Makunduchi OR19-8 Test Site – Atmospheric Corrosivity

Site OR19-8

Makunduchi Test Site (Image by Geosun).

Background:

Makunduchi is situated on the south side of Unguja (also known as Zanzibar Island), about 50 km north of Dar es Salaam in Tanzania, in the Zanzibar Archipelago (Indian Ocean) [1]. The town comprises two parts, i.e., "Old Makunduchi" and "New Makunduchi" [2], of which the former is a fishermen's village and the latter a more modern urban establishment [2]. Unguja is a mountainous island that is situated just south of the equator [3] and the most extensive and populous island (896 721 per 2012 census) in the Zanzibar Archipelago [3]. The island's length (north-south) is about 85 km and the width 30 km (east-west). The main economic activities include tourism, fishing, and agriculture [3].

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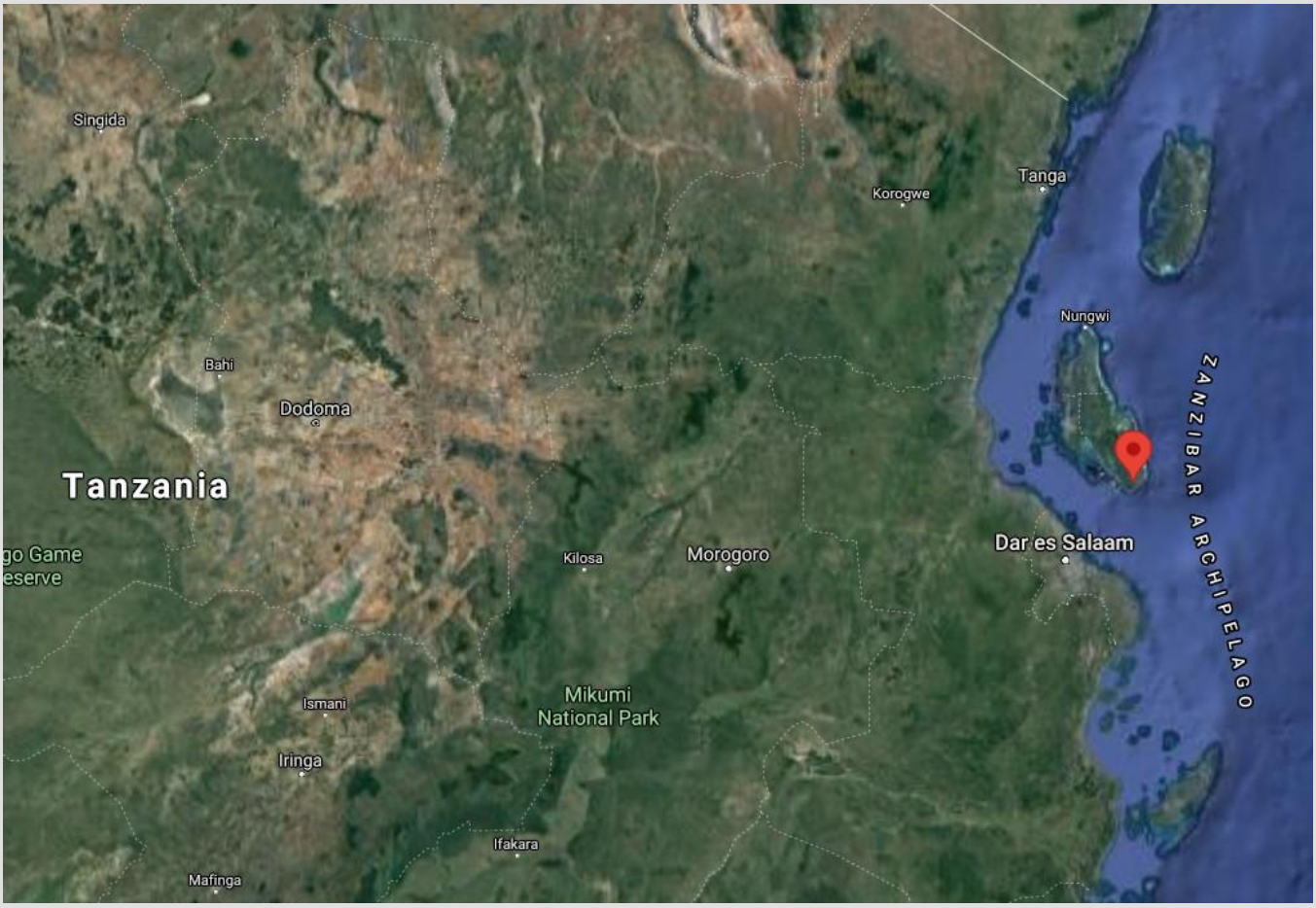
The test site is approximately 5.3 km from the ocean, between Mukunduchi and Kufile [1]. From a general corrosivity perspective, the atmosphere is classified as tropical, with two rainy seasons, March to May, and Middle-October to December [4]. The average yearly temperature at the site is 26.7 ± 1.2ºC, fluctuating between 23.9ºC and 29.4ºC, and the mean yearly humidity level, near 82.4 ± 23.7%. Per the Köppen-Geiger system, the climate is typically classified as Am, Tropical Monsoon, with a yearly precipitation level of approximately 2 136 mm. The driest months are June to September, and the average wind speed at the site, 2.0 ± 0.9 m/s, in a predominant south-easterly direction. The seawater temperature ranges from 25°C to 29 °C [4].



Google Inc Map of Tanzania and the Zanzibar Archipelago [1].

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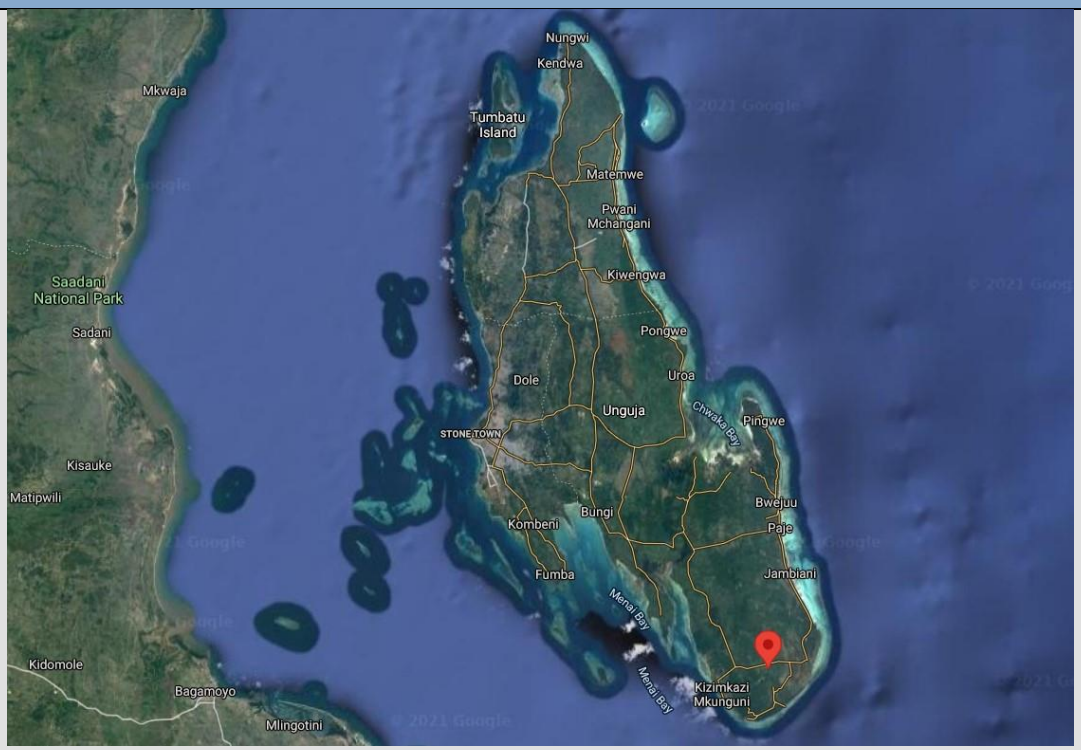


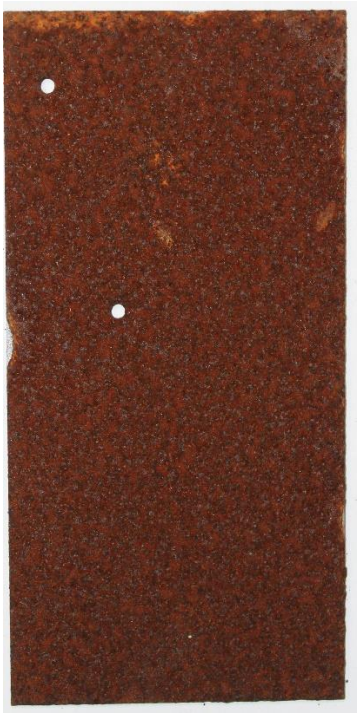
Google Inc Map of Unguja (Zanzibar Island) [1].

GPS Coordinates of Site:	6°25'01.2"S 39°31'12.0"E	**Elevation above Sea Level (m):**	30 m	**Distance from Ocean (km):**	~5.3 km

ISO 9226 Corrosion Rates and ISO 9223 Corrosivity Classification	
12-month R_{CORR} Mild steel (µm/yr)	27.4 ± 1.6 µm/yr
12-month R_{CORR} Aluminium (µm/yr)	0.20 ± 0.01 µm/yr
12-month R_{CORR} Hot Dip Galvanised Steel (µm/yr)	1.7 ± 0.1 µm/yr
12-month R_{CORR} Copper (µm/yr)	2.6 ± 0.1 µm/yr
ISO 9223 Corrosivity Classification	Medium (C3) to C4 (High)
Typical surface contaminants	<testing still in progress>

Makunduchi OR19-8 Test Site – Atmospheric Corrosivity

Mild steel – 12 months



Mild steel – 12 months

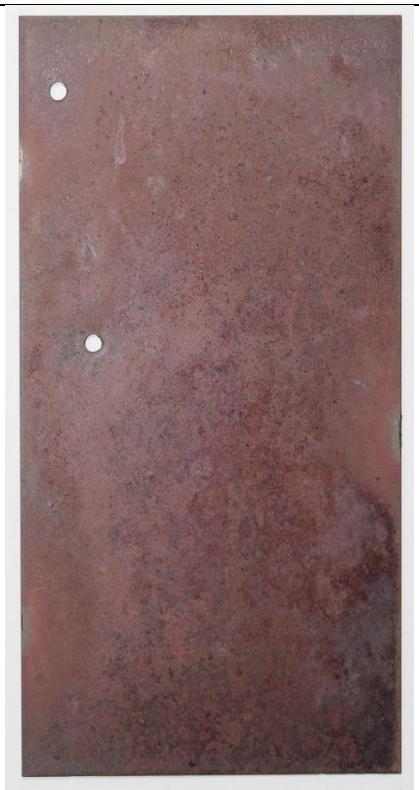
Aluminium – 12 months

Aluminium – 12 months

Makunduchi OR19-8 Test Site – Atmospheric Corrosivity

HDG – 12 months

HDG – 12 months



Copper – 12 months

Copper – 12 months

Works Cited

[1] Google Inc, "Google Maps," 28 April 2021. [Online]. Available: https://www.google.com/maps/place/6%C2%B025'01.2%22S+39%C2%B031'12.0%22E/@-6.4594516,36.707704,635881m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d-6.417!4d39.52. [Accessed 28 April 2021].

[2] Wikipedia, "Makunduchi," 3 August 2020. [Online]. Available: https://en.wikipedia.org/wiki/Makunduchi. [Accessed 28 April 2021].

[3] Wikipedia, "Unguja," 24 March 2021. [Online]. Available: https://en.wikipedia.org/wiki/Unguja. [Accessed 28 April 2021].

[4] Climates to Travel, "Climate - Zanzibar," [Online]. Available: https://www.climatestotravel.com/climate/zanzibar. [Accessed 28 April 2021].