

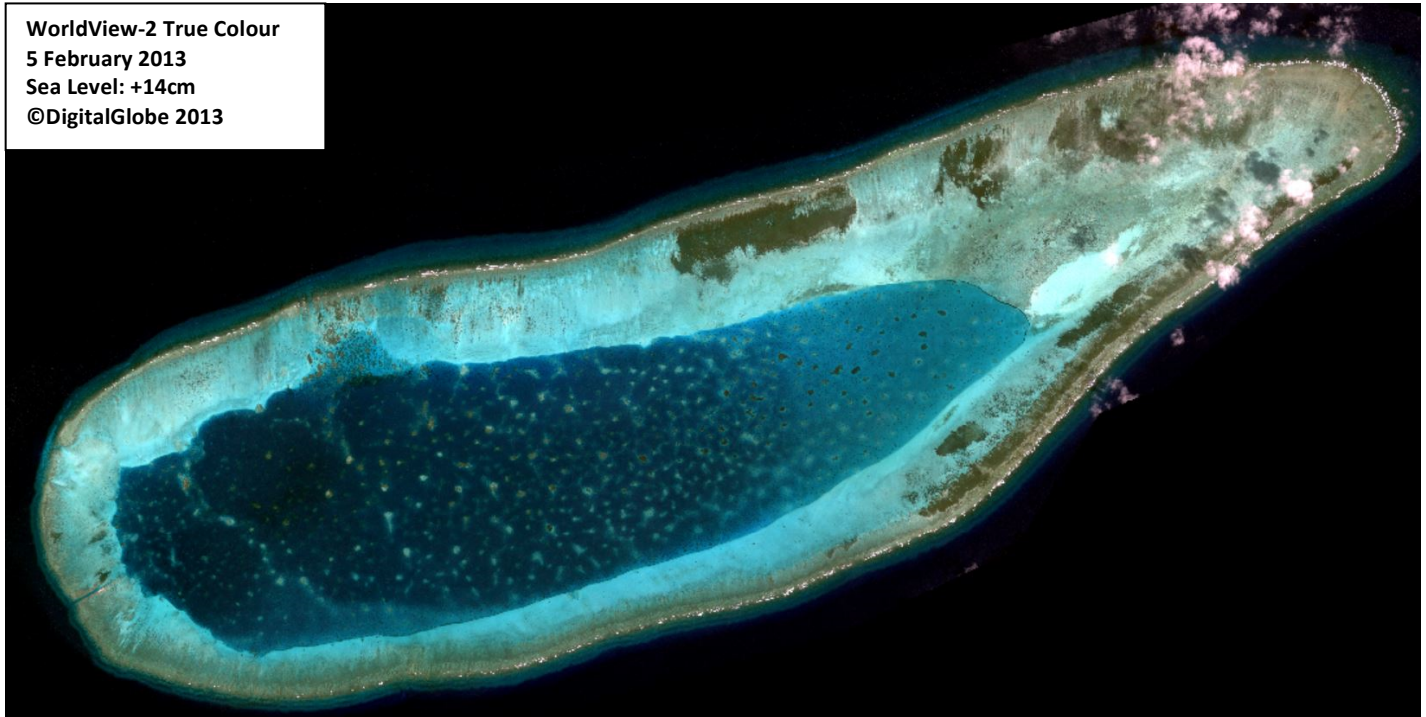
## BOMBAY REEF

16°02'49.52"N, 112°30'40.81"E

### **Geographic area**

Bombay Reef is a shallow atoll on the outskirts of the southeastern part of the Paracels, around 208NM northeast of Vietnam's mainland and 195NM southeast of Hainan. The closest shallow geographic feature is Vuladdore Reef, over 27NM northwest. Bombay Reef extends over 18km along its northeast-southwest axis and reaches 5.5km along its northwest-southeast axis.

WorldView-2 True Colour  
5 February 2013  
Sea Level: +14cm  
©DigitalGlobe 2013



### **Land area above water**

In the 5 February 2013 satellite image, there is one 100m-long by 15m-wide above-water sand bank on the western part of the reef flat, located along the southern bank of a man-made channel that links the lagoon to the open sea. According to the sea level calculated for this Study, this image was taken when the sea level was 14cm above Mean Sea Level. In the absence of past satellite images, it is unclear whether this sand bank was formed naturally or as a result of the excavation of the reef flat when the channel was built. Its height is also unknown. Whether this sand bank is permanent and remains above water at Mean High Water Spring (when the sea level is expected to increase by 62cm) cannot be determined. However, given its narrow width, it seems unlikely.

### **Human infrastructure**

As at 2 March 2015 (satellite image viewable on Google Earth), there is one beacon, possibly a light-house, on the western reef flat, along the northern side of the man-made channel, north of the above-water sand bank.

### **Intertidal and submerged area**

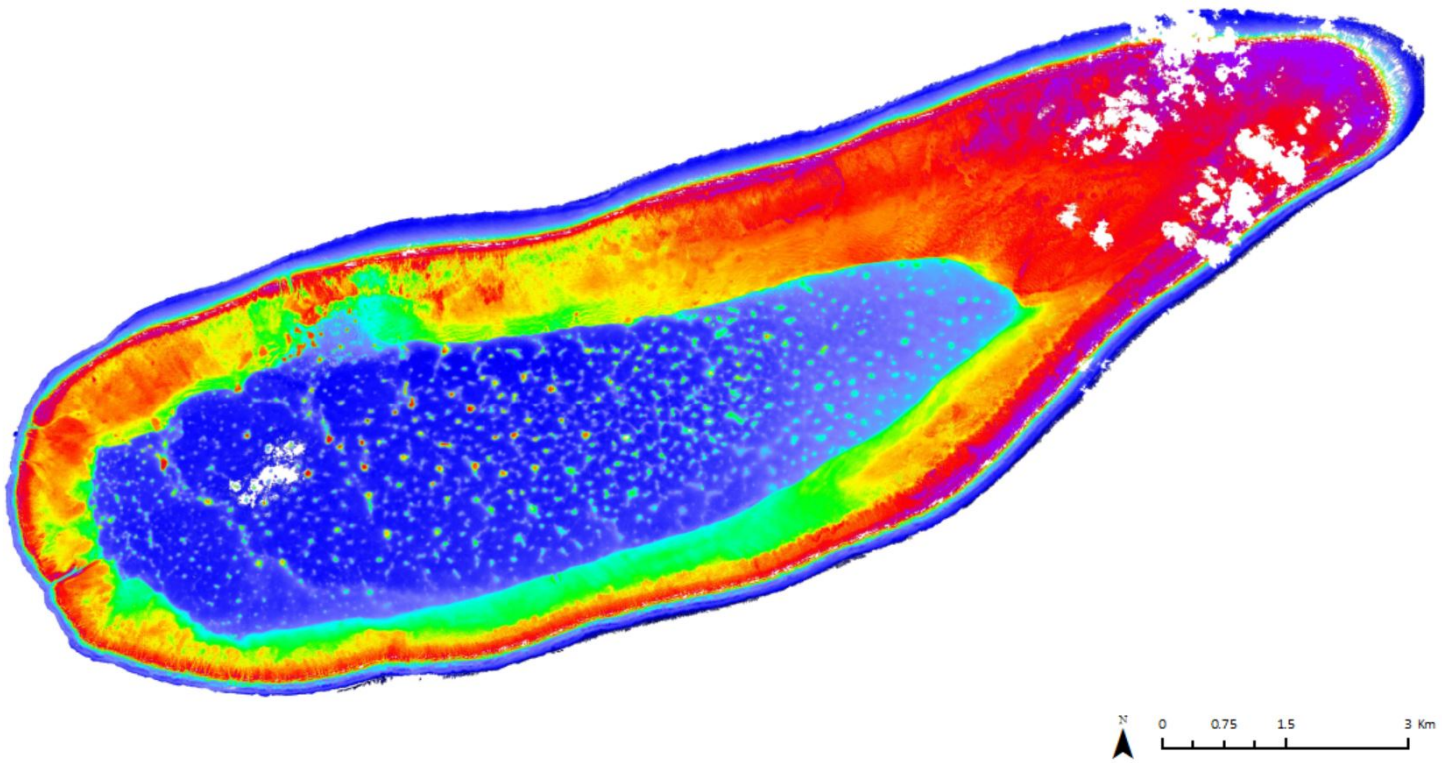
The surface area of the reef platform is 77.86km<sup>2</sup>, comprising a reef flat of 39.24km<sup>2</sup>, a lagoon of 29.15km<sup>2</sup> and a reef slope of 9.47km<sup>2</sup>. The reef flat is composed of two parts: a shallow outer ring with a hard coral bottom and a back reef - the inner ring that links the reef flat's outer ring to the lagoon. The outer ring extends nearly 40km in total, is 100-300m wide (except on the eastern side where it is up to 600m wide) and mostly 1.2-1.8m deep when the sea level is expected to be 14cm above Mean Sea Level. The back reef, which is sand dominated, occupies the largest portion of the reef flat. It is 400m wide south of the lagoon, 1km wide north of the lagoon and extends over 4km on the northeastern side of the lagoon where it is generally less than 2m deep. The depth is similar on the northern side of the lagoon (2m or less, to 2.5m) but it is deeper, 2-3.5m deep on the southern side. Another characteristic of the back reef is the presence of wave-like patterns in the sand (or sand ripples) in many locations. Parts of the reef flat that are 1.12m deep or less in the 5 February 2013 satellite image (above) are expected to be above water at Lowest Astronomical Tide. The lagoon is characterised by a dense reticulate reef system where knolls and coral heads are connected by narrow coral ridges of varying heights. The depth between knolls, coral heads and coral ridges is mostly 8-10m. The visible part of the reef slope reaches a width of 400m off the northwestern-facing side and not more than 200m off the southeast-facing side. Pronounced and regular spurs and ridges are visible on the northern reef slope. By contrast, the southern reef slope has short spurs and grooves and pronounced sand terraces. Localised dredging marks and areas of degraded coral reef are visible on sandy parts of the reef flat (4.20m<sup>2</sup> or 11%).

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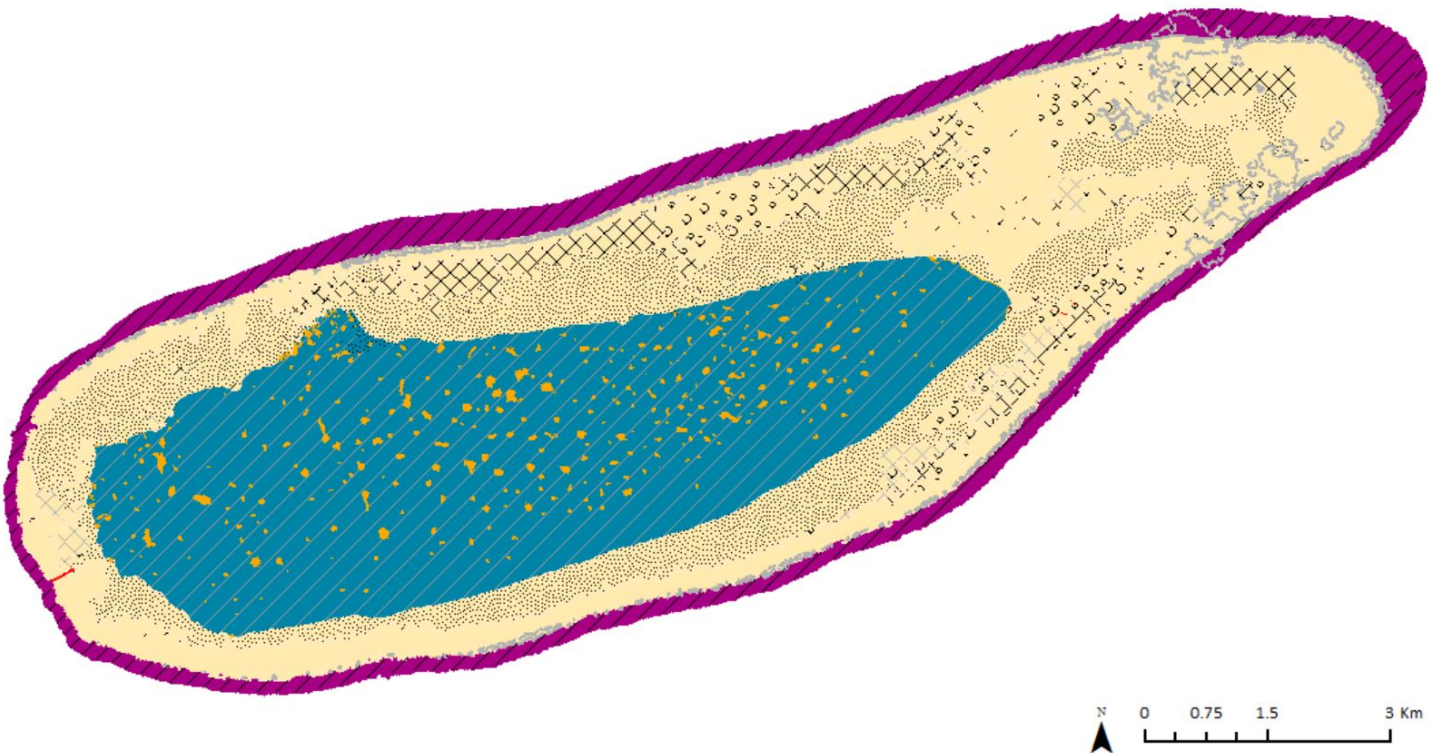
16°02'49.52"N, 112°30'40.81"E

Derived from WorldView-2 satellite data captured on 5 February 2013 [Sea Level: +14cm]

## Bathymetry Map



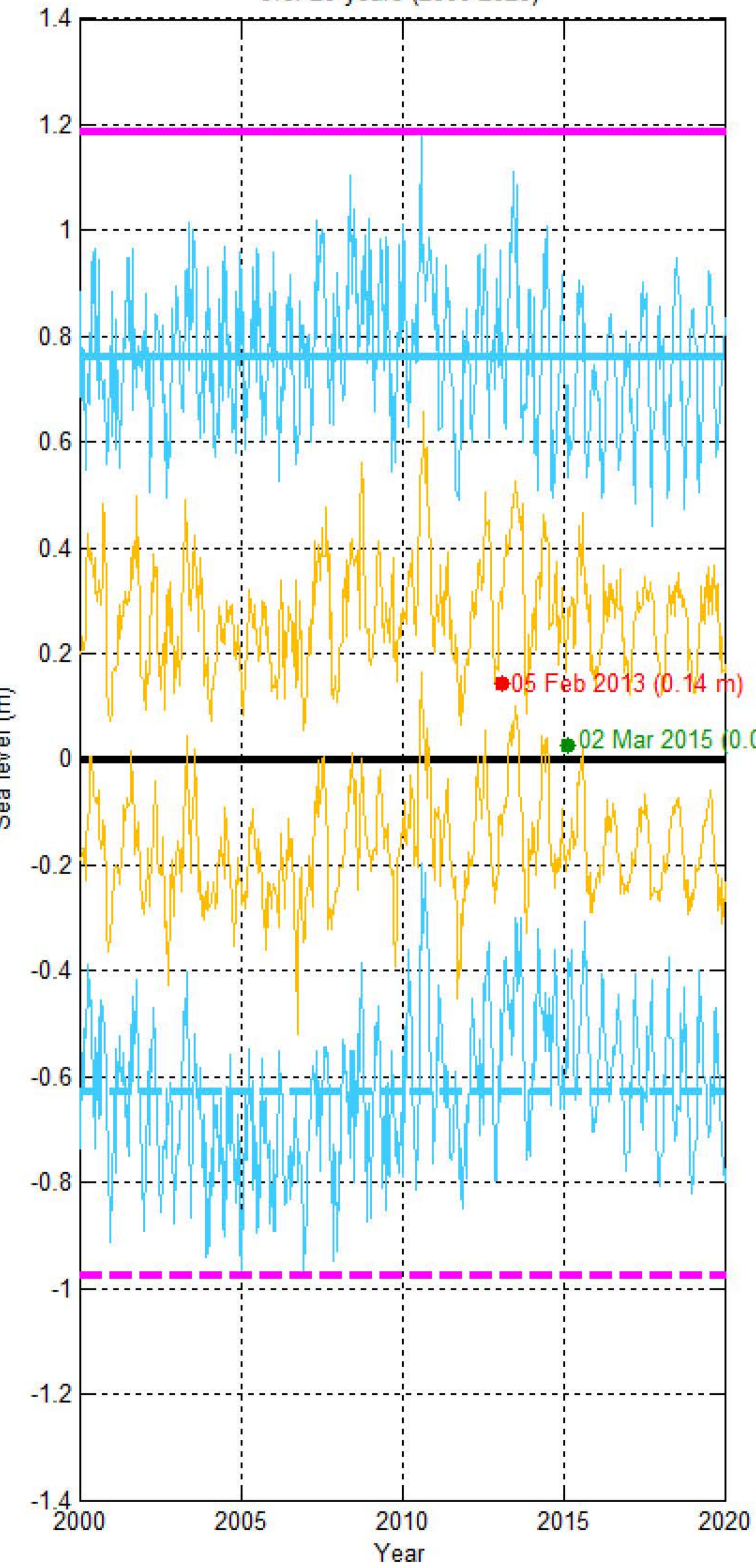
## Habitat Classification and Land Cover Map



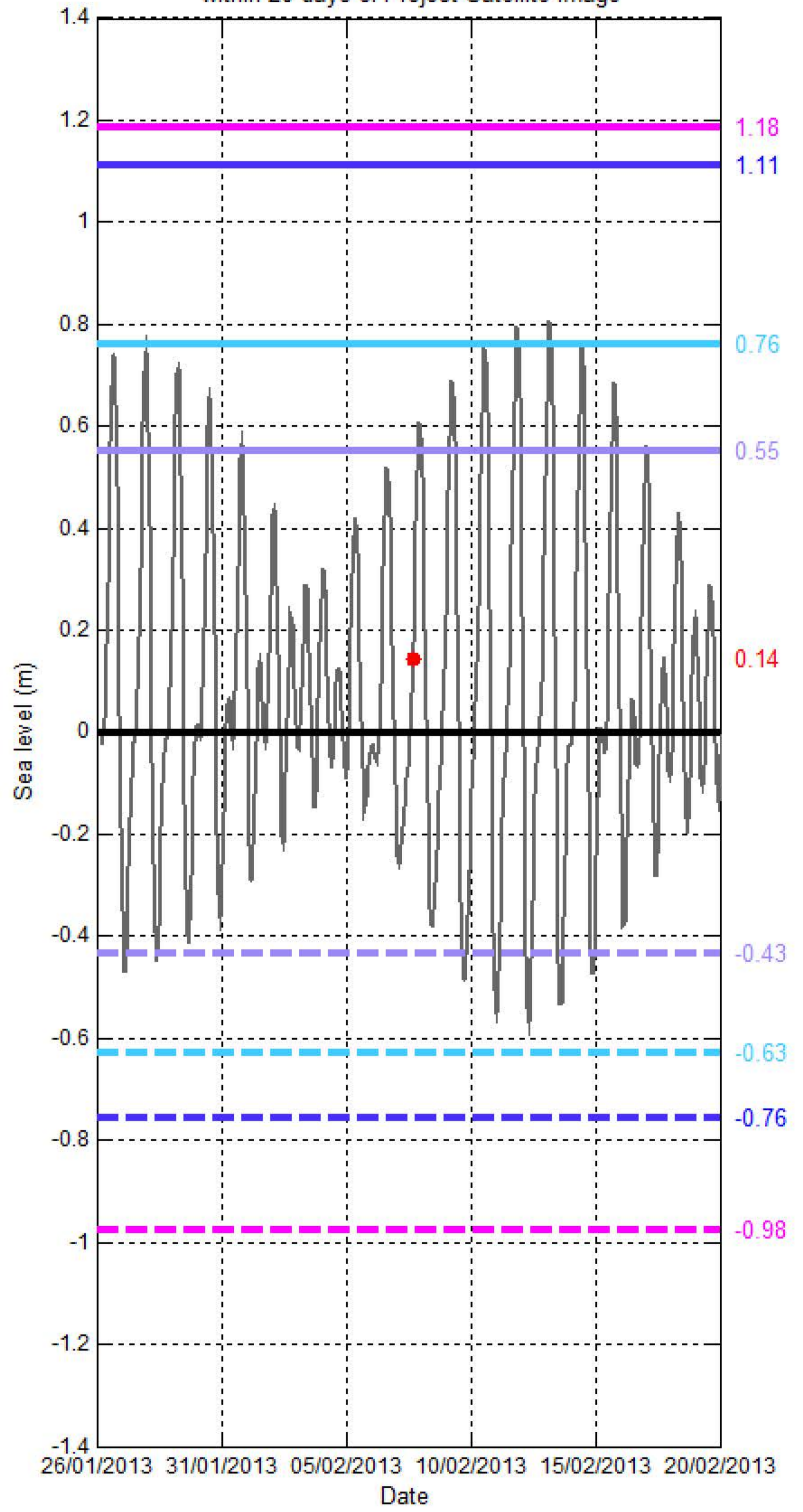
# Sea level (SL) at BOMBAY REEF

[16°02'49.52"N, 112°30'40.81"E]

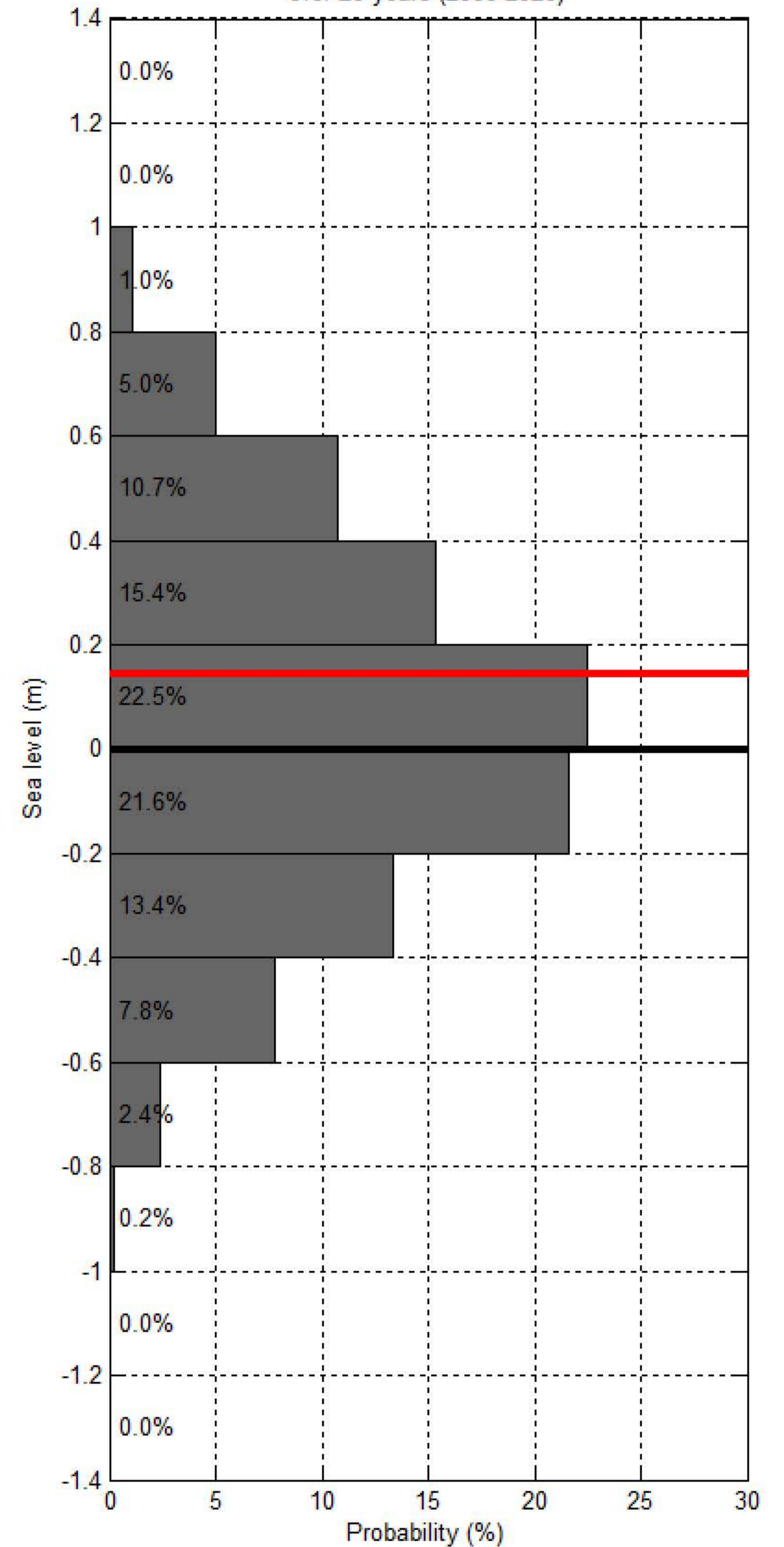
Sea level at spring/neap tide at BOMBAY REEF over 20 years (2000-2020)



Sea level at BOMBAY REEF within 20 days of Project Satellite Image



Probability of sea level at BOMBAY REEF over 20 years (2000-2020)



— Hourly sea level   
 — SL at spring tide   
 — SL at Mean High Water Spring   
 — SL at highest tide of the year   
 — SL at Mean Higher High Water   
 — SL at Highest Astronomical Tide   
 ● Project Satellite Image  
— Mean Sea Level   
 — SL at neap tide   
 — SL at Mean Low Water Spring   
 — SL at lowest tide of the year   
 — SL at Mean Lower Low Water   
 - - - SL at Lowest Astronomical Tide   
 ● Google Earth and Landsat satellite images