



# FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"



*Presented at the FIG Working Week 2019,  
April 22-26, 2019 in Hanoi, Vietnam*

## Developing Africa one CORS at a time

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1 Cheswick Consulting, Nairobi, Kenya

2 NGS NOAA, Boulder, Colorado, USA

3 FrontierSI, Melbourne, Australia

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## Introduction

- Corsmap is a crowdsourcing initiative between 3 geospatial professionals in Kenya, USA and Australia
- Designed to bring information on all Continuously Operating Reference Stations (CORS) on African continent in one place
- Realised due to the lack of information that was currently available

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## How did it start?



Photo showing a solar powered CORS. Image courtesy of wikipedia

### The CORS Network Conversation in the Continent of Africa

Published on October 26, 2016

Derrick Koome ✓ Following  
Survey Engineering Consultant at Cheswick  
25 articles

57 19 4

- Derrick Koome published a LinkedIn article on the CORS conversation in Africa in October 2016
- The theme of the article was that very limited information on African CORS was available
- Clement and Eldar responded and the conversation began
- Shortly after, the Corsmap was born

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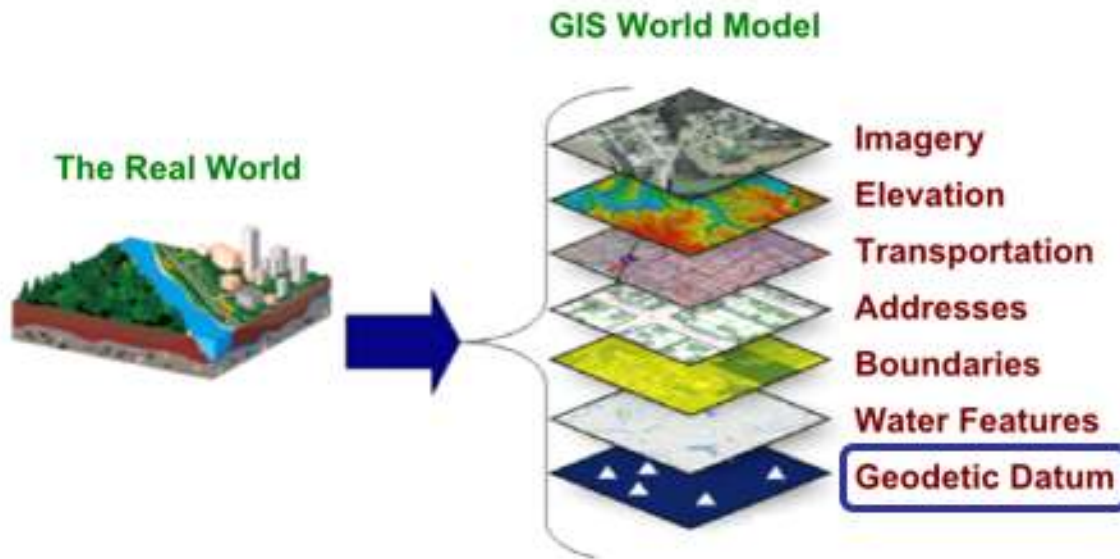
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## Why are CORS important?

- CORS networks are needed to realise geodetic datums, which serve as a backbone for land administration, Spatial Data Infrastructure (SDI) and more



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## AFREF Initiative

- African Reference Frame project is designed to bring all the countries in Africa on to the same reference frame tied to ITRF
- Needs at least one high stability CORS from each country



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## Examples of CORS Networks around the world

- CORS information is readily available in most regions of the world



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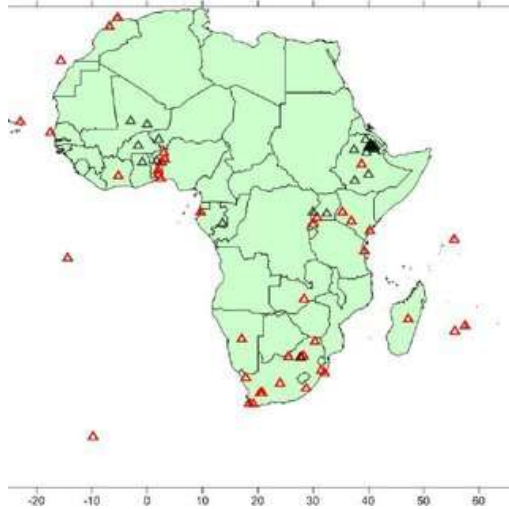
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## Africa CORS information before Corsmap

- A number of patchy maps with limited or no metadata



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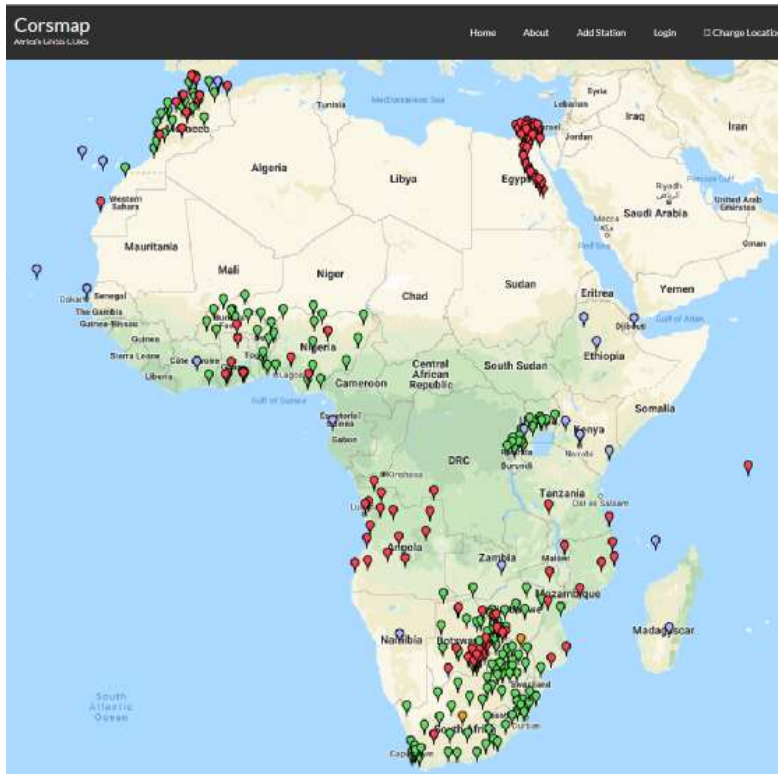
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## Africa CORS information now



- The most comprehensive database of the African CORS sites
- Currently has information on 320 CORS from 27 countries
- Includes metadata on the type of station, custodian, data access etc.
- Still very much a work in progress!

[www.corsmap.com](http://www.corsmap.com)

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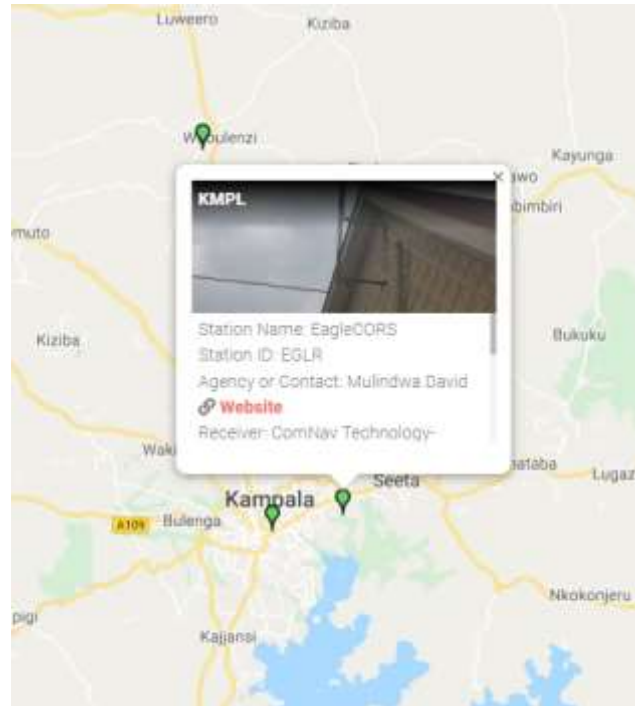
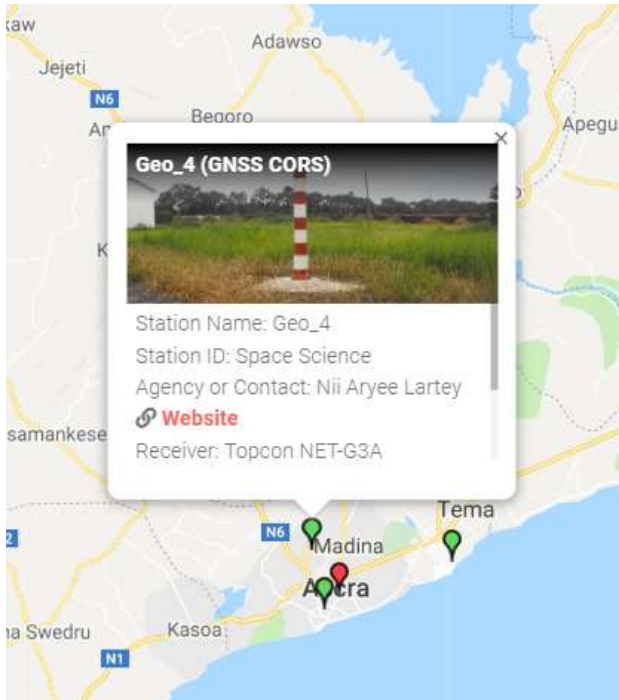
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## Not just a map!



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## Not just a map!

Home > Stations > Nantisa > Khemas Region > Windhock > IGS > WIND (GNSS CORS), IGS

### WIND (GNSS CORS), IGS



Station Category: AFREF, IGS, and Non-Streaming

[Profile](#) [More Info](#) [Photos](#) [Map](#) [Comments](#) [Related Listing](#)

Station Category: AFREF, IGS, and Non-Streaming

[Profile](#) [More Info](#) [Photos](#) [Map](#) [Comments](#)

Station Name: Windhock

Station ID: WIND

Owner: IGS Network

Agency or Contact: IGS

[Website](#)

Receiver: JAVAD TRE\_G3TH DELTA

Antenna: Javad Choke Ring

Sector: Public

Charges: Free

Real-time services?: No

RINEX available?: Yes

Part of AFREF?: Yes

Part of IGS?: Yes

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## Not just a map!

- Corsmap is 100% free, non-commercial service
- Importantly - does not provide coordinates or access to data!
- Instead, serves as a link between service providers and users



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## Aims of Corsmap

- Promote co-operation between member states
- Raise awareness
- Encourage data sharing
- Help with AFREF initiative
- Connect users to service providers

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## Where does the data comes from?

- Open sources (literature, CORS websites, research institutions etc.)  
- *Botswana, Rwanda, Angola, Nigeria, Benin, Burkina Faso, Egypt, Morocco*
- Direct contact with service providers  
- *South Africa, Uganda, Ghana, Mozambique, Zimbabwe*
- No information  
- *Namibia, Ethiopia, Algeria, Tunisia and others*



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## Examples of open source information



Installation and processing of ground-based GPS stations of the Moroccan National Meteorological Service

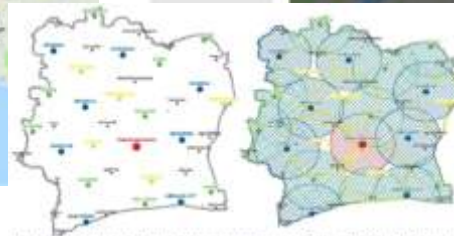
F. HADJOU<sup>1,2</sup>, S. MORDANI<sup>2</sup> and S. SBI<sup>1</sup>



Figure 2 - Sites in the Moroccan GPS network.

Station code	Latitude	Longitude	Height
AGAD	30.3266707	-6.5978924	126.09729
BEMF	32.3666507	-6.3071701	827.70564
CASA	33.3688051	-7.8707333	368.42596
DASH	33.7038164	-15.9206633	49.80909
FES1	33.9301153	-4.9754709	629.03641
OUAR	30.9283310	-6.9128390	1206.27219
OUJD	34.7893947	-1.9378347	539.81105
SALE	34.0454687	-6.7585294	126.02897
TANG	35.7258008	-5.0120780	79.10468

Table 1 - The Moroccan GPS stations coordinates.



Les sites d'installation prévus et les zones de couverture des Stations de Référence (GPS/GNSS) au Territoire du territoire national (rayon de base 100 km de couverture extérieures à 80,61%)



1. Station GPS permanente de l'Université



2. Pôle géométrique PCOR de l'Université (sans infrastructure)

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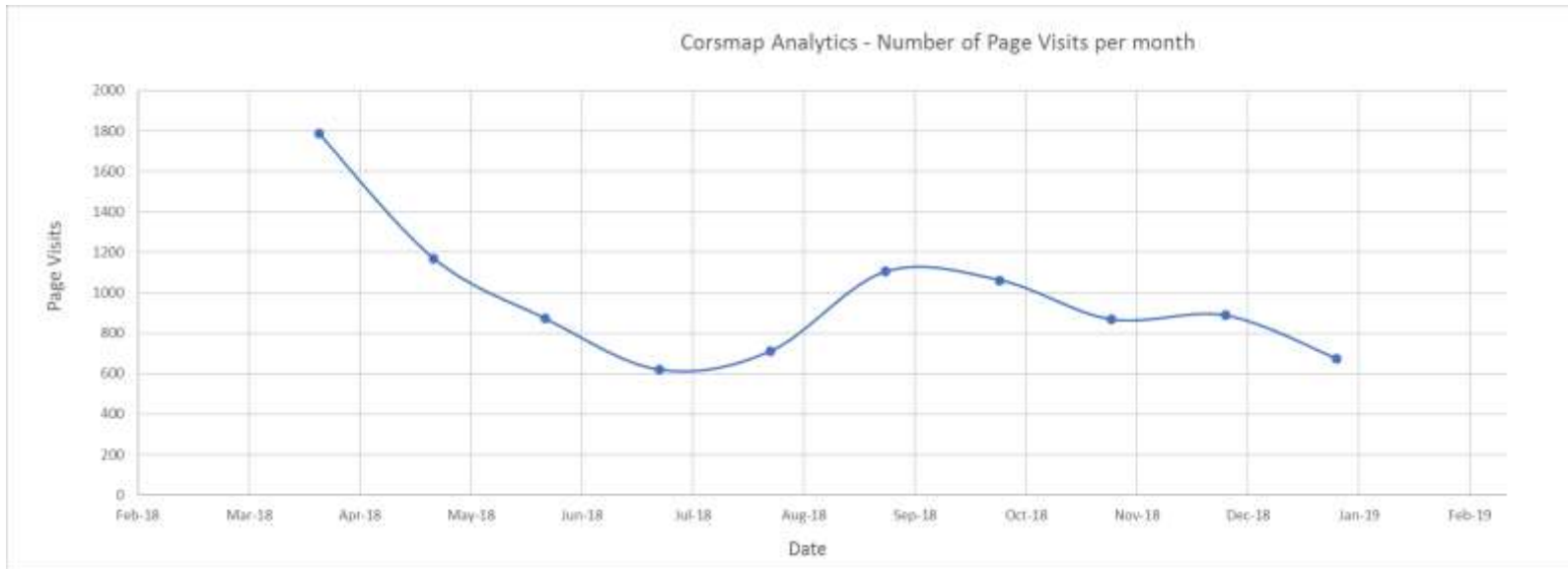
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## Success Stories

- Since going live, Corsmap averages ~1,000 hits per month from 200-300 individual users



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## Success Stories

Dear Sir, I am a geodesist from the University of Nottingham and would like to request CORS data for research purposes. Would you please advice me on how I can have the datasets for CORS in South Africa for one year. Thanks for your help.

Bonjour, est-ce-que c'est possible de recevoir des corrections en temps-reel de l'antenne DAKR00SEN? Si c'est possible, comment vous pouvez offrir les corrections (e.g. par NTRIP)?  
Merci d'avance.

Bonjour, Dans le cadre d'une intervention de levé bathymétrique d'une semaine a Abidjan, nous aurons besoin d'une base RTK à proximité du port. Pouvez vous me dire a quelle conditions nous pourrions récupérer les données (temps réel RTCM ou CMR, puis RINEX) de votre station.  
Merci d'avance

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## Challenges

- Language barrier
  - *Number of languages spoken in Africa including French, Arabic, Portuguese etc.*
- Lack of interest from participating agencies
  - *90% of e-mails are not responded to*



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## Raising Awareness

- Publishing in International Magazines – xyHt, GIM International, XYZ (in French)



July 2018



August 2018



March 2019

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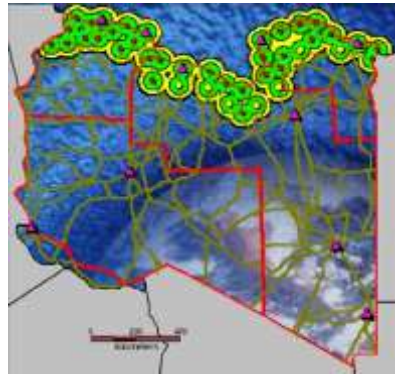
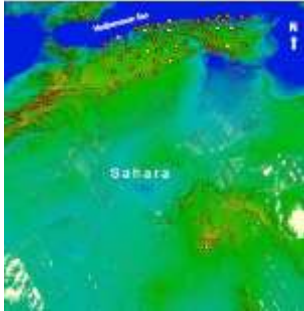
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## Call to Action

- Further co-operation needed to make Corsmap as complete as possible
- Many countries with CORS networks are still missing from the map



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## Future Vision

- Transfer the ownership of Corsmap to the people
- Encourage providers to manage and maintain their own stations
- 3 people on 3 continents cannot maintain a network of hundreds of stations in 50+ countries



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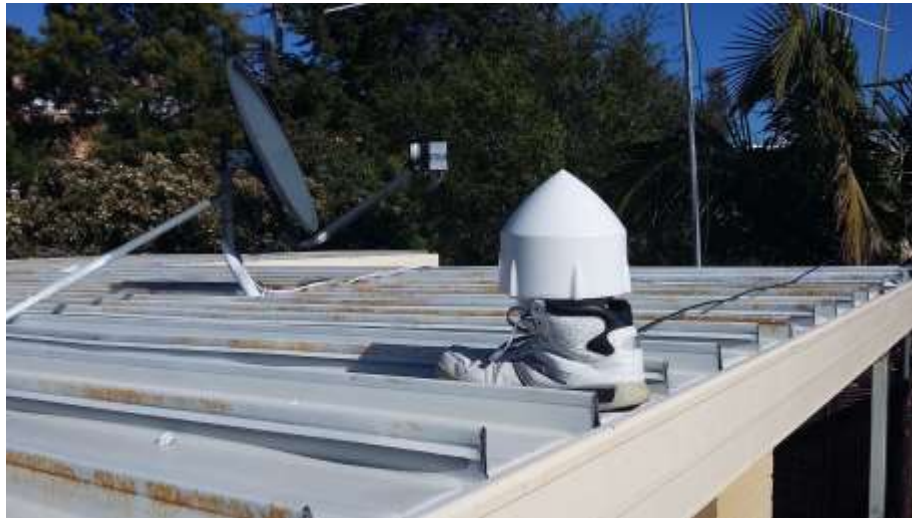
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## Questions



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