PRELIMINARY CRUISE REPORT

U.S. Dept. of State CRUISE No.:	2014_048
SHIP NAME:	*SSV Corwith Cramer*
OPERATING INSTITUTE OR AGENCY:	Sea Education Association
PROJECT TITLE:	Sea Semester C-256
CRUISE DATES (INCLUSIVE):	14 November to 23 December, 2014

CHIEF SCIENTIST:	
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CLEARANCE COUNTRIES:	Spain (Canary Islands), Barbados, Guadeloupe and Martinique, Dominica, Montserrat, Saint Kitts and Nevis, Antigua and Barbuda, Sint Marteen (Dutch), Saba and Saint Eustatius, Saint Martin (French) and St. Bartholemy, Anguilla, British Virgin Islands, US Virgin Islands
FOREIGN PARTICIPANTS:	Dr. Clare Morrall, Associate professor marine science St. Georges University, Grenada.

DESCRIPTION OF SCIENTIFIC PROGRAM (include page-sized chart showing cruise track):

Data Description C256

The cruise track for C-256 (Figure 1) departed from Las Palmas, Gran Canaria, Canary Islands, and finished in Christiansted, St Croix, USVI. During the nearly six-week voyage we had three port stops; the first in Portsmouth, Dominica, the second in Philipsburg, St Martin, and the last in St John, USVI.

Our cruise track traversed several major oceanographic provinces (Figure 1): a) the cold, coastally influenced waters of the Canary Current, b) the sub-tropical North Atlantic gyre or Sargasso Sea, c) the North Equatorial Current (NEC) region, and d) the waters of the Eastern Caribbean Sea.

We collected data with 127 individual deployments from 46 discrete geographic stations along our cruise track. Comparison of the physical, chemical, biologic and geologic features of

these regions represented the major oceanographic theme of this sea semester.

1. Physical oceanographic studies focused on the distribution of surface and sub-surface (to 1200 m) water masses and the delineation of hydrographic boundaries. Specifically, North Atlantic sub-tropical mode water (18°C Water) and Antarctic Intermediate Water (AAIW) was studied in relation to the phase of the North Atlantic Oscillation (NAO). In addition, we conducted a comparison of sea surface temperature using historic (bucket thermometer) and contemporary (electronic thermister from a seawater intake system) instrumentation.
2. Chemical oceanographic studies focused on the geographic and vertical distribution of nutrients (phosphate, silicate), and extracted chlorophyll-*a*. These chemical parameters were related to patterns in physical hydrography at various scales: sub-tropical convergence, ocean fronts and eddies associated with the North Equatorial Current, and water column stratification.
3. Biological studies focused on the geographic distribution of charismatic megafauna (seabirds, sea turtles, flying fish, and marine mammals), several meroplanktonic larvae including spiny lobster (phyllosoma) and eels (leptocephali), the floating macrophyte – *Sargassum* spp., and the density (mL/m2) and diversity (i.e. Shannon-Weiner index) of the aggregate zooplankton community. In addition, patterns of phytoplankton community structure were examined along the cruise track.
4. Geological sampling focused on bathymetric transects across numerous tectonic features (e.g. island hot spots, mid-ocean ridge, abyssal plains, and subduction zone), bathymetric mapping of Researcher Ridge, and sediment collection on Researcher Ridge and continental shelf regions of several Caribbean Islands.

Sea surface temperature, salinity, fluorescence (chlorophyll-*a* and CDOM) and transmissivity levels; along with barometric pressure, winds, bathymetry, and geographic position were recorded continuously along the cruise track. Surface samples (96) of nutrients (phosphate, silicate) and chlorophyll-*a* were collected every six hours and in conjunction with all neuston net tows during the cruise track.

A comparison of historic and contemporary methods for determination of sea surface temperature was conducted routinely as part of lab Hourly Observations. Historic methods involved collection of surface water using a bucket and temperature measurements made with an alcohol thermometer. Contemporary methods collect water with a thru-hull intake pump that collects water from 1-3m below the sea surface, depending on ship heel, and measured temperature with an in-line electronic thermistor. Each technique was cross-calibrated before the cruise began.

Additional Hourly Observations included the enumeration of seabirds, sea turtles, flying fish, marine mammals, *Sargassum* spp clumps, and floating plastic debris. Observations occurred only during daylight hours 0700-1900 for a period of 6 minutes each hour (n=129). Periodically, opportunistic sightings were also recorded when notable megafauna or marine debris were present.

The density structure of the water column (maximum depth 1500 m) was determined using a Seabird CTD with attached *in situ* chlorophyll-*a* fluorescence and dissolved oxygen sensors (21 stations).

Surface plankton assemblages along with the floating macrophyte *Sargassum* spp., marine debris and tar balls were sampled regularly with a neuston net (46 stations, 335 µm mesh). Plankton assemblages at discrete depths were collected using a $1m^2$-Tucker trawl net (4 stations, 335 µm mesh). Targeted depths ranged from 5 to 15 m. In combination these myriad net deployments reveal the vertical and horizontal distribution patterns of the marine insect *Halobates*, eel (leptocephali) and spiny lobster (phyllosoma) larvae, pteropods, and general zooplankton diversity and taxonomic composition in relation to numerous environmental parameters.

Discrete samples of *Sargassum* clumps and marine plastic debris were collected with a dip net (13 stations, 335 µm mesh). Shrimp, crab, fish specimens and all epibionts (emphasis on attached phytoplankton) were rinsed from collected samples. Abundance and diversity of associated biota were related to mass (g) of *Sargassum* or plastic debris and geographic location.

Additional phytoplankton samples were routinely collected with a surface (~1-3m) drifted phytonet (12 stations, 30cm frame, 63 µm mesh).

Seven sediment samples were collected using a shipek grab. Two along the crest of Researcher Ridge, a single sample on the continental shelf of Dominica, Montserrat, and St Martin, and two on Saba Bank.

Final scientific work conducted aboard ship was the routine deployment of a secchi disc (18 stations) to estimate the 1% light level.

Jeffrey Schell, Associate Professor – Chief Scientist, C256

SCHEDULE OF DATA DELIVERY:	
Data Description	Date of Expected Delivery to Dept. of State
Final Cruise Report	23 December 2015

CRUISE TRACK (insert here):