

EOMAP DOWN UNDER SDB Day 2022



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EOMV5



International team of ~35 employees

Mathematicians, physicists, software engineers and developers, EO data analysts, remote sensing and GIS specialists, geographers, consulting engineers, hydrologists, geoscientists



EOMAP Australia

Who are we?

- Dr Magnus Wettle
 Aquatic Remote Sensing
 Managing Director
 EOMAP since 2012
 EOMAP AU since 2016
- Emily Twiggs Marine Geoscientist Senior Project Scientist EOMAP AU since 2018
- Incredible few years, uptake increasing in various sectors
- We value our work-life balance at EOMAP AU!



Data SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat / Copernicus

USERS AND NETWORK



- Hydrographic Offices
- Government Agencies
- Marine surveyors
- Engineers
- Environmental consultancies
- Energy suppliers
- Intergovernmental organisations
- Non-profits and NGOs
- Academia





FIT-FOR-PURPOSE MAPPING

- Hydrographic surveys, charting
- Baseline habitat mapping, EIAs
- Coastal change monitoring/management
- Oceanographic modelling
- Coastal infrastructure (pipeline crossings, jetties/ports)
- Port operations (bathymetry and turbidity monitoring)
- Disaster impact assessments
- Maritime boundary disputes
- Regional-global mapping initiatives (EMODnet and Seabed 2030)

WHERE DO WE MAP DOWN UNDER?



Australia's Antarctic Marine Jurisdiction





2021-2023 FY





SCIENCE AGENCY JURISDICTIONS AND RESEARCH

Geoscience Australia

- Nations trusted advisor on the Geology and Geography of Australia
- Apply science and technology to describe and understand the earth for the benefit of Australia
- Cover the Australian continent, extensive marine jurisdictions and territories in Antarctica





Australian Government

Geoscience Australia

SCIENCE AGENCY JURISDICTIONS AND RESEARCH

Geoscience Australia

 SDB to aid in management of jurisdictions (2021-22)

Australia:

- The Kimberley coastline (10m) - being processed
- Offshore WA reefs (10m) Sept 22
- Coral Sea reefs (2m)

Update 30m North West Australia Grids (Dr Rob Beaman, JCU) The Kimberley Coastline and Offshore Reefs of Western Australia



Australian Government

Good

Geoscience Australia

ΕΟΜΛΡ

OFFSHORE WA REEFS





ΕΟΜΛΡ

SCIENCE AGENCY JURISDICTIONS AND RESEARCH

Geoscience Australia

 SDB to aid in management of jurisdictions (2021-22)

Pacific countries:

- 10m SDB and habitats
- Reef research and management

Data eventually to the AusSeabed Platform (national seabed mapping coordination program) and Seabed 2030



Geoscience Australia

Ashmore Reef and Cartier Island Marine Parks (2022-23)

- Funding 'Our Marine Parks Grants Program', Parks AU
- Shelf-edge reef systems rising from westward limit of Sahul Shelf, off WA
- Australia's most remote Marine Parks
- Biodiversity hotspot for sea snakes, dugongs, turtles, extensive seagrass beds, and high coral diversity



Ashmore Reef and Cartier Island Marine Parks

The Kimberley

Sahul Sheli

20WIEY Shelf

Australia

This Our Marine Parks Grants project received grant funding from the Australian Government.



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Australian Government

Parks Australia

Ashmore Reef and Cartier Island Marine Parks (2022-23)

 Sahul Shelf exposed and major migration route for first nations people 50,000 years ago





This Our Marine Parks Grants project received grant funding from the Australian Government.

Australian Government A Parks Australia Ma



EOMVS







Data will be freely available online at AusSeabed, Seamaps and various other sites





ΕΟΜΛΡ

Great Barrier Reef (2019)

- All 3000 Reefs mapped at 10m resolution (2019)
- Data freely available via the GBR Reef Explorer
 Portal on the GBRMPA website
- Data fed into Seabed
 2030 and on the
 AusSeabed portal



SCIENCE AGENCY SAFE NAVIGATION

Antarctica (2022)

Surveying uncharted navigational hazards in the Mawson Station Region

RSV Nuyina ('southern lights' in Palawi Kani, a Tasmanian **First Nations Language**)

- Australia's new Icebreaker and most advanced polar research vessel
- Covered by sea ice for most of the year, dangerous to survey













YDROGRAPHIC



Australian Government Geoscience Australia

SCIENCE AGENCY SAFE NAVIGATION

Antarctica (2022)

- Australian Antarctic Division asked us to map in 380km² surrounding Mawson Station
- Rapidly identify seabed features <6-8m using WorldView-2 satellite (2m)
- Used by AHO to issue navigation advice through a 'Notice to Mariners' and plan to update charts





Australian Government

Department of the Environment Australian Antarctic Division



Australian Government

Geoscience Australia



SCIENCE AGENCY CLIMATE CHANGE

Climate Information Services for Resilient Development in Vanuatu, CSIRO (2021)

- Standardise science-based climate information
- Up-to-date bathymetry needed for shallow coastal region of entire archipelago
- 10 SDB, 10m and 50m
 MSB for entire archipelago



SCIENCE AGENCY CLIMATE CHANGE

Climate Information Services for Resilient Development in Vanuatu, CSIRO (2021)

- Hydrodynamic, wave and biogeochemical models amongst others
- Very important to map shallow waters, gaps lead to artifacts in GEBCO data

MAPPING THE GAPS

South and West Pacific Ocean Regional Centre

Tawi-Tawi, Philippines (2022)

Entire Federated States of Micronesia (2021-22)

Helen Reef, Palau

Cook Islands Atolls, (2021)

Minerva Reefs,

(2021)

Manihi and Katiu Atolls, French Polynesia (2022)

Data SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat / Copernicus Image IBCAO

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2, 10 and 30m SDB

HYDROGRAPHIC MAPPING

Cook Islands - Seabed 2030 and Charting (2021)

- 2018 6,500 km² (Tonga, Tokelau, Niue and Cook Islands) for the Pacific **Regional Navigation** Initiative (PRNI) via LINZ
- Sites not previously covered including Pukapuka and Suwarrow Atolls, Atiu Island
- Very remote and at-risk reefs
- 2m SDB, archived and tasked WorldView-2

Pukapuka Atoll

HYDROGRAPHIC MAPPING Cook Islands - Seabed 2030 and Charting (2021)

"The technology and processes" are really clever – the satellite can see the seafloor in exquisite detail, but to derive the water depth the software strips away the water and uses complex algorithms to produce depth estimations. It then creates a map with colourings of what the seafloor would look like without any water, which we can then use – it's really great," **Stuart** Caie (LINZ)

TRANSPORT AUTHORITY CHANGE DETECTION

Maritime Safety Queensland Quarterly SDB monitoring (2019-2020)

- Two locations with different requirements:
 1) Wide Bay Bar: navigation in a highly dynamic environment
- 2) Rous Channel: positioning navigational aids in complex channel system
- Archived and tasked 2 and 10m data

WIDE BAY BAR, QLD: CHANGE DETECTION FOR NAVIGATION (2019-2020)

Department of Transport and Main Roads - Maritime Safety Queensland

NOTICE TO MARINERS 196 of 2020

Issued by Gladstone Maritime Region on 4 June 2020

Area: Gladstone pilotage area

- Locality: Maryborough pilotage area
- Activity: Wide Bay Bar Revised Depths

Mariners are advised that a survey by satellite bathymetry of the Wide Bay Bar has been completed, and the latest indicative depths are shown in the attached chartlet. Mariners should be mindful that the depths shown are indicative within the ranges shown and the survey depths shown on the last hydrographic survey provide more detail of the depths existing when that survey was undertaken. However, the bar is dynamic, and Mariners should be cognizant the depths and positions of sandbars are continually changing. Therefore, the depths on both chartlets may no longer be as shown.

The latest information regarding conditions on the bar can be obtained from Tin Can Bay Coast Guarc on (07) 5486 4290, or VHF Ch 16, 67, 80 and 82, or 27Mhz Ch 88 and 90.

Wide Bay Bar is a designated coastal bar and as such mariners are reminded of the requirement to wear a lifejacket while crossing the bar in open boats under 4.8m.

Refer to notice: 133 of 2020 Cancel notice: 133 of 2020

AUS charts affected: 240, 817

Latitude and longitude positions are on WGS84 horizontal datum and are compatible with GDA94 datum.

For further information about this notice, please contact:

The Gladstone Regional Harbour Master's office:

Phone 07 4971 5200 Email: vtsgladstone@msq.qld.gov.au

Notice authorised by: Regional Harbour Master (Gladstone) - Maritime Safety Queensland

NON-PROFIT SHARK MITIGATION

Esperance Mapping (2021)

- Esperance remote Western Australian coastal community, 700km south-east of Perth
- Ocean Safety & Support
 Esperance founded by local waterman Mitch Capelli
 following the tragic death of
 teenager Laeticia Brouwer
 (2017). 3 deaths in 3 years.
- Focus on protecting ocean users from Great White Sharks in form of education, training, experience, technology and research.

NON-PROFIT SHARK MITIGATION

Esperance Mapping (2021)

- Map 2m SDB and habitats, initially in a test area and then SDB for 70km2 along the coast
- Data will be merged with other bathymetry data to understand the geomorphology of the region and shark movements along the coastline

GREEN ENERGY GREEN ENERGY HUB

South East Western Australia (SEWA Project), Fortescue Future Industries (2022)

- Scoping and feasibility for renewable energy project deliver zero-carbon green hydrogen
- Wind turbines, solar farms, desalination facilities produce demineralised water for hydrogen generation
- Green hydrogen and green ammonia production facility

GREEN ENERGY GREEN ENERGY HUB

80 Mile Beach, WA: Asian Renewable Energy Hub (2020)

Largest wind and solar farm in the world

- 26,000 MW of renewable energy using wind and solar power mines and industry
- Create green hydrogen, combine with nitrogen to create green ammonia
- Offset 20 million tons of CO₂ emissions every year, generate electricity, power ships, fertiliser and pharmaceuticals
- 10m SDB mapping to inform marine infrastructure siting

DEFENCE (WA)

Underwater Training Range (2019)

- UTR's at two military sites
- Facilitate training of special forces troops, the WA Police force and other national/international forces
- Underwater demolitions (very strict safety and environmental guidance), 1m above seafloor, ~8m
- 2-3 exercises a year, each max 2 days

Australian Government

Defence

DEFENCE (WA)

Underwater Training Range (2019)

- 2m SDB, Worldview-2
- ~70km² mapped to ~18m (Swanbourne) and ~22m depth (Lancelin)

DEFENCE (WA)

Underwater Training Range (2019)

- Training footprint in sandy habitats away from seagrass meadows/limestone reef habitats
- UTR under Environmental Review with EPA, approved

aurecon

Bringing ideas

Australian Government

Defence

EOMAP INNOVATION SDB Software

WATCOR-X

- Powerful commercial physicsbased desktop SDB software used by Hydrographic Offices and Defence
- Australian Defence, Geospatial-Intelligence
 Organisation (AGO) has several licences on multi-year contracts
- AGO lead agency for geospatial data, information and intelligence (GEOINT) for Defence and the National Intelligence Community (NIC)

Dr Magnus Wettle of EOMAP Australia (left) and Hydrographer of Australia Commodore Stewart Dunne

Australian Government

Department of Defence

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EO PLATFORMS COASTAL MONITORING

Coastal Change Observation and Analytics (multi-) Scale (multi-) Technology System, COASTS –

- satellite imagery
- drone data
- numerical modelling
- advanced AI analytics
- cloud-based portal technology
- Create state-of-the-art coastal change monitoring and hazards early warning system
- Platform will be directly ready for commercialisation
- Facilitate adaptation to climate change and build resilience against coastal hazards

IN SUMMARY:

- Large uptake of SDB by Government agencies e.g.
 CSIRO, GA, Parks Australia, GBRMPA
- Burgeoning use of SDB in
 Green Energy Sector e.g. FFI
- 'next level of EO' bringing together different data sets and analytics to make a solution-specific platforms for defined user types, e.g. COASTS
- Continued support for Seabed 2030, encouraging clients to contribute

None of this work is possible without the world-best technology and magic skills from the team at Germany HQ! Vielen Dank!

Thanks for listening!

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BJECTSETC

EOMVS