

## Shinyanga OR19-9 Test Site – Atmospheric Corrosivity

### Site OR19-9

Installation: 13-12-2019



Shinyanga Test Site (Image by Geosun).

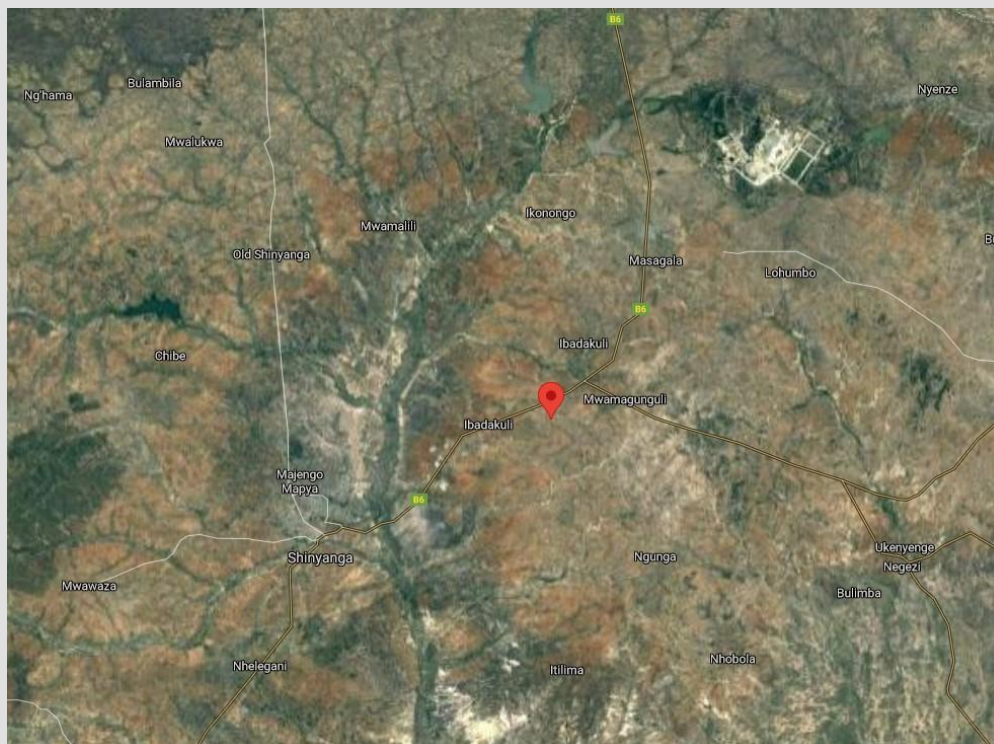
### Background:

Shinyanga, with a population of about 93 000 people (per the 2012 census) [1], is positioned roughly 116 km to the south of Lake Victoria [2] and near 136 km from Mwanza [2] (175 km by road) [1] in Tanzania. It is the capital of the Shinyanga Region [1], with a total population of about 1 534 808 people, mainly relying on agriculture as the primary source of income [3]. The region exhibits two different climates, Aw (Tropical wet) and BSh (Hot semi-arid), per the Köppen-Geiger system [4] [5].

The corrosion monitoring test site is positioned on the north-eastern side of the city [2]. It has an average yearly temperature (measured during 2020-2021) of  $24.3 \pm 1.7^{\circ}\text{C}$ , fluctuating between  $19.7^{\circ}\text{C}$  and  $30.8^{\circ}\text{C}$ , and a mean annual humidity level of  $75.9 \pm 18.3\%$ . The precipitation level per annum is approximately 1 205 mm, with the driest months spanning from June to September/October. The average wind speed at the site is  $1.9 \pm 0.7$  m/s, with gusts of up to 64.2 m/s, in a predominant southeasterly direction.

From a macro atmospheric perspective, the site is classified as Low (mid-C2) corrosive, with corrosion mainly due to precipitation and slight phosphate-based contaminant deposition (likely from bird muck).

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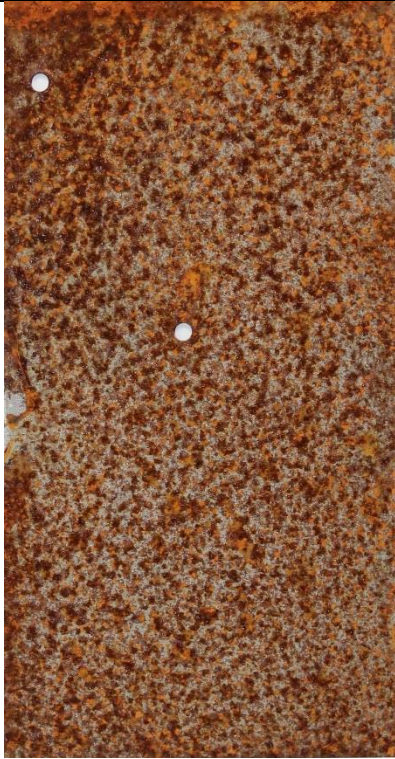
Google Inc Map of the Shinyanga Region in Tanzania [2].

<b>GPS Coordinates of Site:</b>	3°37'30.0"S 33°31'12.0"E	<b>Elevation above Sea Level (m):</b>	1 176 m	<b>Distance from Ocean (km):</b>	~640 km
<b>ISO 9226 Corrosion Rates and ISO 9223 Corrosivity Classification</b>					
<b>R<sub>CORR</sub> Mild steel (µm/yr)</b>	5.84 ± 1.01 µm/yr (1 <sup>st</sup> year) and 6.14 ± 0.05 µm/yr (2 <sup>nd</sup> year)				
<b>R<sub>CORR</sub> Aluminium (µm/yr)</b>	<0.1 µm/yr (Negligible) (1 <sup>st</sup> and 2 <sup>nd</sup> year)				
<b>R<sub>CORR</sub> Hot Dip Galvanised Steel (µm/yr)</b>	0.71 ± 0.12 µm/yr (1 <sup>st</sup> year) and 0.32 ± 0.03 µm/yr (2 <sup>nd</sup> year)				
<b>R<sub>CORR</sub> Copper (µm/yr)</b>	0.28 ± 0.02 µm/yr (1 <sup>st</sup> year) and 0.23 ± 0.02 µm/yr (2 <sup>nd</sup> year)				
<b>Corrosivity Classification</b>	Low (mid-C2)				
<b>Typical surface contaminants</b>	Pollution – mainly phosphate-based Specific contaminants include: Water-soluble salts – 7-14 mg/m <sup>2</sup> Chlorides – Not detected pH – Somewhat acidic (5.3-6.6)				

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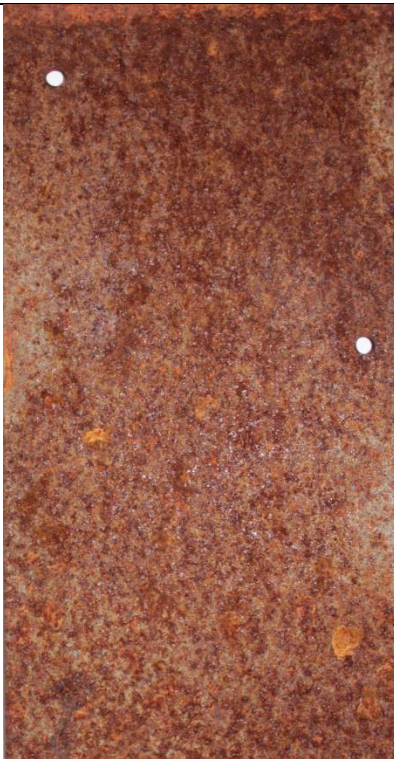
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**Mild steel – 12 months**



**Mild steel – 12 months**



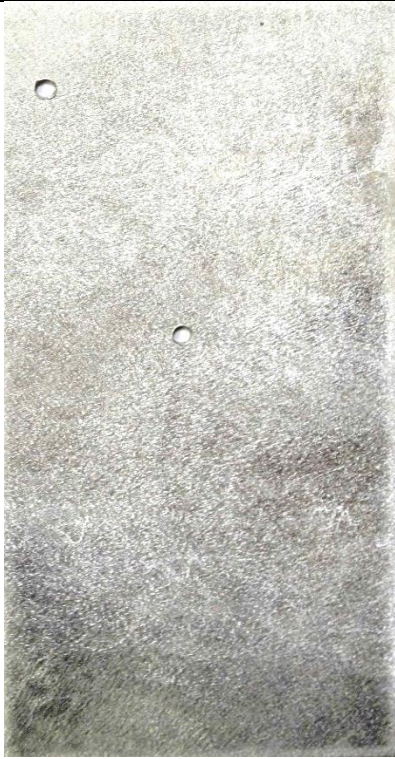
**Mild steel – 24 months**



**Mild steel – 24 months**



## Shinyanga OR19-9 Test Site – Atmospheric Corrosivity



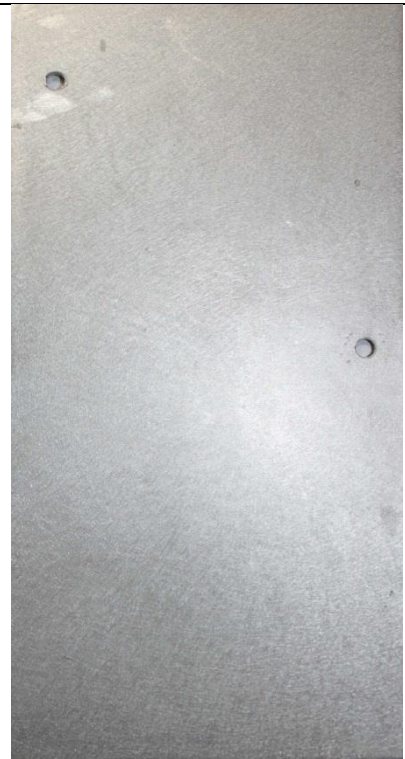
**Aluminium – 12 months**



**Aluminium – 12 months**



**Aluminium – 24 months**

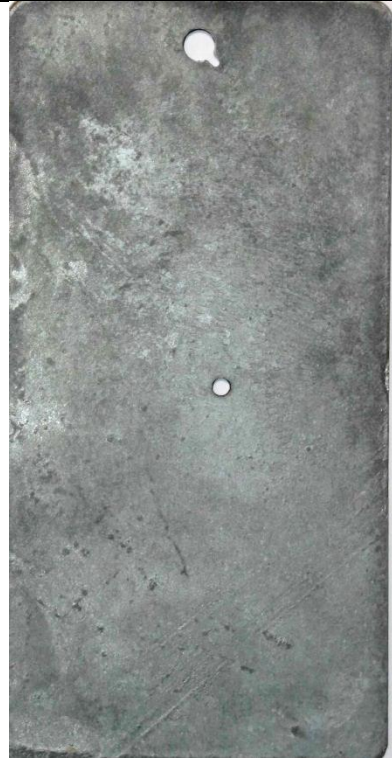


**Aluminium – 24 months**

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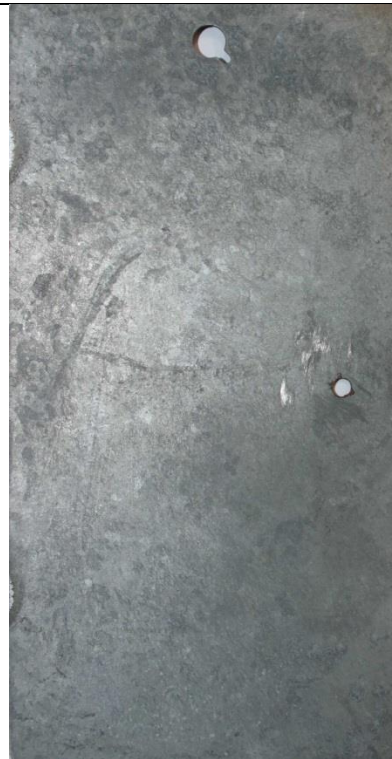
**HDG – 12 months**



**HDG – 12 months**



**HDG – 24 months**



**HDG – 24 months**



## Shinyanga OR19-9 Test Site – Atmospheric Corrosivity



**Copper – 12 months**



**Copper – 12 months**



**Copper – 24 months**



**Copper – 24 months**

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### Works Cited

- [1] Wikipedia, "Shinyanga," 19 January 2021. [Online]. Available: <https://en.wikipedia.org/wiki/Shinyanga>. [Accessed 29 April 2021].
- [2] Google Inc, "Google Maps," 29 April 2021. [Online]. Available: <https://www.google.co.za/maps/place/3%C2%B037'30.0%22S+33%C2%B031'12.0%22E/@-3.5990026,33.4564308,43905m/data=!3m1!1e3!4m5!3m4!1s0x0:0x0!8m2!3d-3.625!4d33.52>. [Accessed 29 April 2021].
- [3] Wikipedia, "Shinyanga Region," 7 April 2021. [Online]. Available: [https://en.wikipedia.org/wiki/Shinyanga\\_Region](https://en.wikipedia.org/wiki/Shinyanga_Region). [Accessed 29 April 2021].
- [4] Climate-Data.Org, "Shinyanga Climate," [Online]. Available: <https://en.climate-data.org/africa/tanzania/shinyanga-1646/>. [Accessed 21 April 2021].
- [5] Wikipedia, "Köppen climate classification," 18 April 2021. [Online]. Available: [https://en.wikipedia.org/wiki/K%C3%B6ppen\\_climate\\_classification](https://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification). [Accessed 29 April 2021].