Cruise: C288
Organization: Sea Education Association
Vessel: SSV *Corwith Cramer*
Chief Scientist: Jeffrey M. Schell
Captain: Jason Quilter
Cruise Dates: 11 October to 18 November 2018

Application for Consent to Conduct Marine Scientific Research in Areas Under National Jurisdiction of: Anguilla, Antigua and Barbuda, Barbados, Bermuda, British Virgin Islands, Dominica, Guadeloupe and Martinique (French), Montserrat, Saba and Sint Maarten (Dutch), St Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines.

Table 1. Estimated entry and exit dates for foreign territorial waters

Foreign coastal state-specific details		
Coastal Area	**Estimated Entry Date**	**Estimated Departure Date**
Bermuda	Oct. 14, 2019	Oct. 25
Anguilla	Oct. 27	Nov. 12
Antigua and Barbuda	Oct. 28	Nov. 12
Guadeloupe and Martinique (France)	Oct. 29	Nov. 12
Dominica	Oct. 30	Nov. 11
St Lucia	Oct. 30	Nov. 05
Barbados	Oct. 30	Nov. 05
St. Vincent & the Grenadines	Oct. 30	Nov. 05
Montserrat	Nov. 09	Nov. 12
St Kitts And Nevis	Nov. 09	Nov. 12
Saba and St. Maarten	Nov. 09	Nov. 12
British Virgin Islands	Nov. 11	Nov. 18

Table 2. Cruise Plan

Cruise Plan		
	Location	**Date(s)**
Program Begins:	Woods Hole MA, USA	Oct. 11, 2019
Depart:	Woods Hole MA, USA	Oct. 12, 2019
Port Stop:	Portsmouth, Dominica	Nov. 05 - 09, 2019
Port Stop:	Francis Bay, St John	Nov. 13 - 17, 2019
Arrive:	Christiansted, St Croix	Nov. 18, 2019
End of Program:	Christiansted, St Croix	Nov. 18, 2019

Figure 1. **Cruise Track**

Figure 2: Zoom in of cruise track

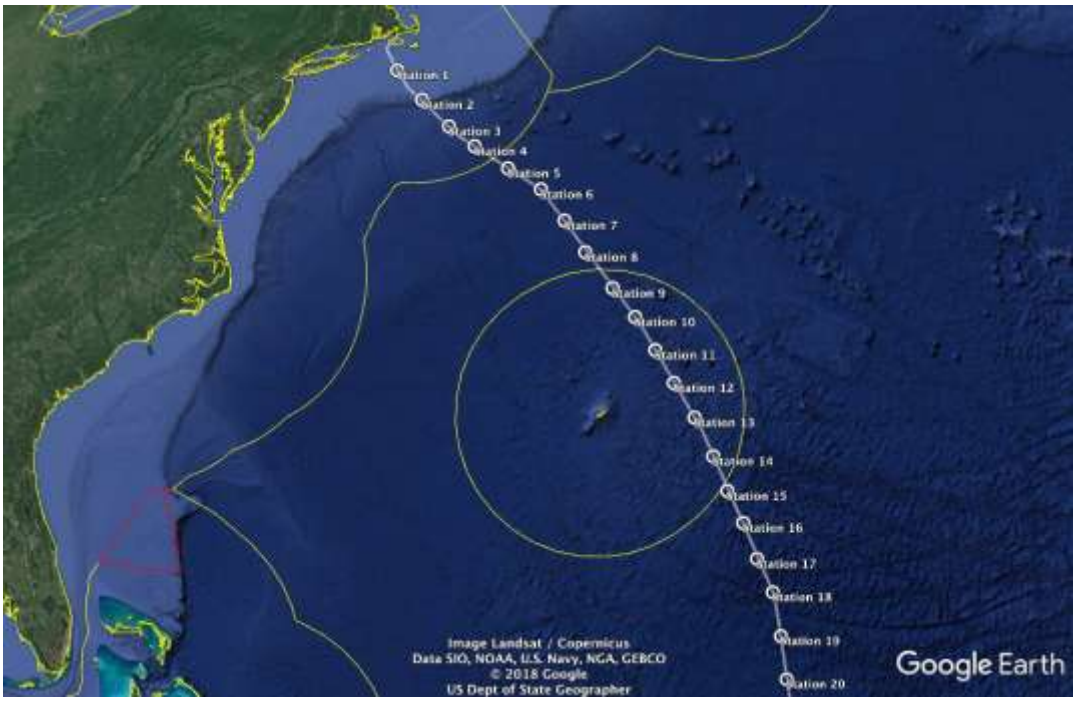
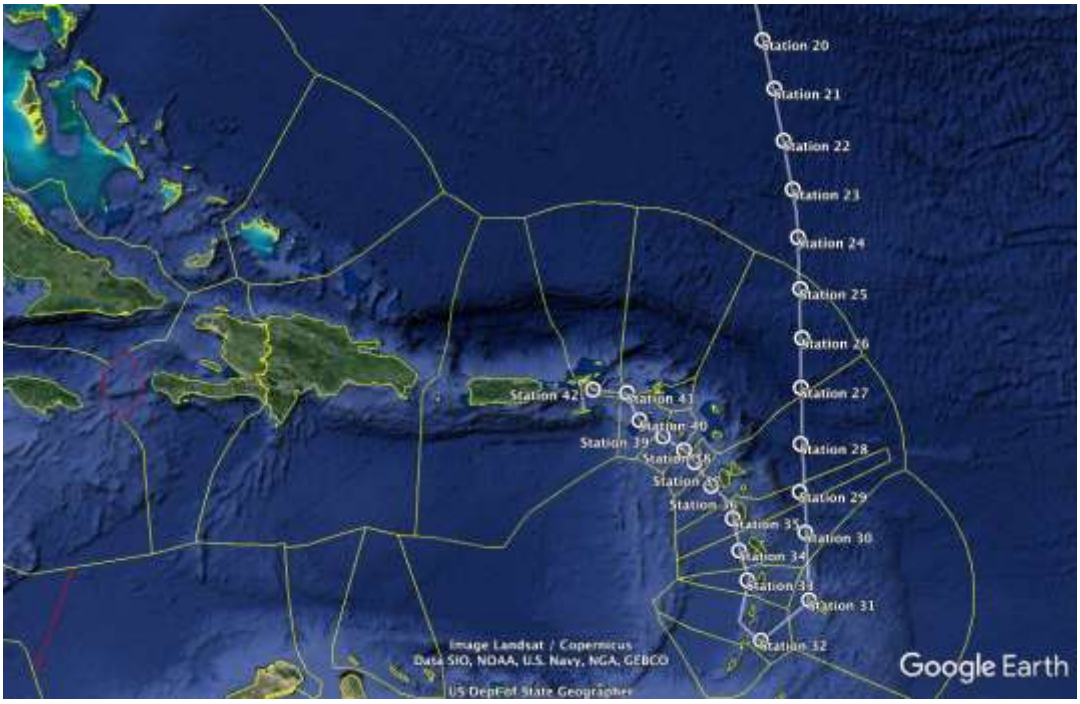


Figure 3: Zoom in of cruise track



Proposed Scientific Stations:

Station 1	40.66 °N	70.61°W	Station 22	23.19 °N	59.78 °W
Station 2	39.92 °N	69.80 °W	Station 23	22.14 °N	59.68 °W
Station 3	39.26 °N	68.95 °W	Station 24	21.11 °N	59.66 °W
Station 4	38.76 °N	68.17 °W	Station 25	20.02 °N	59.70 °W
Station 5	38.20 °N	67.17 °W	Station 26	18.98 °N	59.75 °W
Station 6	37.67 °N	66.20 °W	Station 27	17.94 °N	59.85 °W
Station 7	36.90 °N	65.54 °W	Station 28	16.76 °N	59.93 °W
Station 8	36.13 °N	64.98 °W	Station 29	15.74 °N	60.01 °W
Station 9	35.26 °N	64.24 °W	Station 30	14.85 °N	59.92 °W
Station 10	34.55 °N	63.65 °W	Station 31	13.38 °N	59.90 °W
Station 11	33.74 °N	63.13 °W	Station 32	12.59 °N	61.02 °W
Station 12	32.94 °N	62.67 °W	Station 33	13.93 °N	61.27 °W
Station 13	32.08 °N	62.15 °W	Station 34	14.59 °N	61.43 °W
Station 14	31.13 °N	61.71 °W	Station 35	15.28 °N	61.54 °W
Station 15	30.27 °N	61.38 °W	Station 36	16.01°N	61.98 °W
Station 16	29.46 °N	60.99 °W	Station 37	16.53 °N	62.33 °W
Station 17	28.55 °N	60.68 °W	Station 38	16.80 °N	62.55 °W
Station 18	27.68 °N	60.29 °W	Station 39	17.11 °N	62.99 °W
Station 19	26.55 °N	60.13 °W	Station 40	17.48 °N	63.49 °W
Station 20	25.42 °N	60.03 °W	Station 41	18.07 °N	63.74 °W
Station 21	24.33 °N	59.88 °W	Station 42	18.17 °N	64.48 °W

Proposed Scientific Sampling:

Proposed scientific sampling to include continuous water column profiles of current magnitude and direction via ADCP; continuous single-beam measurements of bathymetry; continuous surface seawater measurements of temperature, salinity, colored dissolved organic matter (CDOM) fluorescence, beam transmittance, and chlorophyll fluorescence; CTD profiles of upper water column; discrete water samples collected by Niskin bottle for chemical analysis (nitrate, phosphate, silicate, dissolved oxygen, chlorophyll concentration, pH, total and carbonate alkalinity, and abundance of microplastic particles); surface and near-surface zooplankton biodiversity and abundance assessed by net tow (333um mesh); surface and near-surface phytoplankton biodiversity and abundance assessed by drifted phytoplankton net; seafloor sediment sampling by shipek grab and/or gravity core.

In addition to instrument-driven observation we will also conduct hourly visual surveys (0600-1800 hours) of marine debris, marine mammals, seabirds, fish and sea turtles. Enumeration of marine debris and fauna (e.g. seabirds, marine mammals, etc.) may be augmented with aerial surveys using a drone equipped with a digital recording device (e.g. Phantom 3 or similar model ~ 400m range) and a hydro- acoustic device to record the ocean soundscape - including marine mammal vocalization and anthropogenic noise pollution.

During our two port calls (Dominica and St John, USVIs), we will conduct non-destructive visual and photographic surveys of coral reef systems. During these surveys we will assess substrate rugosity, live coral and algal cover, and extent of coral bleaching and disease using standard transect/quadrat sampling methodology. Diversity and abundance of fish and invertebrate communities will be assessed using belt transect, stationary point count, and roving survey techniques. Relevant water quality parameters (e.g. sea surface temperature, salinity, pH, nutrients, turbidity, and *E. coli* bacteria counts) will be sampled on the reef to assess thermal and acidification stress, coral bleaching risk, nutrient loading and other anthropogenic stressors. In addition, we propose to record coral reef soundscapes using a portable hydro-acoustic device (same as above). The acoustic recording device would be placed on the seafloor adjacent to reef environments for 24 hrs. Upon retrieval all equipment moorings and weights would be recovered.

Table 3. Ports of Call

Port	Date Arrive	Date Depart	Distance (nm)	Days of Travel	Miles/Day
Woods Hole MA, USA		12 Oct. 2019	2100	24	88
Portsmouth, Dominica	05 Nov. 2019	09 Nov 2019	260	4	65
Francis Bay, St John USVIs	13 Nov. 2019	17 Nov. 2019	40	1	40
Christiansted, St Croix	18 Nov. 2019				