Research Data Journal

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General

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| --- | --- |
| **Researcher** | *Niklas A. Kornder* |
| **Researcher ID** | *ORCID: 0000-0003-3932-6078* |
| **Researcher Affiliations** | *University of Amsterdam, Institute for Biodiversity and Ecosystem Dynamics, Department of Freshwater and Ecosystem Dynamics, Science Park 904, 1098XH Amsterdam* |
| **Supervisors** | *1. Jasper M. de Goeij 2. Mark J. A. Vermeij* |
| **Supervisors ID** | *ORCID J. M. de Goeij: 0000-0002-3411-3084*  *ORCID M. J. A. Vermeij: 0000-0001-9612-9527* |
| **Supervisors Affiliations** | *University of Amsterdam, Institute for Biodiversity and Ecosystem Dynamics, Department of Freshwater and Ecosystem Dynamics, Science Park 904, 1098XH Amsterdam* |
| **Project title** | *Organic carbon cycling in a Caribbean coral reef* |
| **Project description** | The aim of the project was to improve our understanding of organic carbon flows between organisms in coral reef ecosystems |
| **Project duration** | *From 2017-08-01 to 2023-01-31* |
| **Funder(s)** | *European Research Council (ERC)* |
| **Related documents** | *ERC starting grant agreement # 715513* |

Computer and software specifications

|  |  |
| --- | --- |
| **Operating system** | *Windows10* |

|  |  |  |
| --- | --- | --- |
| **Required Software** | **Version** | **Libraries/Packages/Modules/Plugins** |
| *CPCe*  *Agisoft Photoscan*  *Meshlab*  *R*  *imageJ* | *4.1*  *1.4*  *1.3*  *3.6.1.* | *fBasic, LIM*  *MtrackJ* |

Directory structure

Most supplementary files are named as “Chapter\_type\_description”, where “type” can be raw or processed data (in xls format often with multiple tabs), code (in txt format), output (in xls format), or other supplements, such as images (in jpg format) or supplementary texts, tables, and figures (referred to as “Online Resources”, in pdf format). All supplementary files of each chapter are compressed into chapter-specific zip files. One exception from this is the set of images used in our photogrammetric approach to build digital 3D models of the reef benthos presented in Chapter 2, which were compressed by site to keep individual zip files below 15 GB. Each chapter-specific zip file is accompanied by a “README” txt file that outlines the folder content and describes the data structure, including the naming convention. If specific cells in tables contain no value, this means that data are missing (e.g., contaminated samples, loss during transport, etc.). All missing data are treated similarly.

**Chapter\_2**

* **0\_Data**
  + Supplementary figures and tables (D1)
  + Supplementary datasets (D2–D11)
* **Relative\_cover\_images**
* **Site\_name**
* **Transect number (T1 or T2)**
* **Surface type (Horizontal, Vertical, or Cryptic)**
  + - * Images (D42)
      * Coral Point Count analyses (D43)
      * Coral Point Count summaries (D44)
* **Chapter\_2\_Photogrammetry (by Site)**
* Images (D41)

**Chapter\_3**

* **0\_Data**
  + Supplementary figures and tables (D13)
  + Supplementary videos (D14–D16)
* **Ex\_situ\_time\_lapse**
  + - Images (D45)
* **In\_situ\_time\_lapse**
  + - Images (D46)

**Chapter\_4**

* **0\_Data**
  + Supplementary methods figures and tables (D17)
  + Supplementary datasets (D18, D19)
* **1\_Code**
  + Supplementary codes (D20, D21)
* **2\_Output**
  + Model output (D22)

**Chapter 5**

* **0\_Data**
  + Supplementary tables (D23)
  + Supplementary dataset (D24)
* **Benthic\_communities**
* **Community\_name**
  + - Images (D47)
* **1\_Code**
  + Supplementary codes (D25–D30)
* **2\_Output**
  + Model outputs (D31–D36)

**Chapter\_6**

* **1\_Code**
  + Supplementary codes (D37, D38)
* **2\_Output**
  + Model outputs (D39, D40)

Datasets

|  |  |  |  |
| --- | --- | --- | --- |
| **Nr** | **Dataset name** | **Dataset acronym** | **Dataset**  **Description** |
| **D1** | *Chapter 2 Online Resource 1 Supplementary figures, tables, and texts* | *C2OR1* | *Supplementary figures S1–S9, Supplementary tables S1–S4, and Supplementary texts 1 and 2. This resource tabulates and describes small datasets and provides conceptual illustrations and detailed descriptions of the analytical procedures.* |
| **D2** | *Chapter 2 Online Resource 2 Volume and biomass conversions* | *C2OR2* | *Volume- and biomass conversions. ‘Samples’ lists raw results of the tissue analyses. Organisms are summarized in ‘summary’ and different benthic groups are summarized in ‘communities’. Volume- and biomass standardizations for fleshy algae and subgroups thereof are based on their average canopy heights.* |
| **D3** | *Chapter 2 Online Resource 3 Hidden cave surfaces and volumes* | *C2OR3* | *Hidden cave surfaces and volumes. All surveyed quadrats are listed in rows, and columns show individual (hardly accessible and, thus, hand-measured) cavities in each quadrat. ‘hidden cavity surface areas’ displays total surface areas and ‘hidden cavity volumes’ displays cavity volumes, as approximated from simple geometrical shapes.* |
| **D4** | *Chapter 2 Online Resource 4 Coral cryptic surface ratios* | *C2OR4* | *Coral cryptic surface ratios. Proportion of cryptic surface in percent of live coral surface for individuals of sheeting and stalking corals.* |
| **D5** | *Chapter 2 Online Resource 5 Percent cover* | *C2OR5* | *Percent cover on different reef surfaces. ‘horizontal percent cover’ sheet lists raw results from horizontal (i.e. top-down) coral point counts. Sites are summarized in ‘horizontal site summaries’ and communities are summarized in ‘horizontal communities’. The tab ‘horizontal cover incl layers’ displays cover data that was used to calculate 3D metrics of reef communities (see Methods – ‘Relative cover on exposed and cryptic reef surfaces’). Percent cover and respective site summaries for percent cover on vertical and cryptic surfaces are provided in the following tabs.* |
| **D6** | *Chapter 2 Online Resource 6 Absolute 3D surface cover* | *C2OR6* | *Absolute 3D surface cover. Surface areas of individual benthic biota for the total reef (reef summaries), as well as exposed areas (exposed summaries) and cryptic areas (cryptic summaries) individually. Communities are summarized in ‘communities’.* |
| **D7** | *Chapter 2 Online Resource 7 Biovolumes and canopy heights* | *C2OR7* | *Biovolumes and canopy heights. Canopy height measurements for individual surface types (horizontal, vertical, and cryptic) are listed in ‘canopy heights’, and summarized by site and surface type in ‘canopy summaries’. ‘emergent organisms’ lists in situ measured biovolumes of massive sponges and gorgonians. Total volumes are summarized by site in ‘reef volumes’ (total reef), ‘exposed volumes’ (exposed reef), and ‘cryptic volumes’ (cryptic reef). Benthic groups are summarized in ‘communities’.* |
| **D8** | *Chapter 2 Online Resource 8 Ash-free dry weights* | *C2OR8* | *Standing stock of ash-free dry weights. Total weights are summarized by site in ‘reef summaries’ (total reef), ‘exposed summaries’ (exposed reef), and ‘cryptic summaries’ (cryptic reef). Benthic groups are summarized in ‘communities’.* |
| **D9** | *Chapter 2 Online Resource 9 Organic carbon weights* | *C2OR9* | *Standing stock of organic carbon. Total weights are summarized by site in ‘reef summaries’ (total reef), ‘exposed summaries’ (exposed reef), and ‘cryptic summaries’ (cryptic reef). Benthic groups are summarized in ‘communities’.* |
| **D10** | *Chapter 2 Online Resource 10 Organic nitrogen weights* | *C2OR10* | *Standing stock of organic nitrogen. Total weights are summarized by site in ‘reef summaries’ (total reef), ‘exposed summaries’ (exposed reef), and ‘cryptic summaries’ (cryptic reef). Benthic groups are summarized in ‘communities’.* |
| **D11** | *Chapter 2 Online Resource 11 Site coordinates and substrate surface areas* | *C2OR11* | *Site coordinates and substrate surface areas. ‘substrates’ sheet lists relief and surface areas of horizontal, vertical, and cryptic reef surfaces, as well as all surfaces combined (i.e. total surface area). Sites are summarized and coordinates are provided in ‘site summaries’.* |
| **D12** | *Chapter 2 Coral reef 3D reconstructions* | *C23D* | *3D models of 191 m2 of coral reef benthos are provided in an interactive format on Sketchfab (www.sketchfab.com) under the account ‘coralreefs.kornder’. Models are named by site and quadrat (e.g. Carmabi 1 – 16 chronologically relate to the 16 rows with site = Carmabi across all Online resources). Raw images underlying the models are stored in the TAPE Archive.* |
| **D13** | *Chapter 3 Online Resource 1 Supplementary figures and tables* | *C3OR1* | *Supplementary figure S1, Supplementary tables S1 & S2. This resource tabulates and describes small datasets and provides visual illustrations of the analytical procedures.* |
| **D14** | *Chapter 3 Video S1 Time-lapse Aplysina archeri* | *C3VS1* | *In situ and ex situ time-lapses of Aplysina archeri shedding particle-laden mucus into the environment, Related to Figures 1 and 3. Photos were obtained at 7x magnification with the lens at 12 mm proximity to the sponge surface (see Materials and Methods for camera specifications). Intervals were set to one image per minute and images assembled at 24 fps.* |
| **D15** | *Chapter 3 Video S2 Time-lapse Chelonaplysilla sp.* | *C3VS2* | *Ex situ time-lapse of the Indo-Pacific massive sponge Chelonaplysilla sp. displaying similar patterns of particle shedding as observed in this study, Related to Figure 1. Photos were acquired at a rate of one image every two minutes, and assembled to a frame rate of 24 fps.* |
| **D16** | *Chapter 3 Video S3 Time-lapse sponge associations* | *C3VS3* | *Various in situ and ex situ time-lapses of a various sponge-associated fauna hiding or scavenging on the surface of sponges, Related to Figure 1. Photos were acquired at a rate of 0.5–1 image per minute (see bottom banner in the movie for specific acquisition rate of individual movie parts) and assembled to a frame rate of 24 fps.* |
| **D17** | *Chapter 4 Online Resource 1 Supplementary methods, figures, and tables* | *C4OR1* | *Supplementary methods, Supplementary figures S1–S3, Supplementary tables S1–S6. This resource tabulates and describes small datasets and provides conceptual illustrations and details of the analytical procedures.* |
| **D18** | *Chapter 4 Data S1 Raw values discrete measurements* | *C4DS1* | *Raw measurements of the C concentrations during incubations and in reef water in µmol C L-1. The initial “read me” tab provides descriptions of abbreviated terms and applicable conversion factors. The following tabs each list the raw measurements for a particular functional group. The last two tabs list the values measured during incubations containing only seawater (i.e., functional group plankton) and the C concentrations in seawater from the reef versus open ocean.* |
| **D19** | *Chapter 4 Data S2 Logger data* | *C4DS2* | *Raw measurements of the dissolved O2 concentrations during incubations of benthic reef organisms in mg L-1. Individual tabs list all incubations for a particular functional group and incubation time (light = at midday, dark = at night). The first column denotes time (in minutes) followed by dissolved O2 concentrations, temperatures (in ºC) and, where available, light irradiances (in par) for individual replicate incubations.* |
| **D20** | *Chapter 4 Code S1 Model run* | *C4CS1* | *This R script runs a linear-inverse model with 9999 iterations using the LIM package (Soetaert and van Oevelen 2009) and information stored in the script “file\_name.input” (see Code S2). The model output is exported into the R’s current directory as a csv file titled “model\_output.csv”.* |
| **D21** | *Chapter 4 Code S2 Model input script* | *C4CS2* | *This R script defines ranges and relationships for the carbon flows of the linear-inverse model presented in Chapter 4. The text can be saved in R’s current directory as “file\_name.input” to rerun the model using Code S1. The text behind exclamation marks is purely descriptive. The structural elements of the script are explained in Soetaert & van Oevelen (2009).* |
| **D22** | *Chapter 4 Data S3 Model output* | *C4DS3* | *Output of the linear-inverse model for the leeward coral reef of Curaҫao (between 9–14 m water depth). Each column represents a single flow of C between two compartments of the model and lists all 10000 model solutions for that flow. See Box 1 for a description of the abbreviations of the functional groups.*  *Code S1. This R script runs a linear-inverse model with 9999 iterations using the LIM package (Soetaert and van Oevelen 2009) and information stored in the script “file\_name.input” (see Code S2). The model output is exported into the R’s current directory as a csv file titled “model\_output.csv”.* |
| **D23** | *Chapter 5 Online Resource 1 Supplementary tables* | *C5OR1* | *Supplementary tables S1–S4. This resource tabulates and describes raw measurements and meta-data of the community incubations and the incubated communities.* |
| **D24** | *Chapter 5 Data S1 Logger data* | *C5DS1* | *Raw measurements of all high-frequency in-situ measurements (one measurement per minute) of dissolved O2 concentrations and other environmental parameters inside (column denoted as “…IN”) and outside (column denoted as “…OUT”) of the benthic tents during incubations. Each tab list all measurements for a single incubation. Names of tabs correspond with the names of the incubated coral reef communities in Figures 1 and 3 and Table 1 in addition to “light” for incubations performed at midday or “dark” for incubations performed at night.* |
| **D25** | *Chapter 5 Code S1 Model input Coral 1* | *C5CS1* | *This R script defines ranges and relationships for the carbon flows of the linear-inverse model for the benthic reef segment denoted in Chapter 5 as "Coral 1". The text can be saved in R’s current directory as “file\_name.input” to rerun the model using Code S1. The text behind exclamation marks is purely descriptive. The structural elements of the script are explained in Soetaert & van Oevelen (2009).* |
| **D26** | *Chapter 5 Code S2 Model input Mixed 1* | *C5CS2* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 1".* |
| **D27** | *Chapter 5 Code S3 Model input Mixed 2* | *C5CS3* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 2”.* |
| **D28** | *Chapter 5 Code S4 Model input Mixed 3* | *C5CS4* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 3".* |
| **D29** | *Chapter 5 Code S5 Model input Sponge 1* | *C5CS5* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Sponge 1".* |
| **D30** | *Chapter 5 Code S6 Model input Sponge 2* | *C5CS6* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Sponge 2".* |
| **D31** | *Chapter 5 Data S2 Model output Coral 1* | *C5DS2* | *Output of the linear-inverse model for the benthic reef segment denoted in Chapter 5 as "Coral 1". Each column represents a single flow of C between two compartments of the model and lists all 10000 model solutions for that flow. See Box 1 in Chapter 4 for a description of the abbreviations of the functional groups.* |
| **D32** | *Chapter 5 Data S3 Model output Mixed 1* | *C5DS3* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 1".* |
| **D33** | *Chapter 5 Data S4 Model output Mixed 2* | *C5DS4* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 2".* |
| **D34** | *Chapter 5 Data S5 Model output Mixed 3* | *C5DS5* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Mixed 3".* |
| **D35** | *Chapter 5 Data S6 Model output Sponge 1* | *C5DS6* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Sponge 1".* |
| **D36** | *Chapter 5 Data S7 Model output Sponge 2* | *C5DS7* | *Identical to the above, but for the benthic reef segment denoted in Chapter 5 as "Sponge 2".* |
| **D37** | *Chapter 6 Code S1 Daytime respiration Model input* | *C6CS1* | *This R script defines ranges and relationships for the carbon flows of the linear-inverse model presented in Chapter 4 under the alternative assumption that respiration rates of phototrophic organisms during the day equal their respiration rates at night. The text can be saved in R’s current directory as “file\_name.input” to rerun the model using Code S1. The text behind exclamation marks is purely descriptive. The structural elements of the script are explained in Soetaert & van Oevelen (2009).* |
| **D38** | *Chapter 6 Code S2 Limited imports and exports Model input* | *C6CS2* | *This R script defines ranges and relationships for the carbon flows of the linear-inverse model presented in Chapter 4 under the alternative assumption that imports and exports of carbon to and from the modeled system are limited. The text can be saved in R’s current directory as “file\_name.input” to rerun the model using Code S1. The text behind exclamation marks is purely descriptive. The structural elements of the script are explained in Soetaert & van Oevelen (2009).* |
| **D39** | *Chapter 6 Data S1 Daytime respiration Model output* | *C6DS1* | *Output of the linear-inverse model presented in Chapter 4, but under the alternative assumption that respiration rates of phototrophic organisms during the day equal their respiration rates at night. Each column represents a single flow of C between two compartments of the model and lists all 10000 model solutions for that flow. See Box 1 in Chapter 4 for a description of the abbreviations of the functional groups.* |
| **D40** | *Chapter 6 Data S2 Limited imports and exports Model output* | *C6DS2* | *Output of the linear-inverse model presented in Chapter 4 under the alternative assumption that imports and exports of carbon to and from the modeled system are limited. Each column represents a single flow of C between two compartments of the model and lists all 10000 model solutions for that flow. See Box 1 in Chapter 4 for a description of the abbreviations of the functional groups.* |
| **D41** | *Raw images underlying digital 3D reconstructions in Chapter 2 (i.e., D12)* | *C2D12R* | *Images were obtained for each reconstruction using SCUBA, by circling around the area of interest while pointing a GoPro and three underwater video lights at the benthos. GoPro’s were set to time-lapse mode to acquire images in quick succession and generate sufficient overlap between consecutive images for the reconstruction (see Chapter 2 Methods).* |
| **D42** | *Raw images to estimate relative cover on different reef surfaces in Chapter 2* | *C2CPCI* | *Images of horizontal, vertical, and cryptic reef surfaces were analyzed in Coral Point Count with Excel extension (see below for relevant resources). One top-view image of each photo-quadrat was accompanied by three images of vertical and three images of cryptic reef surfaces within the reef framework underneath the quadrat (See Chapter 2 Methods).* |
| **D43** | *Coral Point Count report files to reopen analyses on D42* | *C2CPCA* | *Files returned by CPCe that store information regarding the point count analysis on the images in D42.* |
| **D44** | *Summaries per transect of D43* | *C2CPCS* | *Summaries of the analyses per transect and meta-data in xlsx and csv format, including percent cover estimates and surface areas of the benthos depicted in the analyzed images.* |
| **D45** | *Ex situ raw images D14* | *C3D14EX* | *Raw images underlying the ex situ close-up time lapse of Aplysina archeri presented in Chapter 3 (i.e., D14)* |
| **D46** | *In situ raw images for D14* | *C3D14IN* | *Raw images underlying the in situ close-up time lapse of Aplysina archeri presented in Chapter 3 (i.e., D14)* |
| **D47** | *Benthic communities analyzed in Chapter 5 (i.e., D23–D36)* | *C5IMG* | *Raw images of the benthic communities incubated and modeled in Chapter 5 (i.e., D23–D36). The surface areas of benthic organisms were estimated using delineation in ImageJ, and converted to biomass using conversion factors published online:*  *https://doi.org/10.1007/s00338-021-02118-6.* |

Dataset formats and sizes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Nr** | **Dataset** | **Characteristics\*** | **Format** | **Size (KB)** | **Software requirements\*\*** |
| **D1** | *C2OR1* | *Figures, tables, and texts* | *pdf* | *1175* |  |
| **D2** | *C2OR2* | *Tables* | *xlsx* | *75* |  |
| **D3** | *C2OR3* | *Tables* | *xlsx* | *51* |  |
| **D4** | *C2OR4* | *Tables* | *xlsx* | *10* |  |
| **D5** | *C2OR5* | *Tables* | *xlsx* | *510* |  |
| **D6** | *C2OR6* | *Tables* | *xlsx* | *97* |  |
| **D7** | *C2OR7* | *Tables* | *xlsx* | *108* |  |
| **D8** | *C2OR8* | *Tables* | *xlsx* | *75* |  |
| **D9** | *C2OR9* | *Tables* | *xlsx* | *75* |  |
| **D10** | *C2OR10* | *Tables* | *xlsx* | *75* |  |
| **D11** | *C2OR11* | *Tables* | *xlsx* | *31* |  |
| **D12** | *C23D* | *Interactive 3D models* | *fbx* | *~200000* |  |
| **D13** | *C3OR1* | *Figures and tables* | *pdf* | *762* |  |
| **D14** | *C3VS1* | *Video* | *mp4* | *45442* |  |
| **D15** | *C3VS2* | *Video* | *mp4* | *50052* |  |
| **D16** | *C3VS3* | *Video* | *mp4* | *46803* |  |
| **D17** | *C4OR1* | *Figures, tables, and texts* | *pdf* | *669* |  |
| **D18** | *C4DS1* | *Tables* | *xlsx* | *117* |  |
| **D19** | *C4DS2* | *Tables* | *xlsx* | *553* |  |
| **D20** | *C4CS1* | *R script* | *txt* | *1* | *R* |
| **D21** | *C4CS2* | *R script* | *txt* | *17* | *R* |
| **D22** | *C4DS3* | *Table* | *xlsx* | *8290* |  |
| **D23** | *C5OR1* | *Tables* | *pdf* | *328* |  |
| **D24** | *C5DS1* | *Tables* | *xlsx* | *130* |  |
| **D25** | *C5CS1* | *R script* | *txt* | *19* | *R* |
| **D26** | *C5CS2* | *R script* | *txt* | *19* | *R* |
| **D27** | *C5CS3* | *R script* | *txt* | *19* | *R* |
| **D28** | *C5CS4* | *R script* | *txt* | *19* | *R* |
| **D29** | *C5CS5* | *R script* | *txt* | *19* | *R* |
| **D30** | *C5CS6* | *R script* | *txt* | *19* | *R* |
| **D31** | *C5DS2* | *Table* | *xlsx* | *23379* |  |
| **D32** | *C5DS3* | *Table* | *xlsx* | *24099* |  |
| **D33** | *C5DS4* | *Table* | *xlsx* | *23796* |  |
| **D34** | *C5DS5* | *Table* | *xlsx* | *22714* |  |
| **D35** | *C5DS6* | *Table* | *xlsx* | *24281* |  |
| **D36** | *C5DS7* | *Table* | *xlsx* | *23791* |  |
| **D37** | *C6CS1* | *R script* | *txt* | *20* | *R* |
| **D38** | *C6CS2* | *R script* | *txt* | *20* | *R* |
| **D39** | *C6DS1* | *Table* | *xlsx* | *7989* |  |
| **D40** | *C6DS2* | *Table* | *xlsx* | *7991* |  |
| **D41** | *C2D12R* | *Images* | *jpg* | *206000000* |  |
| **D42** | *C2CPCI* | *Images* | *jpg* | *8570000* |  |
| **D43** | *C2CPCA* | *CPC image analyses* | *cpc* | *CPCe* |
| **D44** | *C2CPCS* | *Tables* | *xlsx, csv* |  |
| **D45** | *C3D14EX* | *Images* | *jpg* | *1990000* |  |
| **D46** | *C3D14IN* | *Images* | *jpg* | *248000* |  |
| **D47** | *C5IMG* | *Images* | *jpg* | *925000* |  |

Analyses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nr** | **Analysis** | **Analysis description** | **Dataset** | **software** |
| **A1** | *Coral reef abundance metric comparison* | *Analysis was performed in Excel. See Chapter 2 and its Online Resource 1 for detailed protocols of the calculations.* | *C2OR1*  *C2OR2*  *C2OR3*  *C2OR4*  *C2OR5*  *C2OR6*  *C2OR7*  *C2OR8*  *C2OR9*  *C2OR10*  *C2OR11*  *C23D*  *C2D12R*  *C2CPCI*  *C2CPCA*  *C2CPCS* | *CPCe, AgiSoft,*  *MeshLab* |
| **A2** | *Sponge sneezing* | *Statistics were performed in R. Images from time-lapses were analyzed using the plugin MtrackJ in ImageJ. See Chapter 3 for protocols of these analyses* | *C3OR1*  *C3VS1*  *C3VS2*  *C3VS3*  *C3D14EX*  *C3D14IN* | *R, ImageJ* |
| **A3** | *Coral reef carbon cycling model* | *A linear-inverse model of the carbon fluxes within the reef slope community of Curacao was generated in R using the packages fBasic and LIM. See C4CS1 and C4CS2 for the R scripts. See Chapter 4 for detailed descriptions of the calculations.* | *C4OR1*  *C4DS1*  *C4DS2*  *C4CS1*  *C4CS2*  *C4DS3* | *R* |
| **A4** | *In situ model validation* | *In situ community fluxes were calculated in Excel. We used the script C4CS1 to rerun the linear-inverse mode presented in Chapter 4, but on the basis of the community abundances within the reef segments incubated here.. See C5CS1–C5CS6 for the R scripts containing input ranges for the modeled fluxes within the incubated segments. See Chapter 5 for a description of the calculations before and after running the models.* | *C5OR1*  *C5DS1*  *C5CS1*  *C5CS2*  *C5CS3*  *C5CS4*  *C5CS5*  *C5CS6*  *C5DS2*  *C5DS3*  *C5DS4*  *C5DS5*  *C5DS6*  *C5DS7*  *C5IMG* | *R, ImageJ* |
| **A5** | *Model sensitivity analysis* | *The sensitivity analysis in this chapter repeats the model run in Chapter 4 with altered assumptions (see Chapter 6 for details).* | *C6CS1*  *C6CS2*  *C6DS1*  *C6DS2* | *R* |

Manuscripts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nr** | **status** | **Manuscript** | **Dataset Acronym** | **Analysis** |
| **MS1** | *Published (06-2021)* | *doi:*  *https://doi.org/10.1007/s00338-021-02118-6* | *C2OR1*  *C2OR2*  *C2OR3*  *C2OR4*  *C2OR5*  *C2OR6*  *C2OR7*  *C2OR8*  *C2OR9*  *C2OR10*  *C2OR11*  *C23D*  *C2D12R*  *C2CPCI*  *C2CPCA*  *C2CPCS* | *A1* |
| **MS2** | *Published (09-2022)* | *doi: https://doi.org/10.1016/j.cub.2022.07.017* | *C3OR1*  *C3VS1*  *C3VS2*  *C3VS3*  *C3D14EX*  *C3D14IN* | *A2* |
| **MS3** | *Draft* | *Chapter 4 and Chapter 6 (“A model is only as good as its assumptions”)* | *C4OR1*  *C4DS1*  *C4DS2*  *C4CS1*  *C4CS2*  *C4DS3*  *C6CS1*  *C6CS2*  *C6DS1*  *C6DS2* | *A3, A5* |
| **MS4** | *Draft* | *Chapter 5* | *C5OR1*  *C5DS1*  *C5CS1*  *C5CS2*  *C5CS3*  *C5CS4*  *C5CS5*  *C5CS6*  *C5DS2*  *C5DS3*  *C5DS4*  *C5DS5*  *C5DS6*  *C5DS7*  *C5IMG* | *A4* |

Metadata documentation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nr** | **Dataset acronym** | **Metadata standard** | **Metadata form** | **resources** |
| **D1** | *C2OR1* | *- metadata provided in publication* | *pdf* | *See MS1* |
| **D2–D11** | *C2OR2–C2OR11* | *- metadata provided in publication* | *xlsx* | *See MS1* |
| **D12** | *C23D* | *- metadata provided in publication* | *fbx* | *See MS1*  3D models online:  <https://sketchfab.com/coralreefs.kornder> |
| **D13** | *C3OR1* | *- metadata provided in publication* | *pdf* | *See MS2* |
| **D14** | *C3VS1* | *- metadata provided in publication* | *mp4* | *See MS2* |
| **D15** | *C3VS2* | *- metadata provided in publication* | *mp4* | *See MS2* |
| **D16** | *C3VS3* | *- metadata provided in publication* | *mp4* | *See MS2* |
| **D17** | *C4OR1* | *- metadata provided in Chapter 4* | *txt* | *See Chapter 4*  *See “read\_me” txt file in the folder “Chapter 4”* |
| **D18** | *C4DS1* | *- metadata embedded within tables* | *xlsx* | *See Chapter 4* |
| **D19** | *C4DS2* | *- metadata given in text* | *pdf* | *See Chapter 4* |
| **D20** | *C4CS1* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D21** | *C4CS2* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D22** | *C4DS3* | *- metadata given in text* | *pdf* | *See Chapter 4* |
| **D23** | *C5OR1* | *- metadata provided in Chapter 5* | *txt* | *See Chapter 5*  *See “read\_me” txt file in the folder “Chapter 5”* |
| **D24** | *C5DS1* | *- metadata given in text* | *pdf, txt* | *See Chapter 5*  *See “read\_me” txt file in the folder “Chapter 5”* |
| **D25** | *C5CS1* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D26** | *C5CS2* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D27** | *C5CS3* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D28** | *C5CS4* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D29** | *C5CS5* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D30** | *C5CS6* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D31** | *C5DS2* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D32** | *C5DS3* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D33** | *C5DS4* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D34** | *C5DS5* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D35** | *C5DS6* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D36** | *C5DS7* | *- metadata given in text* | *pdf* | *See Chapter 5* |
| **D37** | *C6CS1* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D38** | *C6CS2* | *- no metadata* |  | *Author: Niklas Kornder* |
| **D39** | *C6DS1* | *- metadata given in text* | *pdf* | *See Chapter 6* |
| **D40** | *C6DS2* | *- metadata given in text* | *pdf* | *See Chapter 6* |
| **D41** | *C2D12R* | *- metadata given in text* | *pdf* | *See Chapter 2* |
| **D42** | *C2CPCI* | *- metadata given in text* | *pdf* | *See Chapter 2* |
| **D43** | *C2CPCA* | *- metadata given in D44* | *xlsx, csv* | *Chapter 2 TAPE* |
| **D44** | *C2CPCS* | *- metadata embedded in tables* | *xlsx, csv* | *Chapter 2 TAPE* |
| **D45** | *C3D14EX* | *- metadata given in text* | *pdf* | *See Chapter 3* |
| **D46** | *C3D14IN* | *- metadata given in text* | *pdf* | *See Chapter 3* |
| **D47** | *C5IMG* | *- metadata given in text* | *pdf* | *See Chapter 5* |

Data Accessibility

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Nr** | **Dataset acronym** | **Source** | **terms** | **Link/DOI/…** |
| **1** | *C2OR1* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **2** | *C2OR2* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **3** | *C2OR3* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **4** | *C2OR4* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **5** | *C2OR5* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **6** | *C2OR6* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **7** | *C2OR7* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **8** | *C2OR8* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **9** | *C2OR9* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **10** | *C2OR10* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **11** | *C2OR11* | *MS1* | *Public dataset* | [*https://doi.org/10.1007/s00338-021-02118-6*](https://doi.org/10.1007/s00338-021-02118-6)  *and on figshare.com: 10.21942/uva.22592962* |
| **12** | *C23D* | *MS1* | *Available upon request  <Niklas Kornder>* | [*sketchfab.com/coralreefs.kornder*](https://doi.org/10.1007/s00338-021-02118-6) |
| **13** | *C3OR1* | *MS2* | *Public dataset* | [*https://doi.org/10.1016/j.cub.2022.07.017*](https://doi.org/10.1016/j.cub.2022.07.017)  *and on figshare.com: 10.21942/uva.22592956* |
| **14** | *C3VS1* | *MS2* | *Public dataset* | [*https://doi.org/10.1016/j.cub.2022.07.017*](https://doi.org/10.1016/j.cub.2022.07.017)  *and on figshare.com: 10.21942/uva.22592956* |
| **15** | *C3VS2* | *MS2* | *Public dataset* | [*https://doi.org/10.1016/j.cub.2022.07.017*](https://doi.org/10.1016/j.cub.2022.07.017)  *and on figshare.com: 10.21942/uva.22592956* |
| **16** | *C3VS3* | *MS2* | *Public dataset* | [*https://doi.org/10.1016/j.cub.2022.07.017*](https://doi.org/10.1016/j.cub.2022.07.017)  *and on figshare.com: 10.21942/uva.22592956* |
| **17** | *C4OR1* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **18** | *C4DS1* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **19** | *C4DS2* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **20** | *C4CS1* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **21** | *C4CS2* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **22** | *C4DS3* | *Chapter 4* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592536)* |
| **23** | *C5OR1* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **24** | *C5DS1* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **25** | *C5CS1* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **26** | *C5CS2* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **27** | *C5CS3* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **28** | *C5CS4* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **29** | *C5CS5* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **30** | *C5CS6* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **31** | *C5DS2* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **32** | *C5DS3* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **33** | *C5DS4* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **34** | *C5DS5* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **35** | *C5DS6* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **36** | *C5DS7* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |
| **37** | *C6CS1* | *Chapter 6* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592944)* |
| **38** | *C6CS2* | *Chapter 6* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592944)* |
| **39** | *C6DS1* | *Chapter 6* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592944)* |
| **40** | *C6DS2* | *Chapter 6* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592944)* |
| **41** | *C2D12R* | *Chapter 2* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592962* |
| **42** | *C2CPCI* | *Chapter 2* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592962* |
| **43** | *C2CPCA* | *Chapter 2* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592962* |
| **44** | *C2CPCS* | *Chapter 2* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592962* |
| **45** | *C3D14EX* | *Chapter 3* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592956* |
| **46** | *C3D14IN* | *Chapter 3* | *Public dataset* | *Available on figshare.com: 10.21942/uva.22592956* |
| **47** | *C5IMG* | *Chapter 5* | *Embargoed until 25th May 2025* | *After 25th May 2025 available on figshare.com (10.21942/uva.22592905)* |

Physical storage

|  |  |  |  |
| --- | --- | --- | --- |
| **Nr** | **Dataset acronym** | **Stored in data archive?** | **Location (folder name)** |
| **1** | *C2OR1* | *Yes* | *Chapter 2 -> 0\_Data* |
| **2** | *C2OR2* | *Yes* | *Chapter 2 -> 0\_Data* |
| **3** | *C2OR3* | *Yes* | *Chapter 2 -> 0\_Data* |
| **4** | *C2OR4* | *Yes* | *Chapter 2 -> 0\_Data* |
| **5** | *C2OR5* | *Yes* | *Chapter 2 -> 0\_Data* |
| **6** | *C2OR6* | *Yes* | *Chapter 2 -> 0\_Data* |
| **7** | *C2OR7* | *Yes* | *Chapter 2 -> 0\_Data* |
| **8** | *C2OR8* | *Yes* | *Chapter 2 -> 0\_Data* |
| **9** | *C2OR9* | *Yes* | *Chapter 2 -> 0\_Data* |
| **10** | *C2OR10* | *Yes* | *Chapter 2 -> 0\_Data* |
| **11** | *C2OR11* | *Yes* | *Chapter 2 -> 0\_Data* |
| **12** | *C23D* | *No* | <https://sketchfab.com/coralreefs.kornder> |
| **13** | *C3OR1* | *Yes* | *Chapter 3 -> 0\_Data* |
| **14** | *C3VS1* | *Yes* | *Chapter 3 -> 0\_Data* |
| **15** | *C3VS2* | *Yes* | *Chapter 3 -> 0\_Data* |
| **16** | *C3VS3* | *Yes* | *Chapter 3 -> 0\_Data* |
| **17** | *C4OR1* | *Yes* | *Chapter 4 -> 0\_Data* |
| **18** | *C4DS1* | *Yes* | *Chapter 4 -> 0\_Data* |
| **19** | *C4DS2* | *Yes* | *Chapter 4 -> 0\_Data* |
| **20** | *C4CS1* | *Yes* | *Chapter 4 -> 1\_Code* |
| **21** | *C4CS2* | *Yes* | *Chapter 4 -> 1\_Code* |
| **22** | *C4DS3* | *Yes* | *Chapter 4 -> 2\_Output* |
| **23** | *C5OR1* | *Yes* | *Chapter 5 -> 0\_Data* |
| **24** | *C5DS1* | *Yes* | *Chapter 5 -> 0\_Data* |
| **25** | *C5CS1* | *Yes* | *Chapter 5 -> 1\_Code* |
| **26** | *C5CS2* | *Yes* | *Chapter 5 -> 1\_Code* |
| **27** | *C5CS3* | *Yes* | *Chapter 5 -> 1\_Code* |
| **28** | *C5CS4* | *Yes* | *Chapter 5 -> 1\_Code* |
| **29** | *C5CS5* | *Yes* | *Chapter 5 -> 1\_Code* |
| **30** | *C5CS6* | *Yes* | *Chapter 5 -> 1\_Code* |
| **31** | *C5DS2* | *Yes* | *Chapter 5 -> 2\_Output* |
| **32** | *C5DS3* | *Yes* | *Chapter 5 -> 2\_Output* |
| **33** | *C5DS4* | *Yes* | *Chapter 5 -> 2\_Output* |
| **34** | *C5DS5* | *Yes* | *Chapter 5 -> 2\_Output* |
| **35** | *C5DS6* | *Yes* | *Chapter 5 -> 2\_Output* |
| **36** | *C5DS7* | *Yes* | *Chapter 5 -> 2\_Output* |
| **37** | *C6CS1* | *Yes* | *Chapter 6 -> 1\_Code* |
| **38** | *C6CS2* | *Yes* | *Chapter 6 -> 1\_Code* |
| **39** | *C6DS1* | *Yes* | *Chapter 6 -> 2\_Output* |
| **40** | *C6DS2* | *Yes* | *Chapter 6 -> 2\_Output* |
| **41** | *C2D12R* | *Yes* | *Chapter 2* |
| **42** | *C2CPCI* | *Yes* | *Chapter 2 -> 0\_Data* |
| **43** | *C2CPCA* | *Yes* | *Chapter 2 -> 0\_Data* |
| **44** | *C2CPCS* | *Yes* | *Chapter 2 -> 0\_Data* |
| **45** | *C3D14EX* | *Yes* | *Chapter 3 -> 0\_Data* |
| **46** | *C3D14IN* | *Yes* | *Chapter 3 -> 0\_Data* |
| **47** | *C5IMG* | *Yes* | *Chapter 5 -> 0\_Data* |