Reef Rescue Marine Monitoring Program – Assessment of terrestrial run-off entering the Great Barrier Reef (ACTRF JCU)

Field	Description
Title	Water Quality, River Discharge and Remote Sense Data Base
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Point of Contact	NAME: da Silva, Eduardo, Dr ORGANISATION: James Cook University POSITION: Research Officer ROLE: Researcher PHONE: +61 7 4781 4675 FAX: +61 7 4781 5589 EMAIL: name: dasilva.eduardoteixeira, domain: gmail.com name: eduardo.dasilva1, domain: jcu.edu.au ADDRESS: University Rd, Townsville, Queensland , Australia , 4811
Data summary	The exposure of Great Barrier Reef coral reef and seagrass ecosystems to contaminants is estimated from the synthesis of: river discharge, water quality data sampled in inshore sites during flood conditions and the use of remote sensing technology to estimate flood plume extents and duration. River discharge: Daily mean, maximum and minimum river discharge (Megaliters/day) from 36 rivers, plus their quality control code (as in the DERM web page –Department of the Environment and Resource Management, Qld Government, http://watermonitoring.derm.qld.gov.au/host.htm) dated from 1915 (Barron River at Kuranda) up to current date. Rivers current in the data base are: Barron River at Kuranda, Calliope River at Castlehope, Mossman River at Mossman, Waterpark Creek at Byfield, Fitzroy River at The Gap, Kolan River at Springfield, Sandy Creek at Homebush, North Johnstone River at Tung Oil, Endeavour River at Flaggy, Daintree River at Bairds, O'Connell River at Caping Siding, Haughton River at Powerline, Murray River at Upper Murray, Mulgrave River at Peets Bridge, Tully River at Euramo, Baffle Creek at Mimdale, Black River at Bruce Highway, Carmila Creek At

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	Carmila, Ross River at Ross River Dam Headwater, South Johnstone River at Upstream Central Mill, Burdekin River at Clare, Pioneer River at Mirani Weir Tailwater, Russell River at Bucklands, Mary River at Home Park, Barron River at Myola, Herbert River at Ingham, Don River at Reeves, Burrum River at Lenthalls Dam Release, Annan River at Beesbike, Proserpine River at Proserpine, Boyne River at Milton, Burnett River at Figtree Creek, Rocky Dam Ck, O'Connell River at Stafford's Crossing, Normanby River at Kalpower Crossing, and Pioneer River at Dumbleton Weir T/W. Water Quality: Near-shore water quality data has been measured from direct water mainly sampled at the surface, since 1991 as part of the Water Quality Monitoring Plan for the Great Barrier Reef lagoon. Sometimes stratified samples using Niskin bottle has been also carried out. Water samples are analyzed for: TSS (mg/l), chl-a (µg/l), phaeo-a (µg/l), cdom (440), Si (µM), DIP (µM), DOP (µM), TDP (µM), PP (µM), TP (µM), NO2 (µM), NO3 (µM), NOX (µM), NH4 (µM), DIN (µM), DON (µM), TDN (µM), PN (µM), TN (µM), POC (µM), DOC (µM), and the pesticides Ametryn, Atrazine, Bromacil, Desethyl-A, Desisoprop, Diuron, Fluometuro, Hexazinone, Imidaclopr, Metolachlo, Prometryn, Simazine, Tebuthiuro, and Terbutryn. Water temperature, salinity, light and dissolved oxygen are also determined using a Sea-Bird profiler. Each sample is identified in the water quality table by its name, latitude, longitude, sampling time and date. All sample analyses are carried out by the ACTFR laboratory, except for pesticides, which are processed at University of Queensland. The Sea-Bird profiles are treated before inclusion into the data base, and outliers are masked. Remote sensing: The data base has an inventory of ~3000 MODIS imagery, including Aqua and Terra sensors. Because the main focus of our team research is to understand the influence of river plumes on the Great Barrier Reef, a more comprehensive temporal coverage covers the period form January to April from 2003 to 2011 (mainly MODIS Aqua imagery). The processed images were done up to level-2 and the main products extracted are CDOM as adg_443, nLw_667, bbq_555_qaa (both used as a proxy for turbidity) and chlorophyll as chl_gsm. True color images are also available for most of the images that have been processed.
Data limitations* (optional)	In relation to the water quality data, not all the parameters have been sampled at a regular basis. Most of the MODIS images have not been processed yet, so they are as Level-0 data. River discharge obtained form DERM may not have been quality controlled (process that my take 3-4 months after data collection, http://watermonitoring.derm.qld.gov.au/host.htm). Even though most of the Level-0 images cover the whole extension of the GBR, not all of them were processed for the whole area. The extraction of the Level-2 products is an ongoing

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	process and changes on the selection of the current extracted products may occur.
Preview Image	
Data lineage	River discharge data have been obtained from DERM (Department of the Environment and Resource Management, Queensland Government, http://watermonitoring.derm.qld.gov.au/host.htm). Satellite imagery have been obtained from NASA (MODIS Aqua and Terra sensors, http://oceancolor.gsfc.nasa.gov/cgi/browse.pl?sen=am), and water quality data have been sampled in North Queensland waters by ACTFR team and other collaborators. Water sample analyses have been carried out mainly at the ACTFR laboratory, for most of the parameters, except for pesticides, which have been analyzed at University of Queensland
Data file description*	Data is stored in a Microsoft Access database on the James Cook University Share Drive (\\fseit-share\fse\ACTFR\ACTFR-Data\Data Base\ACTFR.mdb), which is backed up in accordance with the JCU backup policy. The data base has been recently created and all the relationships and some of the tables are not in place yet. Water quality anachronisms used in the water quality table (WQdata) are as follow: TSS = Total suspended solid, CDOM = Colored dissolved organic matter, TN = Total Nitrogen, TDN = Total Filterable Nitrogen, NH4 = Ammonia, NO2 = Nitrite, NO3 = Nitrate, NOX = NOX, DIN = dissolved inorganic nitrogen, DON = dissolved organic nitrogen, PN = Particulate nitrogen, TP = Total Phosphorus, TDP = Total Filterable phosphorus, DIP = dissolved inorganic phosphorus, FRP = Filterable Reactive phosphorus, PP = Particulate phosphorus, DOP = dissolved organic phosphorus, and Urea = Urea-N. In the satellite inventory table (in preparation), the image name uses a SeaWiFS-like convention, which indicates sensor (A for Aqua/MODIS, T for Terra/MODIS), sampling rate (LAC for full 1-km sampling), and time of the first scan in the file, Ayyyydddhhmmss, where ddd stand for the day in Julian Day format. River discharge table (river_disch) is organized by the River code, as defined by DERM, and its translation to the river name is presented in the table 'river_info' table. The profiles data is organized on the SeaBirdData table. All tables have the same basic structure in which date, time, latitude and longitude are used as unique identifiers combined. An exception occurs at the river_disch table in which the date and the river code as used as unique identifiers combined, and latitude, longitude and site name are presented in the river_info table.
Spatial Extent	The data in the data base cover the whole extension of the GRB with extreme coordinates as indicated below: NORTH LATITUDE: -10.5 SOUTH LATITUDE: -27.0 WEST LONGITUDE: 142.3 EAST LONGITUDE: 154 HORIZONTAL DATUM: WGS84
Temporal extent	The input of data into the data base is an ongoing process. The earliest river

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	discharge data dates from the 2nd of August of 1915 for Barron River at Kuranda. Satellite imagery starts on 1 January 2003, and water quality data starts on 23 January 1991.
Vertical extent	N/A
Maintenance and Update Frequency	The data collection is an ongoing process. The data base is usually updated at every 2-3 weeks, based on the frequency of the field work campaigns and or satellite image acquisition/processing. The data base update occurs more often during the wet season from December to April, which coincides with the field work campaigns.
Resource Constraints and licensing	COPYRIGHT: The dataset is licensed under a Creative Commons Attribution-Noncommercial 3.0 Australia License (http://creativecommons.org/licenses/by-nd/3.0/au/) ATTRIBUTION: "Devlin, M, 2012, AIMS, 'Flood plume monitoring of the Great Barrier Reef. NOTE: This data is under an exclusive access period. Contact the data repository manager(e@ Eduardo Teixeira da Silva (dasilva.eduardoteixeira@gmail.com)) for possible access to the data within this period.
Processing*	River discharge data is manually downloaded form the DERM web page (http://watermonitoring.derm.qld.gov.au/host.htm), at a regular basis (2-3 months, and more often during the wet season), and summary tables and statistics produced based on this data are performed using R scripts. NASA MODIS Aqua/Terra imagery is ordered form NASA web page and Level-0 data is processed using SeaDAS 6.2. The use of Level-2 products is still an ongoing process, and it has not been totally defined, the main products that have been extracted so far are adg_443, nLw_667, bbq_555_qaa and chl_gsm.
References	N/A
Credits and funding*	Thank you to CSIRO remote sensing team who were instrumental in helping to initiate our use of remote sensing tools and for their continued support in our spatial mapping. We appreciate funding support from the the Reef and Rainforest Center (RRRC) and for the Great Barrier Reef Marine Park Authority (GBRMPA) for the Marine Monitoring Program. Thank you to others of the TropWater Catchment to Reef Research Group..
Supplemental information	N/A
Online resources	Report 50: **Waterhouse, J. (2010)** Thresholds of major pollutants with regard to impacts on instream and marine ecosystems, http://www.rrrc.org.au/publications/pollutant_thresholds.html Report 51: **Waterhouse, J. *et al.* (2010)** Optimising water quality and impact monitoring, evaluation and reporting programs, http://www.rrrc.org.au/publications/water_monitoring_evaluation.html Report 52: **Devlin, M. and Waterhouse, J. *et al.* (2010)** Improved understanding of biophysical and socio-economic connections between catchment and reef

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	ecosystems: Wet and Dry Tropics case studies, http://www.rrrc.org.au/publications/catchmenttoreef_synthesis.html Report 56: **Waterhouse, J. and Brodie, J. E. (2011)** Identification of priority pollutants and priority areas in the Great Barrier Reef catchments, http://www.rrrc.org.au/publications/priority_pollutants.html Report 60: **Johnson, J. and Martin, K. (2011)** Water quality and climate change: Managing for resilience, http://www.rrrc.org.au/publications/gbrresilience_waterquality.html Report 61: **Johnson, J. and Martin, K. (2011)** Managing for resilience of the Great Barrier Reef: Socio-economic influences, http://www.rrrc.org.au/publications/gbrresilience_socioeconomics.html Report 63: **Waterhouse, J. and Devlin, M. (2011)** Managing water quality on the Great Barrier Reef: An overview of MTSRF research outputs, 2006-2010, http://www.rrrc.org.au/publications/managing_waterquality.html Report 64: **Devlin, M. and Lewis, S. (2011)** Advancing our understanding of the source, transport and impacts of pesticides on the Great Barrier Reef and in associated ecosystems: A review of MTSRF Research Outputs, 2006-2010, http://www.rrrc.org.au/publications/pesticides_review.html e-Atlas project page: Reef Rescue Marine Monitoring Program - Pesticide monitoring in inshore waters of the Great Barrier Reef using both time-integrated and event monitoring techniques (Entox UQ), http://e-atlas.org.au/rrmmp/gbr-entox-uq-inshore-pesticide-monitoring

* This is a non-standard field that will be used by the e-Atlas team in managing the data. It will be made available through the meta-data record as a linked document.