

Efate, Vanuatu OR19-6 Site – Atmospheric Corrosivity

Site OR19-6



Efate, Vanuatu Site (Image by Geosun).

Background:

The site is positioned on the western side of the island of Efate, in the Pacific Ocean [1], which forms part of the Shefa Province in the archipelago Vanuatu [2]. The shortest distance from the site to the ocean is about 600 m, while the central urban hub at Port Vila (with a population of nearly 44 000 people) is located approximately 10-12 km to the east, across Mele Bay [1]. The population of Efate is given as 66 000 people [2], with the economy involving small-scale agriculture (mainly livestock farming), tourism and fishing [3].

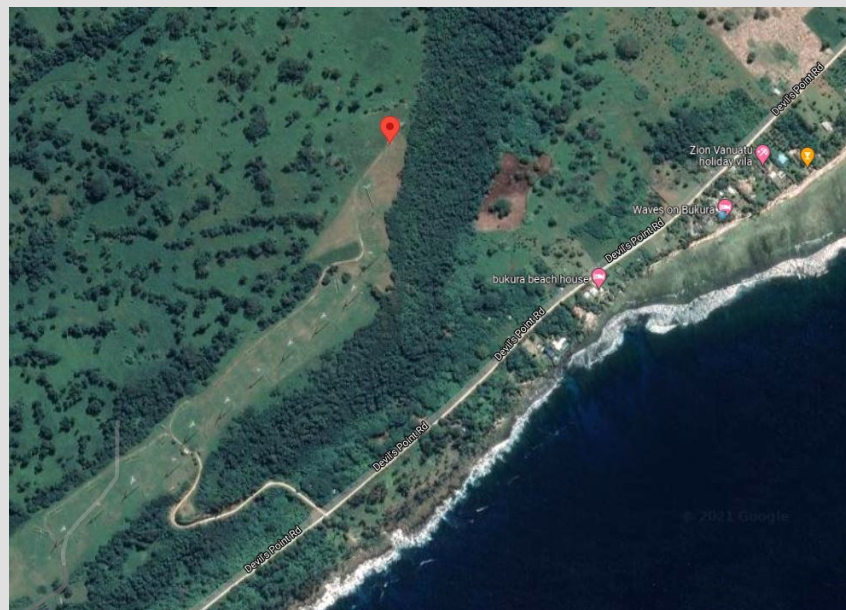
The site has a hot tropical climate (Köppen Af) per the Köppen-Geiger system, with an average yearly temperature of $24.6 \pm 1.6^\circ\text{C}$, fluctuating between 19.4°C and 28.0°C , and the mean annual humidity level of more than 90%. The yearly precipitation level is $\sim 1\,500$ mm, with the driest months spanning May to August. The average wind speed at the site is 1.2 ± 0.9 m/s, predominant in a westerly direction, with gusts of up to 19.0 m/s [4]. The surrounding ocean's pH is about 8.1 (measured over 20 years) [5].

Apart from salts from the ocean, other airborne contaminants likely originate from forestry and human settlement-related activities. Per the atmospheric corrosion data below, this tropical marine site is classified as Very High (C5) corrosive with a significant effect/deposition of chlorides (ISO 9223) [6].

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Position of the Efate, Vanuatu Site [1].



Satellite view of the Efate, Vanuatu Site site [7] .

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GPS Coordinates of Site:	17°42'35.1"S 168°12'41.2"E	Elevation above Sea Level (m):	152 m	Distance from Ocean:	~2 km
ISO 9226 Corrosion Rates and ISO 9223 Corrosivity Classification					
R_{CORR} Mild steel (µm/yr)	153.3 ± 20.3 µm/yr (1 st year) and 150.2 ± 4.6 µm/yr (2 nd year)				
R_{CORR} Aluminium (µm/yr)	0.18 ± 0.02 µm/yr (1 st year) and 0.14 ± 0.01 µm/yr (2 nd year)				
R_{CORR} Hot Dip Galvanised Steel (µm/yr)	1.4 ± 0.1 µm/yr (1 st year) and 1.2 ± 0.1 µm/yr (2 nd year)				
R_{CORR} Copper (µm/yr)	1.8 ± 0.4 µm/yr (1 st year) and 1.7 ± 1.6 µm/yr (2 nd year)				
ISO 9223 Corrosivity Classification	Very High (C5)				
Typical surface contaminants	Pollution: Low to Medium salt mix deposition Specific contaminants: Water-soluble salts – 4-18 mg/m ² Chlorides – 4-14 ppm pH – Neutral to slightly alkaline				



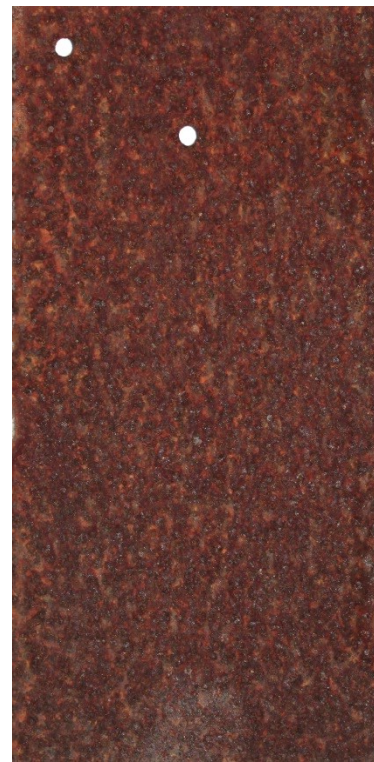
Mild steel – 12 months



Mild steel – 12 months



Mild steel – 24 months



Mild steel – 24 months



Aluminium – 12 months



Aluminium – 12 months



Aluminium – 24 months



Aluminium – 24 months



HDG – 12 months



HDG – 12 months



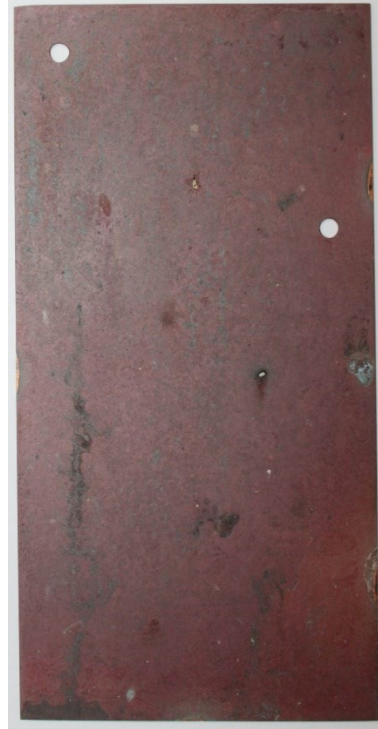
HDG – 24 months



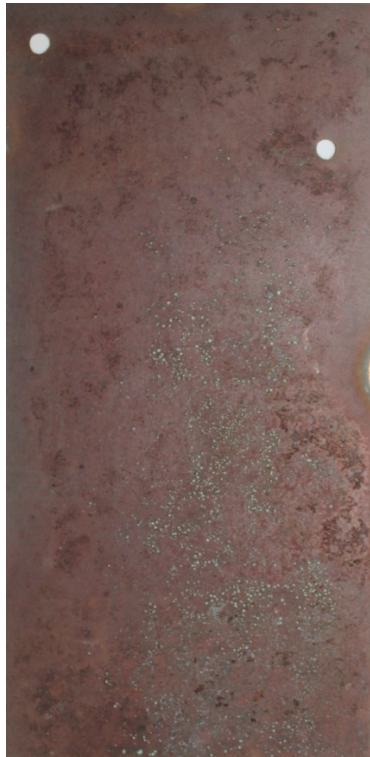
HDG – 24 months



Copper – 12 months



Copper – 12 months



Copper – 24 months



Copper – 24 months

Works Cited

- [1] Google Inc, "Google Maps," Google Inc, [Online]. Available: <https://www.google.com/maps/place/17%C2%B042'35.1%22S+168%C2%B012'41.2%22E/@-17.6527927,168.3201392,65891m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d-17.709738!4d168.211453>. [Accessed 11 November 2021].
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- [3] Moody's Analytics, "Moody's Analytics - Economic Indicators - Vanuatu," Moody's Analytics, [Online]. Available: <https://www.economy.com/vanuatu/indicators>. [Accessed 11 November 2021].
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- [5] The Pacific Community, "Rescue - Climate change impact in north Efate, Vanuatu," March 2016. [Online]. Available: <https://www.spc.int/sites/default/files/wordpresscontent/wp-content/uploads/2016/12/Climate-change-impacts-North-Efate.pdf>. [Accessed 11 November 2021].
- [6] ISO (International Organization for Standardization), *ISO 9223 - Corrosion of metals and alloys — Corrosivity of atmospheres — Classification, determination and estimation*, Geneva, Switzerland: ISO, 2012.
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