



FIG Working Week 2024

19-24 May

Accra, Ghana

Your World, Our World:
Resilient Environment
and Sustainable
Resource Management
for All

Low-cost GNSS solution to densify stations in national terrestrial reference frames

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1. Kurloo Technology
2. Queensland University of Technology
3. Positioning Insights



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International (National) Terrestrial Reference Frame



Source: <https://ggos.org/>

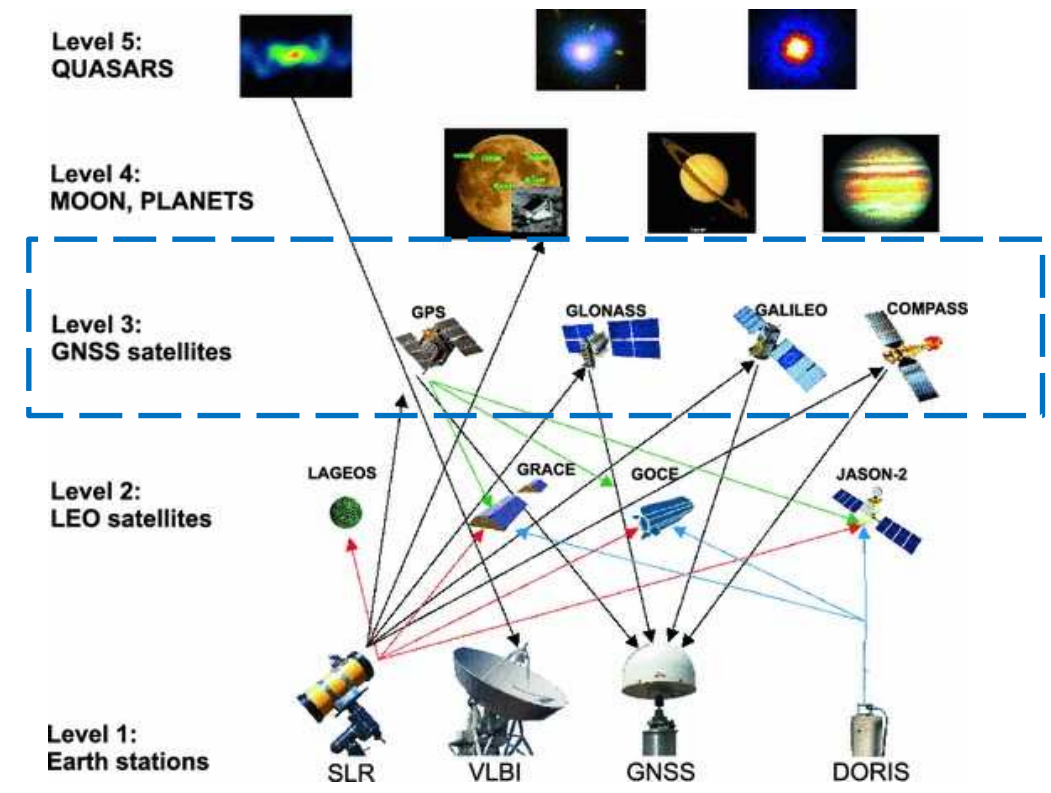




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Current CORS Networks in the World



Fig. 1. The National CORS Network (January, 2010).

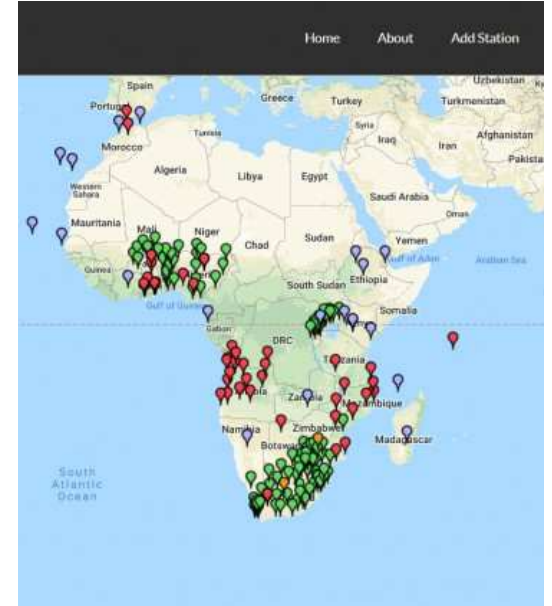




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Hurdles of Development of CORS in Africa

- Cost
 - Instrumentation
 - Installation
 - Management
- Complexity
 - Software
 - Professional
- Policy





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Until now, CORS stations development has been difficult to perform at scale.



Cost and time intensive
Frequent site visits for accurate monitoring are costly and time intensive.



Difficult to scale
Alternative autonomous solutions are complex and don't scale easily.



Delayed or outdated results
Delayed data may be outdated and not be a true reflection of what is happening now.



Availability of personnel
Skilled personnel are often in limited supply and instead focused on higher value activities.

But now... utilisation of IoT, low cost GNSS chips and cloud computing technology creates opportunities to expand high-precision positioning services in a simple manner.



Autonomous and cost effective
Simple to install, Kurloo works autonomously to eliminate the need for frequent visits.



Affordable and flexible
Low daily unit cost makes Kurloo more affordable to scale up and down as required.



Frequent and online
Allows frequent readings at a rate of your choosing with near real time results.



Easy to understand
Provides consistent results which reduce the reliance on skilled personnel.

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Geoscience Australia's High-Precision GNSS Capability courtesy of NPIC & GiNAN

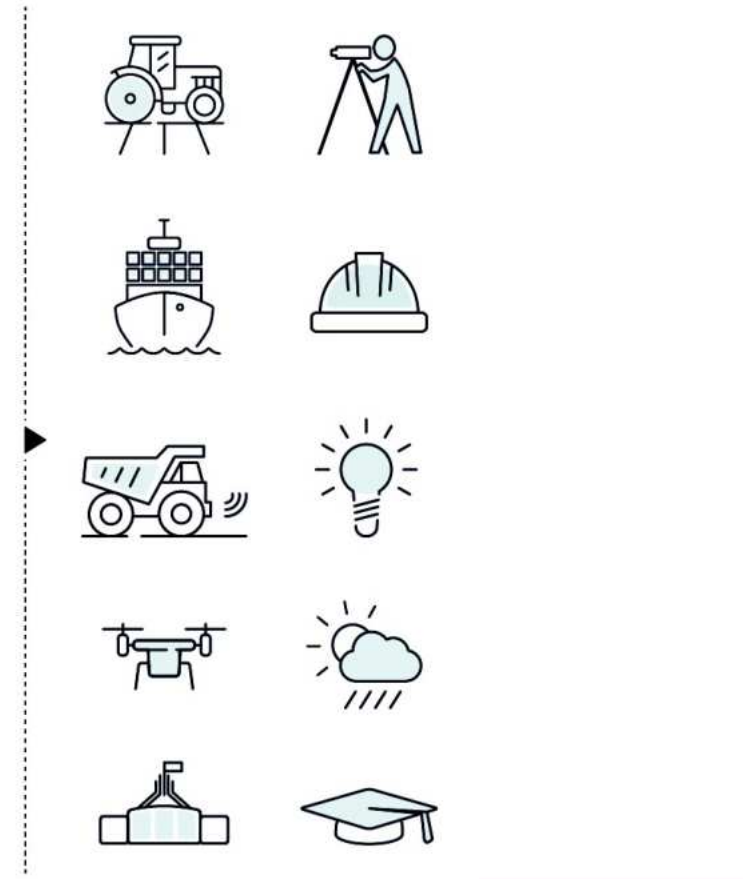
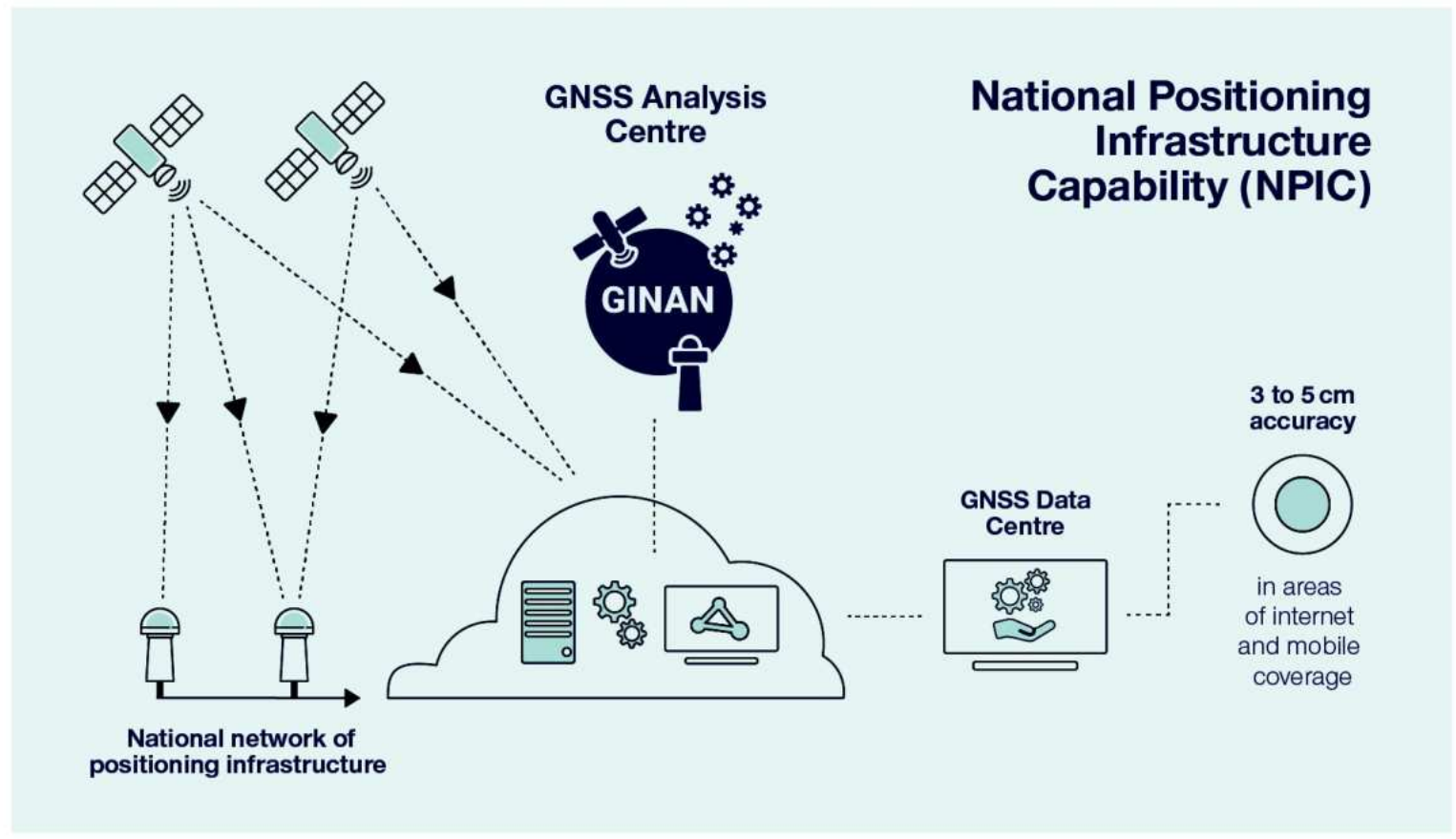




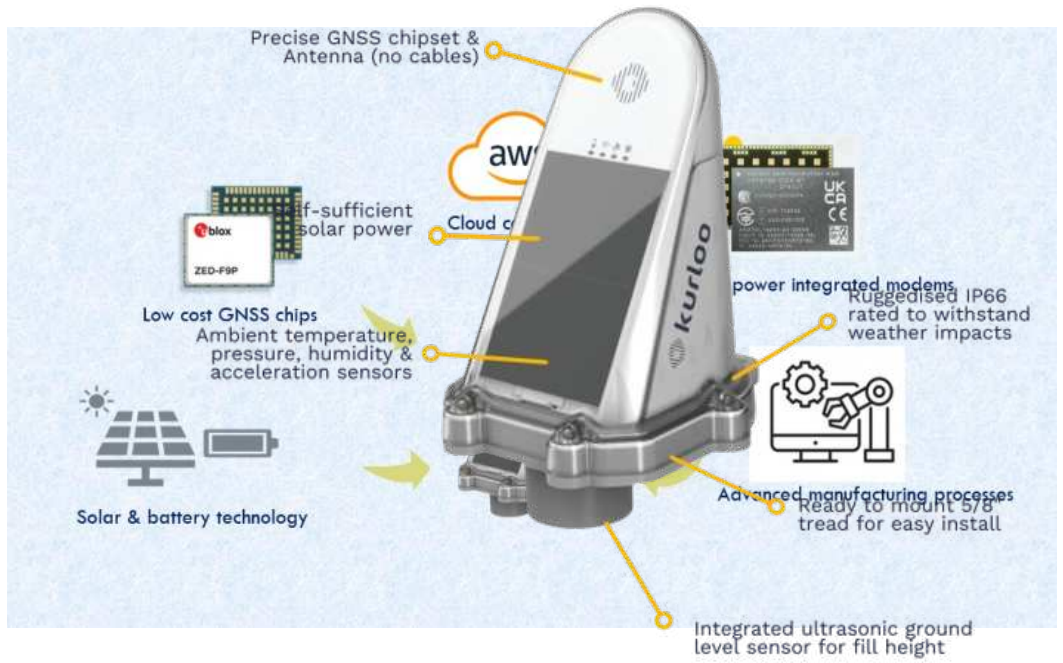
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Kurloo Device Specifications



Why kurloo?

Definition: Curlews are a group of nine bird species well known for their loud screaming that announces sundown.

The English name is imitative of the Eurasian curlew's call, but may have been influenced by the Old French corliu, "messenger", from courir, "to run".

The Kurloo acts as the first warning of ground movement to engineers and projects managers across Australia.



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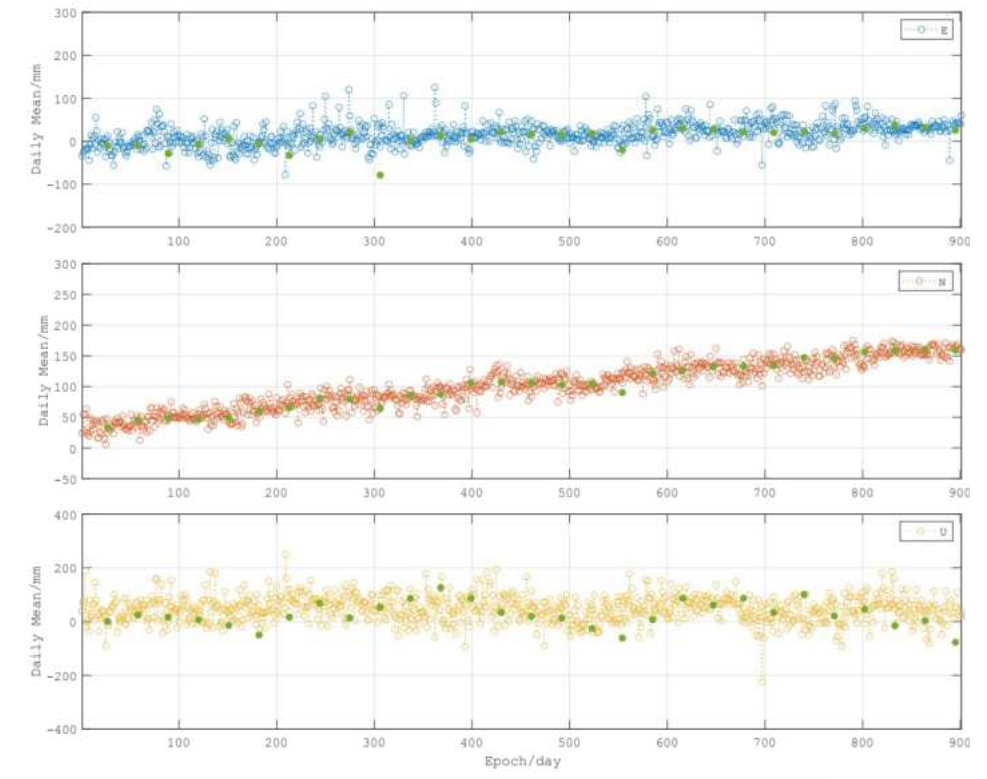
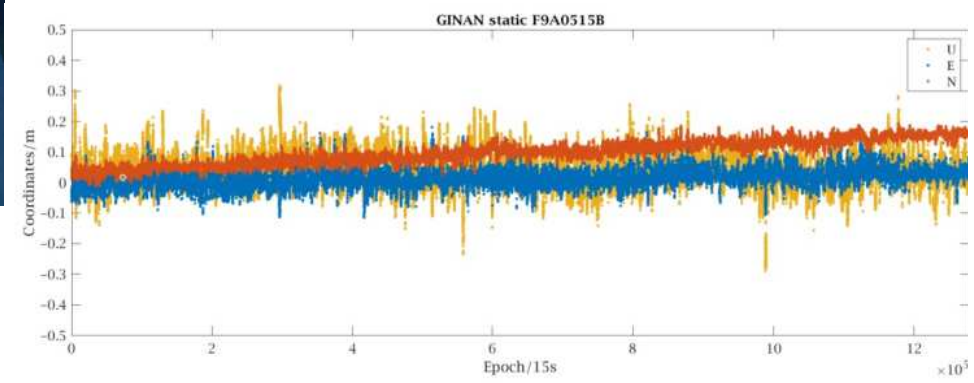
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Case 1: Australian Plate Motion Model Validation



Location: Tweed Heads, NSW
Date: 06/03/2021 – 23/08/2023
Number of days: 901



Site	Receiver	Processing Method	Velocity (cm/year)
Froggy Beach	Kurloo F9A0515B	GINAN PPP	5.41
Robina CORS	SEPT POLARX5	GA Bernese	5.77



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Case 2: Geoscience Australian CORS Comparison

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE

Receiver :TRIMBLE ALLOY
Antenna: TRM59800.00 NONE



Receiver & Antenna:
Kurloo F9



PPP
Network

SYM1	East (mm)	North(mm)	Ell. Ht.(mm)	Kurloo F9	East (mm)	North (mm)	Ell. Ht. (mm)
GINAN (STD 30 days)	8.6	4.9	17.1	GINAN (STD 30 days)	8.9	5.1	18.5
AUSPOS (STD 30 days)	2.6	2.5	8.6	AUSPOS (STD 30 days)	2.8	2.4	9.4

Kurloo achieving positioning performance similar to that of geodetic GNSS receivers at this site



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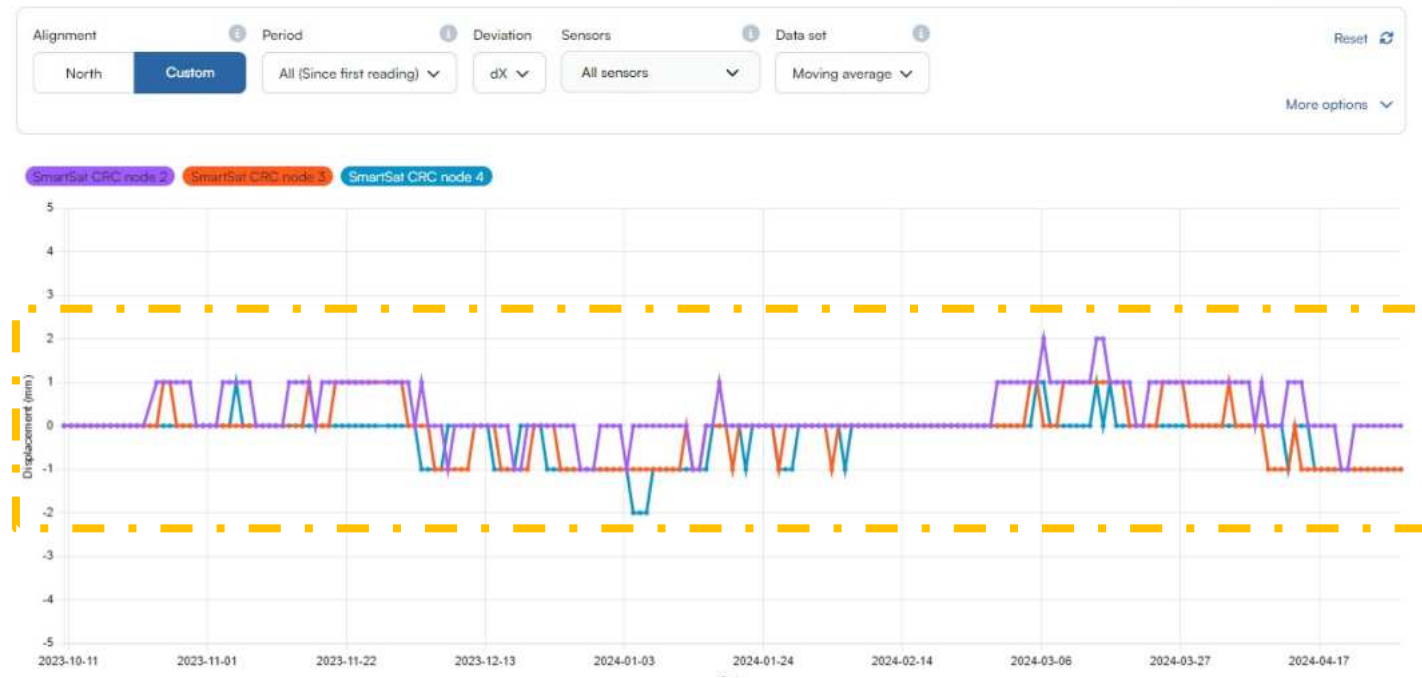
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8 DECENT WORK AND
ECONOMIC GROWTH

Case 3: Relative Positioning Service (PPK)



Dam Wall displacement over time



- Googong Dam wall monitoring
- Baseline displacement recording
- 3 x monitoring devices over 12 months
- Benefits for Safety, accuracy and timeliness

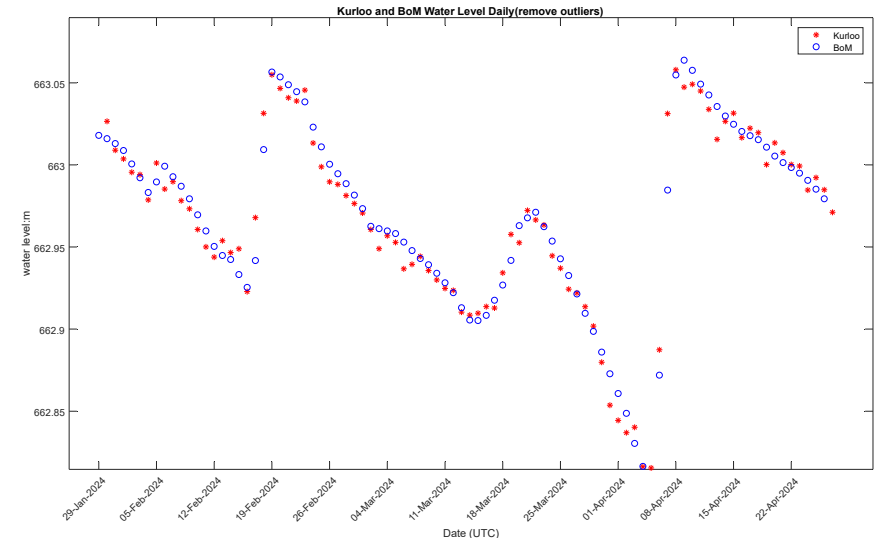


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Case 4: Validation and Calibration of Water Level



6 CLEAN WATER AND SANITATION

13 CLIMATE ACTION

Scenario	STD
Compare Kurloo with BoM (Epoch)	0.033 m
Compare Average Daily Solution	0.007m



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Kurloo's Contributions to the SDGs

- Making modern Geodesy and Industry Safer, Smarter and Sustainable Using Data Solutions
- At EOL, 100% recyclable



Keen to know more?





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Invented and made in Australia by geospatial experts



Kurloo Technology Pty Ltd
Designed and Made in Australia

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SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Commission 5

Positioning and Measurement

Serving Society for the Benefit of People and Planet



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