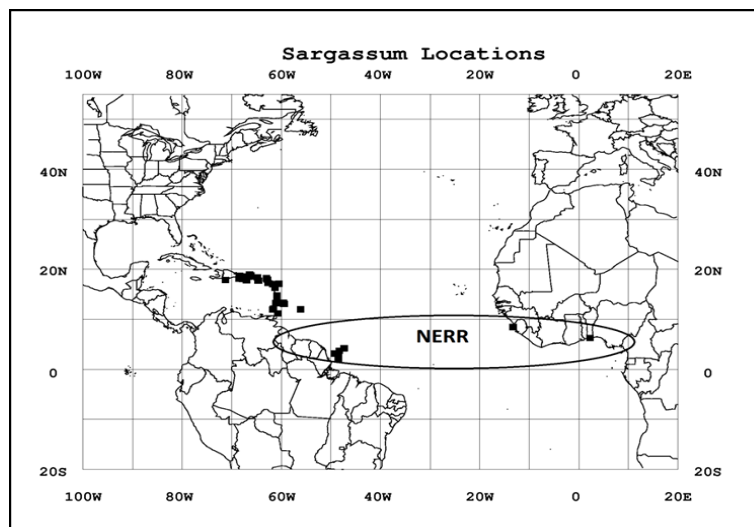
### L'Invasion de Sargasse dans les Caraïbes Orientales et leur Dynamique dans la Partie Nord de l'Atlantique Équatorial

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#### EXTENDED ABSTRACT

In the spring and summer of 2011, unprecedented quantities of pelagic sargassum came ashore on many islands of the eastern Caribbean (Figure 1), seriously affecting fishery and tourism industries. Concurrently, pelagic sargassum also washed ashore in massive amounts along the coasts of western Africa (Sierra Leone and Benin) and was spotted in large mats by aircraft off northern Brazil (Széchy et al. 2012). Two species were identified in the invasion: *Sargassum natans* and *Sargassum fluitans*, both of which coexist throughout the North Atlantic with large mats and long lines commonly found in the Sargasso Sea (Winge 1923) and in the northern Gulf of Mexico (Comyns et al. 2002). Using satellite tracked mixed-layer drifters during 2010 and 2011 we were unable to connect the Caribbean invasion to the central North Atlantic and the Sargasso Sea. However, from archived results of a numerical circulation model (HYCOM), back-tracking from where landfalls were reported suggested that the sargassum may have bloomed in the north equatorial recirculation region (NERR) where conditions in the spring/summer of 2010 were conducive to growth and consolidation. Further backtracking from the NERR indicated that the equatorial water carrying the sargassum came from the south Atlantic where the presence of these species has not been verified. This suggests that the sargassum bloomed in the NERR where it flourished under high ocean temperatures and high nutrient inputs and was entrained in south Atlantic water. It may have recirculated for an extended time in the NERR before being released into the North Brazil Current (Fonseca et al. 2004) flowing into the eastern Caribbean or drifting to the coast of western Africa.



**Figure 1.** Locations of Sargassum landfall or where large mats/lines were spotted by aircraft – black squares. Ellipse roughly outlines the North Equatorial Recirculation Region – formed seasonally by the equator, the North Equatorial Counter Current and the North Brazil Retroflexion.

The NERR region extends from the equator to the seasonally forming North Equatorial Counter Current at about 5 – 10°N, and from Brazil to Africa (Philander 2001). Satellite chlorophyll images show that this region is influenced by nutrients from the Amazon and Congo Rivers, and by equatorial upwelling. Ocean dynamics in the NERR are strongly affected by the location and intensity of the atmospheric Inter-Tropical Convergence Zone, modulated by global scale climate oscillations. The unusual nature of this event suggests that it may be coupled to larger swings in regional ecosystem dynamics due to global temperature increases.

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