Surficial geology and deepwater habitats of the northern Great Barrier Reef

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RV Franklin Cruise 01/02
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swath mapping
Chirp profiles
CTDs, cores
grabs, UW video

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Methods

Data → Visualise → Statistics → Maps

Data:
- bathymetry grid
- backscatter image
- Chirp attributes
- sediment attributes
- uw video attributes

Visualise:
- ArcGIS maps
- Fledermaus 3D scenes

Statistics:
- geospatial analysis
- multivariate analysis

Maps:
- bathymetry model
- acoustic facies
- surficial sediments
- benthic habitats
ArcGIS maps

bathymetry grid (5m res)

backscatter image (2m res)

sub-bottom profiles (1 min res)
ArcGIS maps

sediment grabs
(<1m res)

video transects
(+1m res)

2 km
Fledermaus 3D scenes
Fledermaus 3D scenes
Fledermaus 3D scenes
Geomorphology

platform dunes
Sealevel change over past 140 kyr
Geospatial analysis

bathymetry slope (5m res)

backscatter groups (2m res)
Sediment texture (Folk diagram)
Sediment trends

- platforms & pinnacles are gravelly
- shelf & valleys are sandy
- valleys are more gravelly than shelf
- all samples have low mud CaCO3
- platforms & pinnacles have high gravel/sand CaCO3
- shelf and valleys have lower gravel/sand CaCO3
- sediment trends relate to gross geomorphology
Megabenthos analysis

- no fauna
- low sponge
- high sponge
- mixed garden
- octocoral
- hardcoral
- *Halimeda*
- mobile
- bioturbator
Megabenthos

octocoral proportion

bioturbator proportion

hardcoral proportion

pinnacles

platforms

shelf

valleys
Megabenthos trends

- pinnacles have hardcoral or *Halimeda*
- platforms have high sponges, mixed gardens
- megabenthos reduces with depth
- shelf has sparse fauna with variable low sponges, octocorals and bioturbators
- steep scarps provide favourable habitats for high sponges and octocorals
- narrow channels favour mobile fauna
Conceptual diagram

[Diagram showing various marine environments including infauna, Halimeda, holothuroid, sponge, sea whip, soft coral, and hard coral at different depths.]
Maps

bathymetry (20 m contour)

acoustic facies (Damuth classes)

-10 m
-243 m

IA
IC
IIA
dunes
modern reef
relict reef

2 km

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Maps

surficial sediment

work in progress

2 km

benthic habitats

work in progress

2 km
Conclusion

• Geophysical datasets are very useful for guiding representative groundtruth samples.
• Multibeam data results in high-resolution bathymetry to map geomorphology, and backscatter data to map variations in surficial sediment.
• Sub-bottom profile data defines depositional processes relevant to the distribution and dispersal of organisms.
• Combined with sediment and uw video data, allows insight into types of assemblages that are likely to be present e.g. suspension feeders vs detritus feeders.