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## Determining Sentinel 2 tiles to image

In this map we determined which Sentinel 2 image tiles to image. To do this we loaded the Sentinel 2 tiling grid along with the existing Coral Sea reef mapping performed by Rob Beaman. This was then used as a guide to select tiles that overlapped with the reef features.

Chart

Description automatically generated

Figure . Map of the Coral Sea with an overlay showing the index of Sentinel-2 images (each rectangular region) and the reef boundaries from the Coral Sea Geomorphology (Beaman).

Graphical user interface, chart

Description automatically generated

Figure . Use the Select by location tool to select all the tiles that contain reefs. We then used Edit/Copy features then Edit/Paste Features as New Vector Layer.

## Graphical user interface, application Description automatically generated

Figure Export settings for the Sentinel-2 image tiles with reefs in them.

Chart

Description automatically generated

## Selecting Reef Definition Test Case Scenes

A key challenge to developing a robust definition of reef boundaries is that there is a large variation in reefs depending on their environment and history. To help in the development of the definition of reef boundaries we selected a diverse set of reefs around the globe to test our definitions on. These test reefs areas were chosen because they represent the diverse range of reef geomorphologies.

Reef areas were review using the imagery available in Google Earth Pro and the Coral Allen Atlas. We looked for image tiles that would represent a broad selection of different reef structures. Given that we did not wish to increase the total imagery processed in this project too much we selected 14 diverse areas covering:

* Drowned coral atoll reefs because of subsidence
  + Federated States of Micronesia, 56NLP, 55PHK
* Near surface drowned continental areas
  + Saya de Malha Banks, 41LMJ, 41LLJ, 41LLK
  + Chesterfield Reefs, 57KVV, 57KVU, 57KVT, 57KVS, 57KWS, 57KWR
* Coral atolls in areas where the sea floor has been uplifted (Palau).
* Complex coral atolls (Maldives)
* Continental shoals that experience periodic turbid waters (Timor Sea, near Ashmore Reef).
* Fringing reefs in turbid waters (Magnetic Island in Queensland, Badu and Moa Island in Torres Strait, Maglalambay in Philippines)
* Complex reef matrices (Eastern PNG near Goodenough Island, Eastern Torres Strait, Dahlak Archipelago in the Red Sea)
* Carribbean reefs (Belize, Bahamas)

## Potential Coral Sea areas with unmapped reefs

In the Coral Sea, outside the Australian EEZ there are a number of potential reefs that maybe connected to Australian reefs. These tiles may contained unmapped reefs.

<https://maps.eatlas.org.au/index.html?intro=false&z=7&ll=159.34210,-21.04698&l0=ea_ea%3AWorld_e-Atlas-UCSD_SRTM30-plus_v8,ea_ref%3AWorld_ESA_Sentinel-2-tiling-grid_Poly,ea_ea-be%3AWorld_Bright-Earth-e-Atlas-basemap,google_HYBRID,google_TERRAIN,google_SATELLITE,google_ROADMAP&s0=Bathymetry-0-40m-Yellow-blue&v0=,,f,f,f,,f>

To determine these tiles shallow areas were determined from the global Digital Elevation Model SRTM30-plus v8.0. In remote locations the DEM model is quite low resolution resulting in potential false positive reef sites. These areas were not mapped by the Coral Allen Atlas.

The Google Earth Engine 01-select-sentinel2-images script was used to quickly determine if any reefs exist in any of these tiles.

57KXT, 57KYT, 57KYS, 57KZS, 57KXS, 57KWP, 57JWN

Map

Description automatically generated

Figure . Shallow areas (< 40 m) in the eastern regions of the Coral Sea as determined by the World: Digital Elevation Model, SRTM30-plus v8.0 (e-Atlas, UCSD) dataset.<https://eatlas.org.au/data/uuid/80301676-97fb-4bdf-b06c-e961e5c0cb0b>

|  |  |
| --- | --- |
| 57KXT – large reef (3 images) Banc de Landsdowne | 57KYT – 1 reef (3 images) Banc de Landsdowne |
| 57KYS – one small reef (2 images) Banc de Landsdowne | 57KZS – 3 reefs (32 images) Banc de Landsdowne |
| 57KXS – 7 reefs (5 images) South of Banc de Landsdowne | 57KWP 1 reef (1 images) |
| 57JWN 1 possible reef (1 image) |  |

<https://upload.wikimedia.org/wikipedia/commons/1/1f/New_Caledonia_and_Vanuatu_bathymetric_and_topographic_map-fr.jpg>

<https://en.wikipedia.org/wiki/Lansdowne_Bank>

Diagram, map

Description automatically generated

https://web.archive.org/web/20130305015208/http://www.shom.fr/fileadmin/data-www/01-LE\_SHOM/02-ACTUALITES/01-LES\_COMMUNIQUES/fig\_2\_-\_Sandy\_Island.png