Wadelai OR19-13 Test Site – Atmospheric Corrosivity

Site OR19-13

Wadelai Test Site (Image by Geosun).

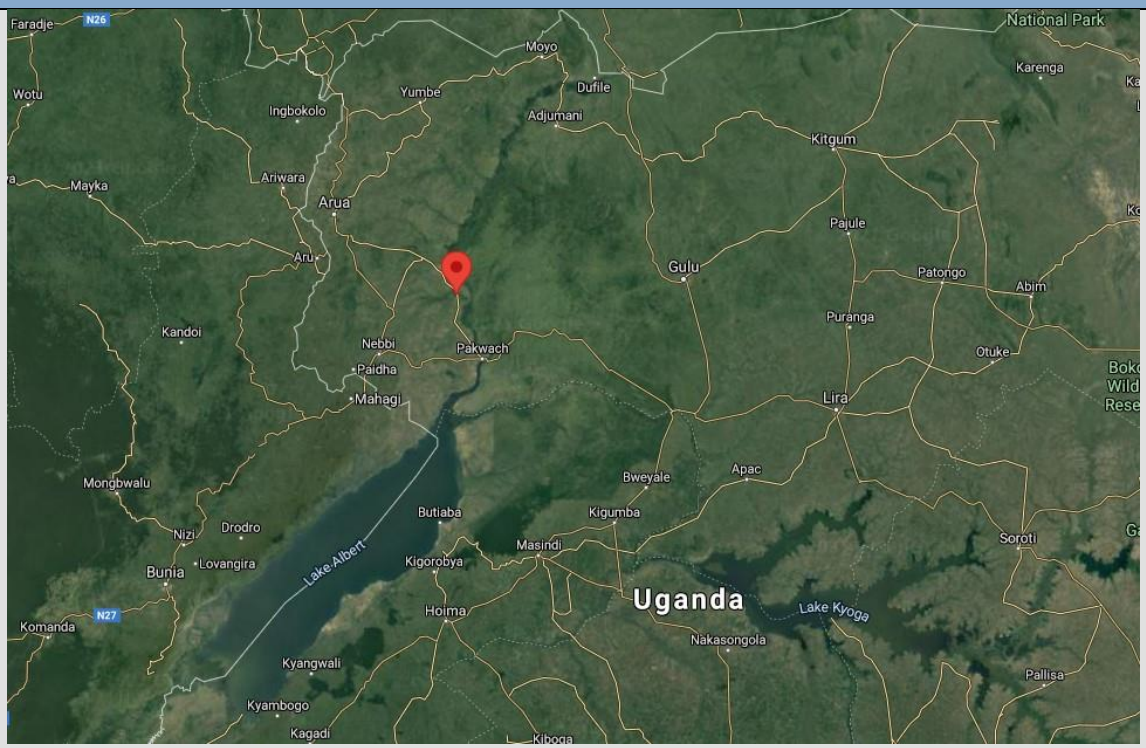
Background:

Wadelai is a fishing village [1] situated in East-Central Africa in the north-northwestern region of Uganda, north of Lake Albert [2], on the White/Albert Nile [3]. The region's climate is classified per the Köppen-Geiger system as Aw (Tropical savanna), with agriculture and fishing being the main economic activities. The warmest period is December to March; however, hot temperatures may be experienced throughout the year [4].

The corrosion monitoring test site is positioned west of the White Nile, near the Ora River [2]. The average yearly temperature at the site, measured during January 2020-January to 2021, is 24.9 ± 1.5ºC, fluctuating between 20.9ºC and 29.7ºC, and the annual mean humidity level is 92.8 ± 7.2%. In 2020-2021, the precipitation level measured ~1 076 mm, with the driest period being December-February. The average wind speed at the site for the same period was 0.7 ± 0.3 m/s, with a maximum of 1.8 m/s, in a predominant southerly direction.

From a corrosivity perspective, the site is classified as Low (C2), and the corrosion is mainly driven by precipitation, some sulphur-based pollutants in the atmosphere, and bird muck deposition.

Wadelai OR19-13 Test Site – Atmospheric Corrosivity



Google Inc Map of the Wadelai area in Uganda.

GPS Coordinates of Site:	2°43'33.6"N 31°23'24.0"E	**Elevation above Sea Level (m):**	646 m	**Distance from Ocean (km):**	~883 km

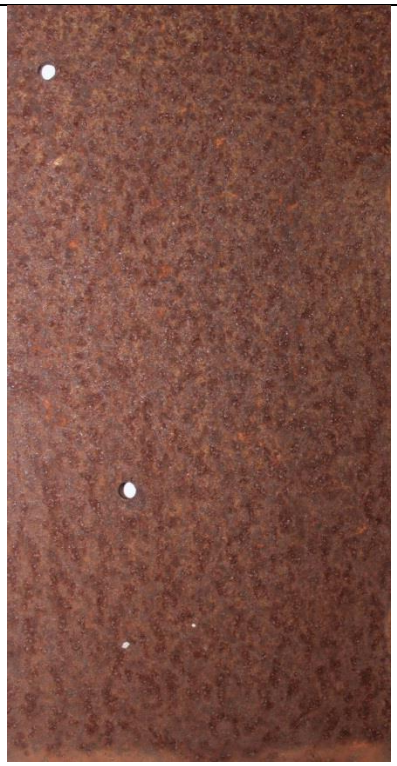
ISO 9226 Corrosion Rates and ISO 9223 Corrosivity Classification	
R_{CORR} Mild steel (µm/yr)	10.18 ± 2.08 µm/yr (1st year) and 9.94 ± 0.35 µm (2nd year)
R_{CORR} Aluminium (µm/yr)	<0.1 µm/yr (Negligible) (1st and 2nd year)
R_{CORR} Hot Dip Galvanised Steel (µm/yr)	0.61 ± 0.02 µm/yr (1st year) and 0.24 ± 0.02 µm (2nd year)
R_{CORR} Copper (µm/yr)	0.46 ± 0.10 µm/yr (1st year) and 0.47 ± 0.03 µm (2nd year)
ISO 9223 Corrosivity Classification	Low (C2)
Typical surface contaminants	Pollution – mainly aluminium-, phosphor-, sulphur- and potassium-based Specific contaminants include: Water-soluble salts – 19-28 mg/m^2 Chlorides – Not detected pH – Slightly acidic to neutral (6.0-6.9)

Wadelai OR19-13 Test Site – Atmospheric Corrosivity

Mild steel – 12 months

Mild steel – 12 months

Mild steel – 24 months

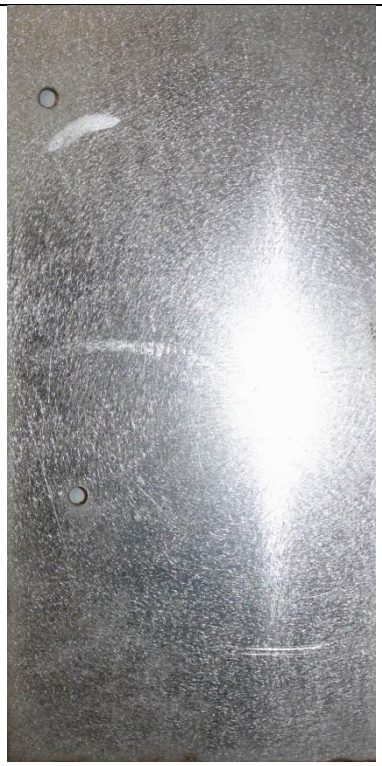


Mild steel – 24 months

Wadelai OR19-13 Test Site – Atmospheric Corrosivity

Aluminium – 12 months

Aluminium – 12 months



Aluminium – 24 months

Aluminium – 24 months

Wadelai OR19-13 Test Site – Atmospheric Corrosivity

HDG – 12 months

HDG – 12 months

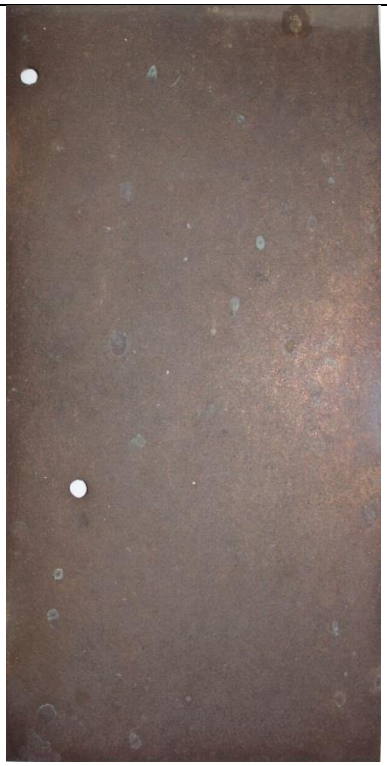
HDG – 24 months

HDG – 24 months

Wadelai OR19-13 Test Site – Atmospheric Corrosivity

Copper – 12 months

Copper – 12 months



Copper – 24 months

Copper – 24 months

Works Cited

[1] Wikitravel, "Fort Wadelai," 22 December 2009. [Online]. Available: https://wikitravel.org/en/Fort_Wadelai. [Accessed 29 April 2021].

[2] Google Inc, "Google Maps," [Online]. Available: https://www.google.co.za/maps/place/2%C2%B043'33.6%22N+31%C2%B023'24.0%22E/@2.2831861,31.1955415,418189m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d2.726!4d31.39. [Accessed 29 April 2021].

[3] Wikipedia, "Wadelai," 16 April 2021. [Online]. Available: https://en.wikipedia.org/wiki/Wadelai. [Accessed 28 April 2021].

[4] Best Time to Visit, "Best time to visit, weather and climate Wadelai," 2021. [Online]. Available: https://www.besttimetovisit.co.za/uganda/wadelai-3796903/. [Accessed 29 April 2021].

[5] Wikipedia, "Köppen climate classification," 18 April 2021. [Online]. Available: https://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification. [Accessed 29 April 2021].