The University Of Queensland
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Faculty of Science

Remote Sensing Research Centre

2017 ANNUAL REPORT

Date: 16 March 2018

Remote Sensing
RESEARCH CENTRE

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The Remote Sensing Research Centre for 2017

Message from the Centre Director – Professor Stuart Phinn

This year was most notable for several global scale changes in Earth Observation that have carried through to our research, teaching and national coordination:

- rapid advancement in earth observation platforms, sensors, low cost launch , global and long-time series archive satellite image data sets in the private and research sectors;
- "democratisation" and lower cost of access to space and development of the "Space 2.0" economy, in response to the first point above, where these changes are now being driven by private industry, not Government Space Agencies;
- Australia's Commonwealth Government finally taking the initiative to develop a form of "Space Agency" through its Space industry Capability Review activity.

The centre continues to be primarily supported by the School of Earth and Environmental Sciences, where it operates as a school level centre. We thank the School, Faculty of Science and Vice Chancellor's Strategic Research Fund for ongoing support and also note the critical support provided by the Queensland and New South Wales Governments in the Joint Remote Sensing Research Program.

Our main achievements fall neatly into the core objective areas of the centre:

1. Centre Research Coordination and Training

The centre continues to be an internationally diverse group of Honours (2), Masters (2) and Doctoral (16) students from 11 countries around the world. The students are addressing topics with industry and government partners using earth observation data to map and monitor a range of biophysical properties, from land cover to biomass and primary production, mainly in terrestrial environments in Australia, with some work in coral reefs as well. Notable events for the year include:

- Four of our Doctoral and two of our Honours students graduated, all moving straight to industry and government jobs.
- Prof. Phinn received a University of Queensland Excellence award for Higher Degree Research Supervision and Queensland Spatial Industry Excellence award for Contribution to Research Training.
- John Tasker's Honours work "Structural Classification of Select Australian Vegetation Communities Using Airborne LiDAR" was awarded the Royal Geographical Society's annual prize for 2017.

2. Core Projects

We have continued to focus our activities around projects that deliver capabilities for private industry, non-government organisations and all levels of government in Australia to use earth observation data as part of their essential activities.

Our core projects continue to be in the Joint Remote Sensing Research Program supporting the development and operational use of EO by agencies in the Queensland, New South Wales, Victorian, Tasmanian and Northern Territory Governments. In 2017 these activities have also seen us lead the development of Australia's "Copernicus Data Hub" providing the Austral-Asian region with access to the extensive and growing set of satellite data from the European Union's $150 Billion satellite program. In addition, JRSRP has contributed significantly to the Commonwealth's Rural R&D for Profit Scheme, with new partner, University of New England. The major output from this for 2017 was a new national commodity level map of all mango, macadamia and avocado farms in Australia, developed in association with these industries. Due to this success and industry uptake of the work, it will be extended across other crops in 2018. JRSRP also received a University of Queensland Partners in Research Excellence Award.

Behind JRSRP and our other activities in 2017 we have significantly expanded our projects working out how to use massive (Peta- to Exa-byte) long term global satellite image archives (Landsat, Sentinel 2, Planet) and cloud compute capabilities, for Australia and globally. These activities build on growing partnerships with Google's Earth Engine, Planet and a range of start-up companies, and the Digital Earth Australia Program. These collaborations will all be delivering significant new national and global capabilities in 2018

Our work in coastal and coral reefs, led by Dr Chris Roelfsema, has also continued to expand and have significant impact from local to global scales. At local scales, citizen science work completed mapping of Flinders Reef and saw Moreton Bay listed as a global "Hope Spot" for marine conservation. Work funded by the Great Barrier Reef Foundation was used to deliver the first detailed benthic community maps of the southern and Cairns to Cooktown regions of the Great Barrier Reef. This work will pave the way for mapping the entire Great Barrier Reef and hopefully a new global reef mapping and monitoring program.

3. Earth Observation Coordination

RSRC has continued to act as the national focus that provides the resources and personnel necessary to maintain and develop Australia's national Earth Observation coordination capacity across all levels of government, private industry, non-government groups and education.

The 10 year strategic plan for Australia's EO community began implementation this year, with "Australian Earth Observation community Coordination Group" being re-launched as "Earth Observation Australia" and five working groups are now well

underway in addressing the five priorities of the plan; Immediate results in 2017 from implementing this plan have been:

- leading the submission of a $160 million EO research infrastructure bid;
- assisting the Commonwealth secure $18 million for the Digital Earth Australia initiative;
- establishing the “Earth Observation for Government Network” and
- providing major direction in development of Australia’s Space Agency.

Professor Stuart Phinn

14 March 2018

Strategic Overview of the Centre Research Activities

The Remote Sensing Research Centre operates as a leading national and international research and training centre for biophysical remote sensing for understanding and solving environmental monitoring management problems. Our centre's strategic goals, objectives and outcomes are:

1. Centre research coordination and training

To maintain and develop the RSRC and UQ as a leading international research, research training, and research to operational activities centre for use of remote sensing in earth observation and monitoring. We are maintaining this status this through our new and graduating students, ongoing weekly meetings, workshops and development of EO applications.

2. Core projects

To develop and maintain the centre's internationally unique critical mass of highly trained staff, specialized equipment, software and databases necessary to undertake and deliver research projects (knowledge, methods, software) that enable mapping, monitoring and modelling of our ecosystems from local to global scales.

Our core projects in the Joint Remote Sensing Research Program have lead the way in which Australia's state governments and now Commonwealth, use remote sensing. Focus projects across the several national horticultural industries and mapping the Great Barrier Reef have been successful, gaining significant national and international recognition for best practice science linked to government and industry activities.

3. Earth Observation Coordination

To act as the national focus that provides the resources and personnel necessary to maintain and develop Australia's national Earth Observation coordination capacity across all levels of government, private industry, non-government groups and education.

RSRC has continued to act highly effectively as the national focus that provides the resources and personnel necessary to maintain and develop Australia's national Earth Observation coordination capacity across all levels of government, private industry, non-government groups and education. We have produced a 10 year plan, and this has led to leading the submission of a $160 million research infrastructure bid on earth observation, and providing major direction in development of Australia's Space Agency.

4. Long term sustainability

To provide the operational, staff and training environment necessary to develop and maintain the highest level research and research training capacity for remote sensing at UQ while providing industry, government and academia with the next generation of ecosystem scientists and managers who are highly skilled in the practical application of remote sensing.

Identifying and obtaining long term funding is a continual challenge – we have partially focused on this through our core objectives in 2017 and will increase our focus during 2018.

Centre Membership in 2017

The RSRC Members

Academic, General and Research Staff, and conjoint, adjunct or honorary members specifically appointed to or affiliated with our centre.

Title	First Name	Last Name	School/Centre/Institute	Position/Program
Professor	Stuart	Phinn	Remote Sensing Research Centre School of Earth and Environmental Sciences	Centre Director
Dr	Chris	Roelfsema	Remote Sensing Research Centre School of Earth and Environmental Sciences	Centre Co-Director
Dr	Peter	Scarth	Remote Sensing Research Centre School of Earth and Environmental Sciences	Joint Remote Sensing Research Program
Dr	Kasper	Johansen	Remote Sensing Research Centre School of Earth and Environmental Sciences	Research Fellow
Mr	Neil	Flood	Remote Sensing Research Centre School of Earth and Environmental Sciences	Joint Remote Sensing Research Program
Dr	Adrian	Fisher	Remote Sensing Research Centre School of Earth and Environmental Sciences	Joint Remote Sensing Research Program
Ms	Christina	Jones	Qld Department of Environment & Science	Joint Remote Sensing Research Program
Mr	Dan	Tindall	Qld Department of Environment & Science	Joint Remote Sensing Research Program
Mr	Tim	Danaher	NSW Office of Environment & Heritage	Adjunct & Joint Remote Sensing Research Program
Dr	Tony	Gill	NSW Office of Environment & Heritage	Adjunct & Joint Remote Sensing Research Program
Dr	Rebecca	Trevithick	Qld Department of Environment & Science	Joint Remote Sensing Research Program
Dr	Nick	Goodwin	Qld Department of Environment & Science	Joint Remote Sensing Research Program
Dr	Melissa	Fedrigo	Qld Department of Environment & Science	Joint Remote Sensing Research Program
Dr	Mitch	Lyons	University of New South Wales	Joint Remote Sensing Research Program
Dr	Mariela	Soto-Berelov	Vic Dept of Environment, Land Water & Planning/RMIT	Joint Remote Sensing Research Program

Title	First Name	Last Name	School/Centre/Institute	Position/Program
Assoc Prof	Andrew	Robson	University of New England	Joint Remote Sensing Research Program
Ms	Jasmine	Muir	University of New England	Joint Remote Sensing Research Program
Dr	Eva	Kovacs	Remote Sensing Research Centre School of Earth and Environmental Sciences	Researcher
Dr	Lucia	Morales Barquero	Remote Sensing Research Centre School of Earth and Environmental Sciences	Postdoctoral Research Fellow
Dr	Zunyi	Xie	Remote Sensing Research Centre School of Earth and Environmental Sciences	Postdoctoral Research Fellow
Professor	Arnold	Dekker	CSIRO	Adjunct
Dr	John	Armston	University of Maryland	Adjunct
Ms	Joanne	Edkins	Remote Sensing Research Centre School of Earth and Environmental Sciences	Research Support Officer

National and International Visitors

Title	First Name	Last Name	Appointment	Place and Name of Institution	Reason for Visit	Duration	Dates
Assoc Prof	Noam	Levin		Hebrew University, Israel	Annual collaboration on remote sensing applications development with Prof. Phinn		April-September
Dr	Kim	Calders		Ghent University, Belgium	Terrestrial laser scanning research project development		December

Our Students – Research Degrees awarded and in progress in 2017

Awarded in 2017						
Name of Student	**Topic**	**PhD / MPhil**	**1st Year**	**Name of University, Institution / School**	**Principal or Joint Advisor**	**Associate Advisors**
Jiban Chandra Deb	Assessing Species Vulnerability to Climate Change in Tropical Asia: Implications for Biodiversity Conservation and Forest Management	PhD	2013		Stuart Phinn	Clive McAlpine
Laura Gow	A Land Surface Temperature Model-data Differencing Approach to Quantifying Subsurface Water use by Vegetation	PhD	2013		Stuart Phinn	Damian Barret
Muhammad Hoque	Cyclone Disaster Mapping, Monitoring and Management Using Satellite Remote Sensing and Spatial Analysis	PhD	2013		Stuart Phinn	Chris Roelfsema
Ralph Trancoso	Ecohydrology in space and time: functioning and changes in the streamflow generation of catchments	PhD	2013		Stuart Phinn	Clive McAlpine
Simon Baltais	Changes in a seagrass seascape over a 25 year period for a complex coastal embayment, Moreton Bay, Australia: An Object Based Landsat Image Analysis Approach.	MPhil	2010		Chris Roelfsema	Stuart Phinn
John Tasker	Structural classification of select Australian Vegetation Communities using Airborne LiDAR	Honours	2017		Stuart Phinn	Peter Scarth
Ofalia Ho	Mapping cloud immersion patterns in Australian subtropical montane forests	Honours	2017		Stuart Phinn	Joshua Soderholm, Luke Shoo

Commencing in 2017						
Name of Student	**Topic**	**PhD / MPhil**	**FT / PT**	**Name of University, Institution and School**	**Principal or Joint Advisor**	**Associate Advisors**
Doddy Yuwono	Developing a Systematic Coastal Habitat Classification Scheme for Indonesia Using Multi-Source Remotely Sensed Data	PhD	FT		Chris Roelfsema	Stuart Phinn

Continuing in 2017							
Name of Student	**Topic**	**PhD / MPhil**	**FT / PT**	**1st Year**	**Name of University, Institution and School**	**Principal or Joint Advisor**	**Associate Advisors**
Aaron Aeberli	Non-Invasive detection of Panama disease and health in bananas	PhD	FT	2016		Stuart Phinn	Andrew Robson
Jason Barnetson	Understanding the Gradual Ecosystem Changes in Native Pastures of the Arid and Semi-arid Rangelands of the Northern Territory	PhD	PT	2015		Stuart Phinn	Peter Scarth
Domminic Bryant	Drivers of coral reef condition in the Central Maldives using kilometre scale survey techniques from the XL Catlin Seaview Survey	PhD	FT	2014		Stuart Phinn	Ove Hoegh Guldberg, Sophie Dove
Danang Candra	Cloud Removal Analysis of Remote Sensing Satellite Image	PhD	FT	2014		Stuart Phinn	Peter Scarth
Catherine Kim	Drivers of Benthic Composition, Marine Biodiversity, and Coral Health along the North Coast of Timor-Leste	PhD	FT	2014		Chris Roelfsema	Ove Hoegh Guldberg, Sophie Dove
Jenny Mahuika	Time Series Data Fusion Methods for Monitoring Woody Vegetation Change in Cloudy Conditions	MPhil	FT	2015		Stuart Phinn	Peter Scarth
Jasminue Muir	Developing a Site Based Index of Vegetation Structure Complexity from Terrestrial Laser Scanner Data	PhD	FT	2013		Stuart Phinn	Peter Scarth

Continuing in 2017							
Name of Student	**Topic**	**PhD / MPhil**	**FT / PT**	**1st Year**	**Name of University, Institution and School**	**Principal or Joint Advisor**	**Associate Advisors**
Chunye Niu	Canopy Reflectance Modelling for Mapping Coastal Wetland Vegetation of South East Queensland	PhD	FT	2016		Stuart Phinn	Chris Roelfsema
Denise Perez	Mapping Coral Reef Primary Production and Calcification from a Light Use Efficiency Model with in situ and Remotely Sensed Data	PhD	FT	2014		Stuart Phinn	Chris Roelfsema
Mohammad Redowan	Mapping forest dynamics in Bangladesh from satellite images: Implications for the global REDD+ program	PhD	FT	2013		Stuart Phinn	Chris Roelfsema
Jeremy Sofonia	Biophysical Dynamics of Coastal Marine Habitats and Satellite Imagery Validation using LiDAR, Multi-spectral and other Remote Sensing Techniques on Unmanned Vehicles	PhD	FT	2015		Stuart Phinn	Chris Roelfsema
Yu-Hsuan Tu	Optimal Remotely Piloted Aircraft System Imaging and Processing for Horticultural Applications	PhD	FT	2016		Stuart Phinn	Kasper Johansen, Andrew Robson
Dan Wu	Integrating LiDAR and Satellite Multispectral data for Monitoring Mango, Avocado and Macadamia Tree Crops	PhD	FT	2015		Stuart Phinn	Kasper Johansen, Andrew Robson
Debbie Chamberlain	Decision-making to facilitate habitat movements in coastal Australia	PhD	FT	2013		Stuart Phinn	

Research Grants and Contracts in 2017

Research Income

Other Funding

Amount ($) received in 2017	Title	Type of Funding and organisation/company	Names of recipients or chief investigators	UQ Admin Unit
237,600	Delivering a reef resilience plan for the Cairns management area through an integrated spatial decision support environment.	Great Barrier Reef Foundation	Roelfsema, Christiaan M; Phinn, Stuart R & Mumby, Peter J	Science
33,739	Algorithms for harvest intelligence.	Innovation Connections	Phinn, Stuart R & Scarth, Peter	Science
31,766	Short-Wave Infrared Satellite Image Applications Development Review.	Innovation Connections	Phinn, Stuart R & Johansen, Kasper	Science
22,699	Measuring rehabilitation response to fire: Implications for long term resilience and mine closure.	Wesfarmers Curragh Pty Ltd	Erskine, Peter D; Phinn, Stuart R & Mckenna, Phillip B	Science
10,691	Advancing vegetation classification and mapping to meet conservation needs (ARC Linkage project administered by UNSW).	University of New South Wales	Phinn, Stuart R; Keith, D.; Elith, R.; Warton, D. & Connolly, D.	Science
419,932	Multi-scale monitoring tools for managing Australian Tree Crops: Industry meets innovation.	Horticulture Innovation Australia Ltd	Phinn, Stuart R	Science
86,625	AusCover Facility - Brisbane Node (TERN III to V).	CSIRO	Phinn, Stuart R & Scarth, Peter	Science
591,512	Joint Remote Sensing Program.	QLD DES & NSW OEH	Phinn, Stuart R & Johansen, Kasper	Science

Major Partners and Linkages in 2017

Person	Company/Institute/Department	Linkage or Activity
Christina Jones and Dan Tindall	Queensland Department of Environment and Science	John Remote Sensing Research Program
Tim Danaher	New South Wales Office of Environment and Heritage	Joint Remote Sensing Research Program
Mariela Soto-Berelov	Victoria Department of Environment, Land Water & Planning/RMIT	Joint Remote Sensing Research Program
Mitch Lyons	University of New South Wales	Joint Remote Sensing Research Program
Andrew Robson	University of New England	Joint Remote Sensing Research Program
Alla Metlenko	Earth Observation for Government Network	Geoscience Australia
Arko Lucieer	University of Tasmania	ARC linkage and discovery grants
Petra Lundgren	Great Barrier Reef Foundation	Coral Reef Mapping and Monitoring
Rachel Pears, Donna Audas	Great Barrier Reef Marine Park Authority	Coral Reef Mapping and Monitoring
Lyndin Llewellyn	Australian Institute of Marine Science	Coral Reef Mapping and Monitoring

Research Publications from 2017

Journal (peer reviewed)	
	Addison, P. F. E., Collins, D. J., Trebilco, R., Howe, S., Bax, N., Hedge, P., Jones, G., Miloslavich, P., **Roelfsema**, C., Sams, M., Stuart-Smith, R. D., Scanes, P., Von Baumgarten, P., McQuatters-Gollop, A. (2017). A new wave of marine evidence-based management: emerging challenges and solutions to transform monitoring, evaluating, and reporting. *ICES Journal of Marine Science*, fsx216-fsx216. doi:10.1093/icesjms/fsx216
	Albert, S., Saunders, M.I., **Roelfsema**, C.M., Leon, J.X., Johnstone, E., Mackenzie, J.R., Hoegh-Guldberg, O., Grinham, A.R., **Phinn**, S.R., Duke, N.C. (2017). Winners and losers as mangrove, coral and seagrass ecosystems respond to sea-level rise in Solomon Islands. *Environmental Research Letters*, 12(9), 094009. doi:10.1088/1748-9326/aa7e68. Open Access.
	Bryant, D. E. P., Rodriguez-Ramirez, A., **Phinn**, S., González-Rivero, M., Brown, K. T., Neal, B. P., Hoegh-Guldberg, O., Dove, S. (2017). Comparison of two photographic methodologies for collecting and analyzing the condition of coral reef ecosystems. *Ecosphere*, 8(10), e01971-n/a. doi:10.1002/ecs2.1971. Open Access

	Deb, J. C., **Phinn**, S., Butt, N., & McAlpine, C. A. (2017). Climatic-Induced Shifts in the Distribution of Teak (Tectona grandis) in Tropical Asia: Implications for Forest Management and Planning. *Environmental Management*, 1-14. doi:10.1007/s00267-017-0884-6
	Deb, J. C., **Phinn**, S., Butt, N., & McAlpine, C. A. (2017). The impact of climate change on the distribution of two threatened Dipterocarp trees. *Ecology and Evolution*. doi:10.1002/ece3.2846
	Ghose, A., **Deb**, J. C., Dakwa, K. B., Ray, J. P., & Reza, A. H. M. (2017). Amphibian species assemblages in a tropical forest of Bangladesh. *Herpetological Journal*, 27(4), 318-325.
	Hamylton, S. M., Duce, S., Vila-Concejo, A., **Roelfsema**, C. M., **Phinn**, S. R., Carvalho, R. C., **Shaw**, E.C., Joyce, K. E. (2017). Estimating regional coral reef calcium carbonate production from remotely sensed seafloor maps. *Remote Sensing of Environment*, 201, 88-98. doi:10.1016/j.rse.2017.08.034
	Hickey, S. M., **Phinn**, S. R., Callow, N. J., van Niel, K. P., Hansen, J. E., & Duarte, C. M. (2017). Is Climate Change Shifting the Poleward Limit of Mangroves? *Estuaries and Coasts*, 1-12. doi:10.1007/s12237-017-0211-8
	Hoque, M. A. A., **Phinn**, S., & **Roelfsema**, C. (2017). A systematic review of tropical cyclone disaster management research using remote sensing and spatial analysis. *Ocean and Coastal Management*, 146, 109-120. doi:10.1016/j.ocecoaman.2017.07.001
	Hoque, M. A.-A., **Phinn**, S., **Roelfsema**, C., & Childs, I. (2017). Modelling tropical cyclone risks for present and future climate change scenarios using geospatial techniques. *International Journal of Digital Earth*, 1-18. doi:10.1080/17538947.2017.1320595
	Hoque, M. A. A., **Phinn**, S., **Roelfsema**, C., & Childs, I. (2017). Tropical cyclone disaster management using remote sensing and spatial analysis: A review. *International Journal of Disaster Risk Reduction*. doi:10.1016/j.ijdrr.2017.02.008
	Johansen, K., Sallam, N., **Robson**, A., Samson, P., Chandler, K., Derby, L., . . . Jennings, J. (2017). Using GeoEye-1 Imagery for Multi-Temporal Object-Based Detection of Canegrub Damage in Sugarcane Fields in Queensland, Australia. *GIScience and Remote Sensing*, 1-21. doi:10.1080/15481603.2017.1417691
	Levin, N. (2017). The impact of seasonal changes on observed nighttime brightness from 2014 to 2015 monthly VIIRS DNB composites. *Remote Sensing of Environment*, 193, 150-164. doi:https://doi.org/10.1016/j.rse.2017.03.003
	Levin, N., Jablon, P.E., Phinn, S., Collins, K. (2017). Coastal dune activity and foredune formation on Moreton Island, Australia, 1944-2015. *Aeolian Research*, 25, 107-121. doi: 10.1016/j.aeolia.2017.03.005
	Levin, N., Kark, S., & Danovaro, R. Adding the Third Dimension to Marine Conservation. *Conservation Letters*, n/a-n/a. doi:10.1111/conl.12408. Open Access.
	Levin, N., Lechner, A.M., Brown, G. (2017). An evaluation of crowdsourced information for assessing the visitation and perceived importance of protected areas. *Journal of Applied Geography*, 79C, 115-126. doi:10.1016/j.apgeog.2016.12.009
	Levin, N., Zhang, Q. (2017). A global analysis of factors controlling VIIRS nighttime light levels from densely populated areas. *Remote Sensing of Environment*, 190, 366-382. doi:10.1016/j.rse.2017.01.006
	McKenna, P., Erskine, P. D., Lechner, A. M., & **Phinn**, S. (2017). Measuring fire severity using UAV imagery in semi-arid central Queensland, Australia. *International Journal of Remote Sensing*, 38(14), 4244-4264. doi:10.1080/01431161.2017.1317942
	Mitchell, M. G. E., **Johansen**, K., Maron, M., McAlpine, C. A., **Wu**, D., & Rhodes, J. R. (2018). Identification of fine scale and landscape scale drivers of urban aboveground carbon stocks using high-resolution modeling and mapping. *Science of the Total Environment*, 622-623, 57-70. doi:10.1016/j.scitotenv.2017.11.255

	Phinn, S. R., **Kovacs**, E. M., **Roelfsema**, C. M., **Canto**, R. F., Collier, C. J., & McKenzie, L. J. (2017). Assessing the potential for satellite image monitoring of seagrass thermal dynamics: for inter- and shallow sub-tidal seagrasses in the inshore Great Barrier Reef World Heritage Area, Australia. *International Journal of Digital Earth*, 1-24. doi:10.1080/17538947.2017.1359343
	Samper-Villarreal, J., **Roelfsema**, C., **Kovacs**, E.M., Adi, N.S., Lyons, M., Mumby, P.J., Lovelock, C.E., Saunders, M.I., Phinn, S.R. (2017). Seagrass morphometrics at species level in Moreton Bay, Australia from 2012 to 2013. *Scientific Data*, 4. doi:10.1038/sdata.2017.60
	Schläppy M, Loder J, Salmond J, Lea A, Dean AJ and **Roelfsema** CM. (2017) Making waves: marine citizen science for impact. *Frontiers in Marine Science*. 4:146. doi:10.3389/fmars.2017.00146
	Trancoso, R., Larsen, J. R., McVicar, T. R., **Phinn**, S. R., & McAlpine, C. A. (2017). CO2-vegetation feedbacks and other climate changes implicated in reducing base flow. *Geophysical Research Letters*, 44(5), 2310-2318. doi:10.1002/2017GL072759
	Trancoso R, **Phinn** S, McVicar TR, Larsen JR, McAlpine CA. (2017) Regional variation in streamflow drivers across a continental climatic gradient. *Ecohydrology*. doi:10.1002/eco.181
	Tulloch, V. J., Klein, C. J., Jupiter, S. D., Tulloch, A. I. T., **Roelfsema**, C., & Possingham, H. P. (2017). Trade-offs between data resolution, accuracy, and cost when choosing information to plan reserves for coral reef ecosystems. *Journal of Environmental Management*, 188, 108-119. doi:10.1016/j.jenvman.2016.11.070
	Venegas-Li, R., **Levin**, N., Possingham, H., & Kark, S. 3D spatial conservation prioritisation: Accounting for depth in marine environments. *Methods in Ecology and Evolution*, n/a-n/a. doi:10.1111/2041-210X.12896
	Weil, G., Lensky, I. M., & **Levin**, N. (2017). Using ground observations of a digital camera in the VIS-NIR range for quantifying the phenology of Mediterranean woody species. *International Journal of Applied Earth Observation and Geoinformation*, 62, 88-101. doi: 10.1016/j.jag.2017.05.016
	Weil, G.; Lensky, I.M.; Resheff, Y.S.; **Levin**, N. (2017) Optimizing the Timing of Unmanned Aerial Vehicle Image Acquisition for Applied Mapping of Woody Vegetation Species Using Feature Selection. *Remote Sens*. 9, 1130. doi: 10.3390/rs9111130. Open Access.
	Woodgate, P., Coppa, I., Choy, S., **Phinn**, S.R., Arnold, L. and Duckham, M. (2017). The Australian approach to geospatial capabilities; positioning, earth observation, infrastructure and analytics: issues, trends and perspectives, *Geo-spatial Information Science*, doi: 10.1080/10095020.2017.1325612. Open Access.
	York, P.H., Smith, T.M., Coles, R.G., McKenna, S.A., Connolly, R.M., Irving, A.D., Jackson, E.L., McMahon, K., Runcie, J.W., Sherman, C.D.H., Sullivan, B.K., Trevathan-Tackett, S.M., Brodersen, K.E., Carter, A.B., Ewers, C.J., Lavery, P.S., **Roelfsema**, C.M., Sinclair, E.A., Strydom, S., Tanner, J.E., van Dijk, K.-J., Warry, F.Y., Waycott, M., Whitehead, S. (2017). Identifying knowledge gaps in seagrass research and management: An Australian perspective. *Marine Environmental Research*, 127, 163-172. doi:10.1016/j.marenvres.2016.06.006
Book	
Book chapter	

Conference Paper (peer reviewed)	
	Barnetson, J., **Phinn**, S., **Scarth**, P., & **Denham**, R. (2017). Assessing Landsat fractional ground-cover time series across Australia's arid rangelands: Separating grazing impacts from climate variability. Paper presented at the International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives.
	Candra, D. S., **Phinn**, S., & **Scarth**, P. (2017). Cloud and cloud shadow removal of landsat 8 images using Multitemporal Cloud Removal method. Paper presented at the 2017 6th International Conference on Agro-Geoinformatics, Agro-Geoinformatics 2017.
	Johansen, K., & Raharjo, T. (2017). Multi-temporal assessment of lychee tree crop structure using multi-spectral RPAS imagery. Paper presented at the International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives.
	Kamal, M., & **Johansen**, K. (2017). Explicit area-based accuracy assessment for mangrove tree crown delineation using Geographic Object-Based Image Analysis (GEOBIA). Paper presented at the Proceedings of SPIE - The International Society for Optical Engineering.
Conference Abstracts (optional)	
Other publications (non-research, e.g. reports, non-peer-reviewed papers, letters, case studies)	
Data	

- **Perez**, Denise Ivette; **Phinn**, Stuart R; **Roelfsema**, Christiaan M; **Shaw**, Emily; Johnston, Lyza; Iguel, John (2017): Primary productivity and calcification rates of coral reef flat and seagrass habitat at Heron Island, southern Great Barrier Reef, Australia and Saipan Lagoon, Commonwealth of the Northern Mariana Islands. PANGAEA, https://doi.org/10.1594/PANGAEA.874687
- **Roelfsema**, Christiaan M; **Kovacs**, Eva M; **Phinn**, Stuart R (2017): Georeferenced photographs of benthic photoquadrats acquired along 160 transects distributed over 23 reefs in the Cairns to Cooktown region of the Great Barrier Reef, January and April/May, 2017. PANGAEA, https://doi.org/10.1594/PANGAEA.877578
- **Roelfsema**, Christiaan M; **Phinn**, Stuart R (2017): Spectral reflectance library of corals and benthic features in the Cook Islands (Aitutaki). PANGAEA, https://doi.org/10.1594/PANGAEA.872505
- **Roelfsema**, Christiaan M; **Phinn**, Stuart R (2017): Spectral reflectance library of healthy corals, bleached corals and other benthic features in Fiji. PANGAEA, https://doi.org/10.1594/PANGAEA.872506
- **Roelfsema**, Christiaan M; **Phinn**, Stuart R (2017): Spectral reflectance library of healthy and bleached corals in the Keppel Islands, Great Barrier Reef. PANGAEA, https://doi.org/10.1594/PANGAEA.872507
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Patents, Royalties, and other Commercial Activities in 2017

Not applicable

Awards and Prizes in 2017

	Name of Recipient	Impact	Name of Award	Awarding entity/organisation	Area or Project
	Stuart Phinn		Excellence in HDR supervision - UQ Research Week Awards	UQ	
	The Joint Remote Sensing Research Program		Partners in Research Excellence Awards (PIREA) – award for science	UQ	
	Stuart Phinn		SSSI Excellence in Queensland Spatial - Educational Development Award	SSSI & SIBA GITA	

Community and Professional Activities in 2017

Title	Name of Staff Member	National/ International	Name of Society	Position Held
Professor	Stuart Phinn	National	Earth Observation Australia	Director
Ms	Joanne Edkins	National	Earth Observation Australia	Coordinator
Dr	Chris Roelfsema	National	Flinders Reef Ecological Assessment by University of Queensland Underwater Club	Project Leader
Dr	Chris Roelfsema	International	Coral Watch	Scientific Advisor
Dr	Chris Roelfsema	National	Reef Check Australia	Scientific Advisor

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- Earth Observation Australia www.eoa.org.au