Dataset: Rainfall and seawater temperature in St. John, USVI in 1987–2013 (St. John LTREB project, VI Octocorals project).

Project(s): LTREB Long-term coral reef community dynamics in St. John, USVI: 1987-2019 (St. John LTREB)
Ecology and functional biology of octocoral communities (VI Octocorals)

Abstract: Physical environmental data from 1989 – 2013 are were recorded using in situ data loggers, weather stations and data buoys, to provide seawater temperature data (1989 – 2013) and rainfall (1987 – 2013). Maximum/ minimum tmeoperatrue, nr of hot/cold days are reported. For a complete list of measurements, refer to the supplemental document 'Field_names.pdf', and a full dataset description is included in the supplemental file 'Dataset_description.pdf'. The most current version of this dataset is available at: http://www.bco-dmo.org/dataset/664254

Description: Temperature and rainfall data for St. John USVI.

Temperature and rainfall data for St. John USVI.

Acquisition Description: **Based on Tsounis and Edmunds (In press), Ecosphere:**

Physical environmental conditions were characterized using three features that are well-known to affect coral reef community dynamics (described in Glynn 1993, Rogers 1993, Fabricius et al. 2005): seawater temperature, rainfall, and hurricane intensity. Together, these were used to generate seven dependent variables describing physical environmental features. Seawater temperature was recorded at each site every 15-30 min using a variety of logging sensors (see Edmunds 2006 for detailed information on the temperature measurement regime). Seawater temperature was characterized using five dependent variables calculated for each calendar year: mean temperature, maximum temperature, and minimum temperature (all averaged by day and month for each year), as well as the number of days hotter than 29.3 deg C (“hot days”), and the number of days with temperatures greater than or equal to 26.0 deg C (“cold days”). The temperature defining "hot days" was determined by the coral bleaching threshold for St. John (http://www.coral.noaa.gov/research/climate-change/coral-bleaching.html), and the temperature defining "cold days" was taken as 26.0 deg C which marks the lower 12th percentile of all daily temperatures between 1989 and 2005 (Edmunds, 2006). The upper temperature limit was defined by the local bleaching threshold, and the lower limit defined the 12th percentile of local seawater temperature records (see Edmunds 2006 for details). Rainfall was measured at various locations around St. John (see http://www.sercc.com) but often on the north shore (courtesy of R. Boulon) (see Edmunds and Gray 2014). To assess the influence of hurricanes, a categorical index of local hurricane impact was employed, with the index based on qualitative estimates of wave impacts in Great Lameshur Bay as a

function of wind speed, wind direction, and distance of the nearest approach of each hurricane to the study area (see Gross and Edmunds 2014). Index values of 0 were assigned to years with no hurricanes, 0.5 to hurricanes with low impacts, and 1 for hurricanes with high impacts, and years were characterized by the sum of their hurricane index values.

Processing Description: **Based on Tsounis and Edmunds (In press), Ecosphere:**

Temporal trends of physical parameters were tested through linear regression using 3-year centered moving averages to address the lag of response of benthic community structure to environmental conditions (resulting in the loss of 2 y from the dataset).

Question 2. The seven physical environmental variables were tested for collinearity by screening variables by pairwise linear correlation. This procedure identified four variables that were independent, and these were used for subsequent analyses: hurricane index (Hindex), mean seawater temperature (deg C), rainfall (cm), and minimum seawater temperature (deg C). The physical variables were transformed using 3-year, centered moving averages of each dependent variable to smooth short-term fluctuations arising from stochastic effects, and to address delayed effects of environmental conditions on the communities. As physical conditions were measured on different scales, they were z-score standardized prior to analysis (Sokal and Rohlf 2012), and expressed as resemblance matrix based on Euclidean distances.

Each of the four assemblages was tested for associations with all combinations of the four measures of physical conditions, using Spearman rank correlation (Clarke and Ainsworth 1993). The Bioenv function (Clarke and Ainsworth 1993) was used for correlations, and was followed with a Mantel procedure (Legendre and Legendre 1998) to identify the set of physical variables most strongly associated with the biological variables, with significance evaluated in a permutational framework. The Bioenv function was performed using the vegan package for R (R Development Core Team 2008 [Oksanen et al. 2015]).

Deployment Information

Deployment description for Virgin Islands National Park Edmunds_VINP

Studies of corals and hermit crabs

Instrument Information

Instrument	Precipitation gauge
Description	Measured rainfall
Generic Instrument Name	Precipitation Gauge
Generic Instrument Description	measures rain or snow precipitation

Instrument	Temperature logger
Description	Measured seawater temperature
Generic Instrument Name	Temperature Logger
Generic Instrument Description	Records temperature data over a period of time.