



FIG Working Week 2024

19-24 May

Accra, Ghana

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

Reaffirmation of Ghana-Togo Boundary: Crossroads of Old and New Approaches to Position Determination

Alexander Ayettey – Lands Commission, Ghana

*Presented at the FIG Working Week 2024,
19-24 May 2024 in Accra, Ghana*

ORGANISED BY



PLATINUM SPONSORS





FIG Working Week 2024

19-24 May

Accra, Ghana

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

Outline

Background

Problem

Field Work

Processing & Computations

Result





FIG Working Week 2024

19-24 May

Accra, Ghana

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

Background

- The national territorial boundary of a state is as important as its sovereignty
- For Ghana in particular, the unambiguous affirmation of our territorial boundary is imperative in light of the recent ITLOS case with Cote D'Ivoire
- Situation is even more dire with the discovery of oil in commercial quantities
- Unlike other regions of the world, state boundaries in Africa are more complex;
 - Artificially created
 - Divide ethnic groups/common language groups

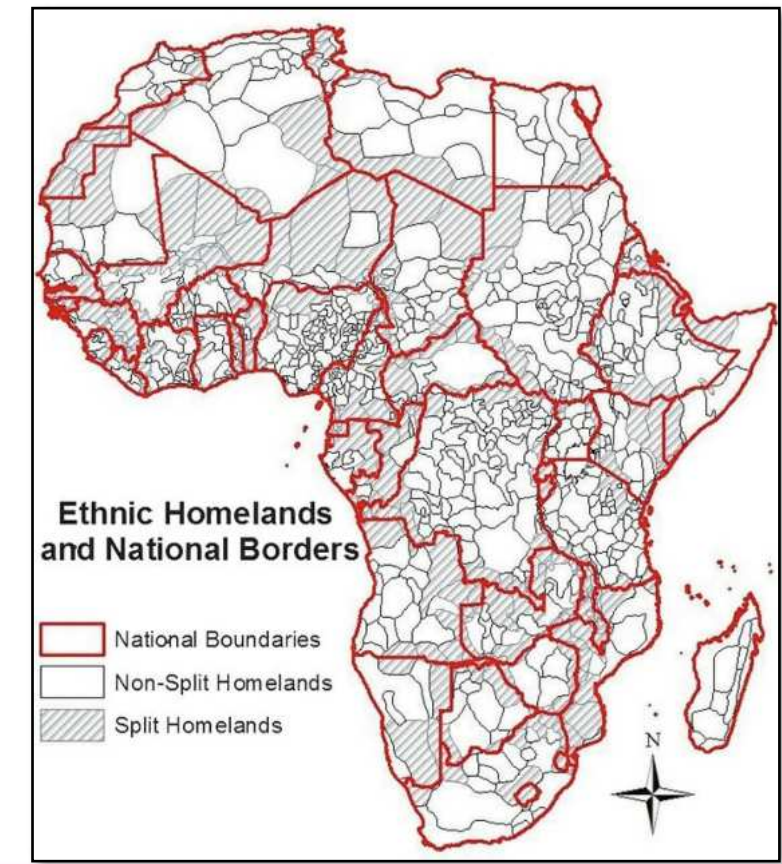




FIG Working Week 2024

19-24 May

Accra, Ghana

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

Problem

- Re-affirm and re-establish the boundary between Ghana-Togo as established by the joint British-French Survey team in 1929
- No report of Survey
- Most referenced features in the boundary description report are non-existent currently
- How to use current technology to re-affirm the Ghana-Togo boundary

SECTION 1.

(a) The Frontier between the GOLD COAST COLONY and that portion of TOGOLAND placed under the authority of the French Government starts from the sea at Pillar 1 on the road from DENU to LOME at an approximate distance from LOME lighthouse of 2,750 metres.



FIG Working Week 2024

19-24 May

Accra, Ghana

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

Problem (cont.)

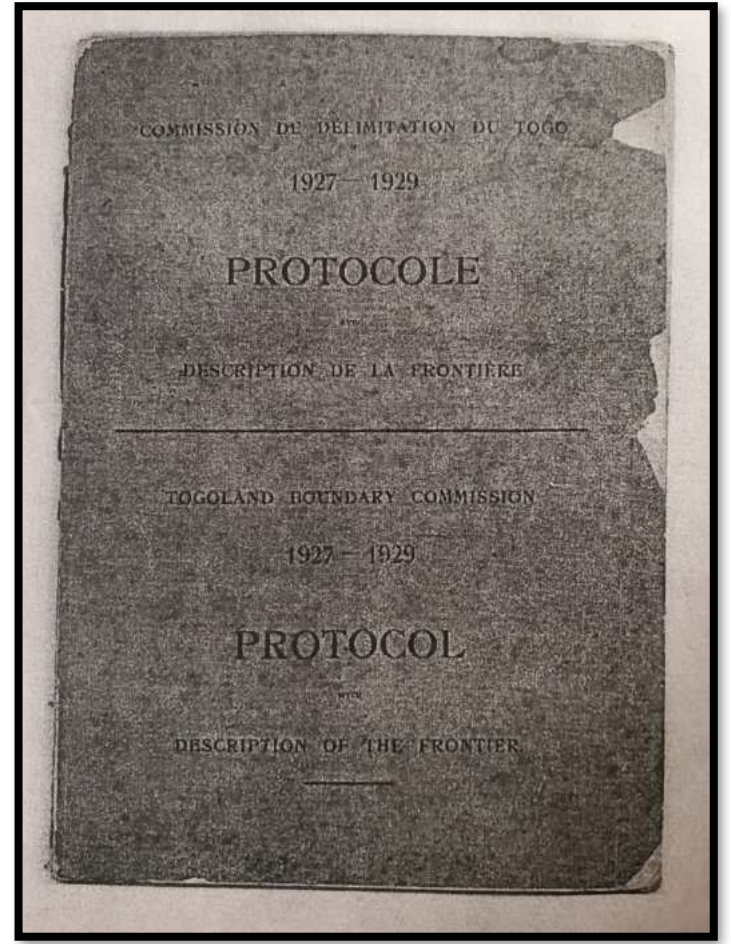
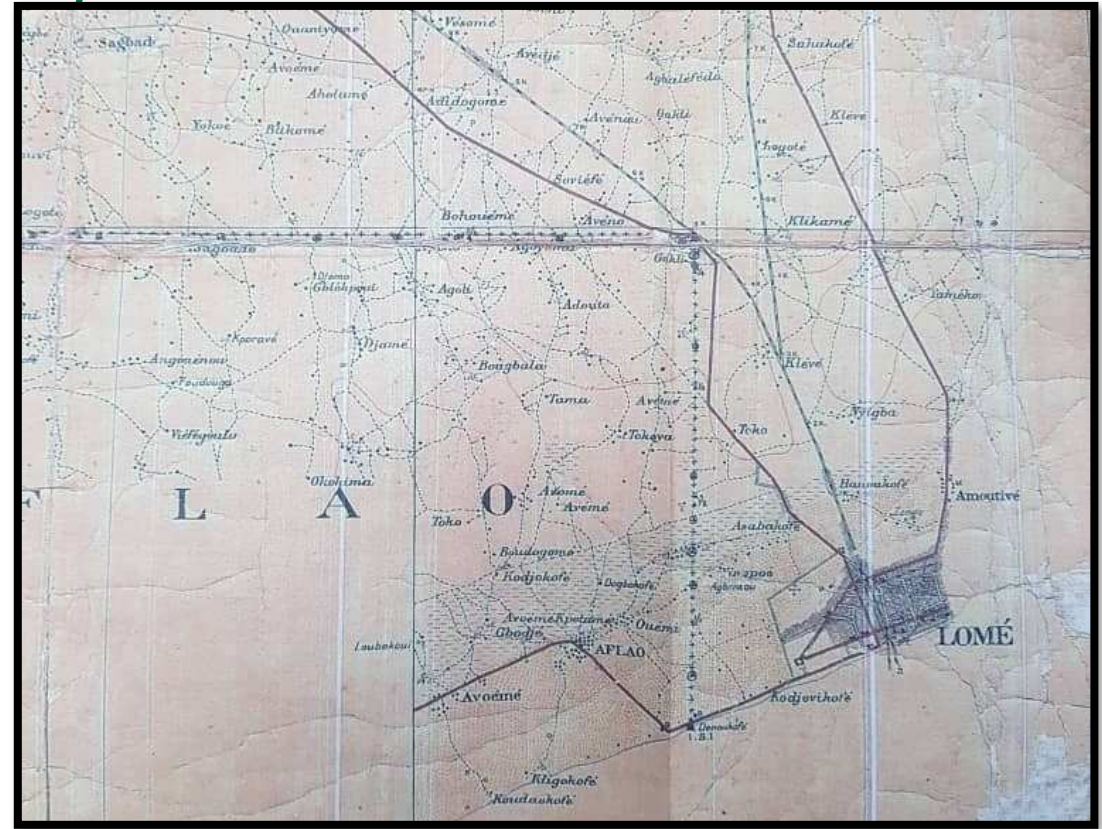




FIG Working Week 2024

19-24 May

Accra, Ghana

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

Proposed Solution

- Identify existing pillars (1929 series) along the boundary
- Re-observe using GNSS technology
- Compute coordinates in a geocentric coordinate system independent of either country
- Use boundary description report and the coordinates of the observed points to re-establish the Land Boundary Terminus

ORGANISED BY



PLATINUM SPONSORS



GEOSA
Geographic Information System
General Authority for Survey
and Geospatial Information





FIG Working Week 2024

19-24 May

Accra, Ghana

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

Field Work

Search and Identification of Legacy Pillars (GC/GT 4,5,6,7,10,11,12*,13,14 & GC TF)



ORGANISED BY



PLATINUM SPONSORS





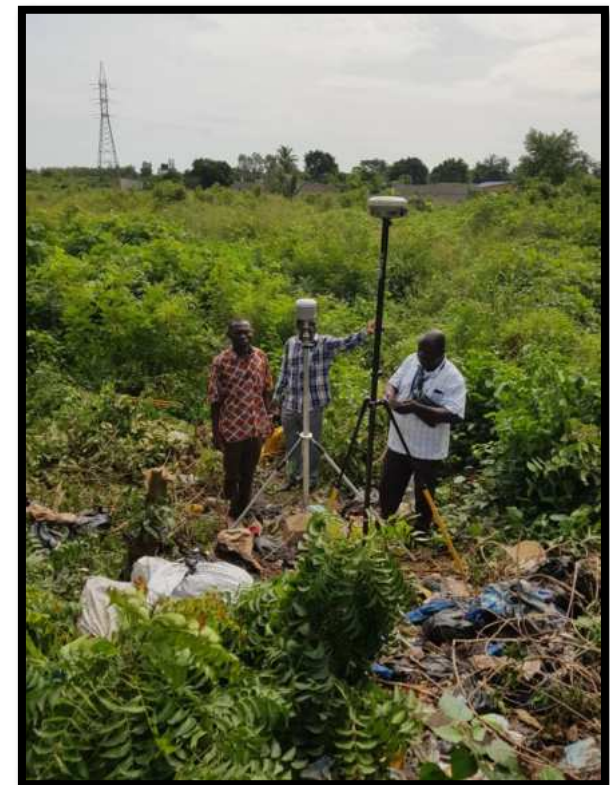
FIG Working Week 2024

19-24 May

Accra, Ghana

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

Field Work (cont.)



ORGANISED BY



PLATINUM SPONSORS



GEOSA





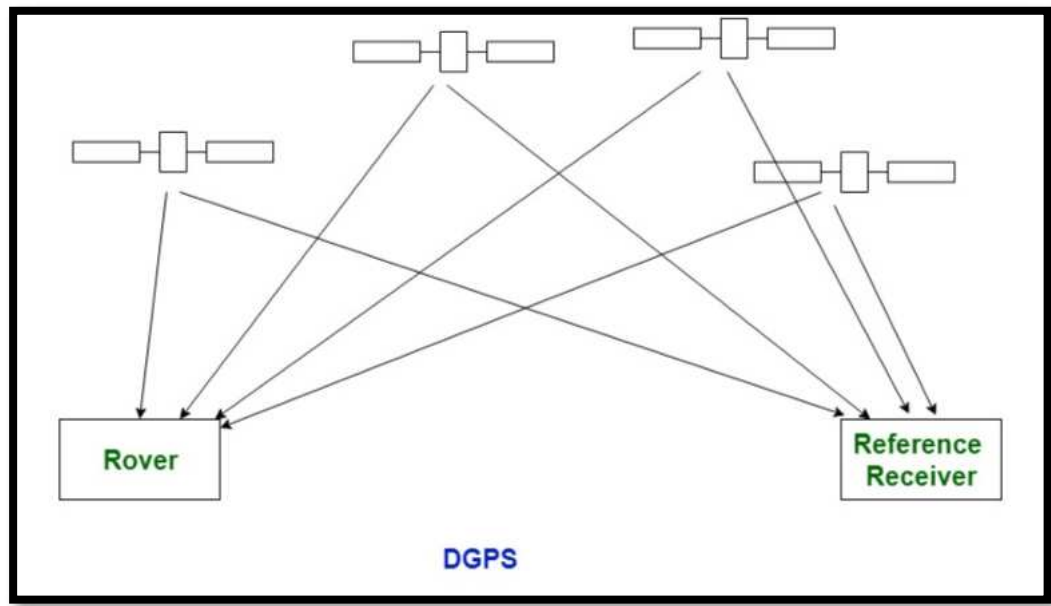
FIG Working Week 2024

19-24 May

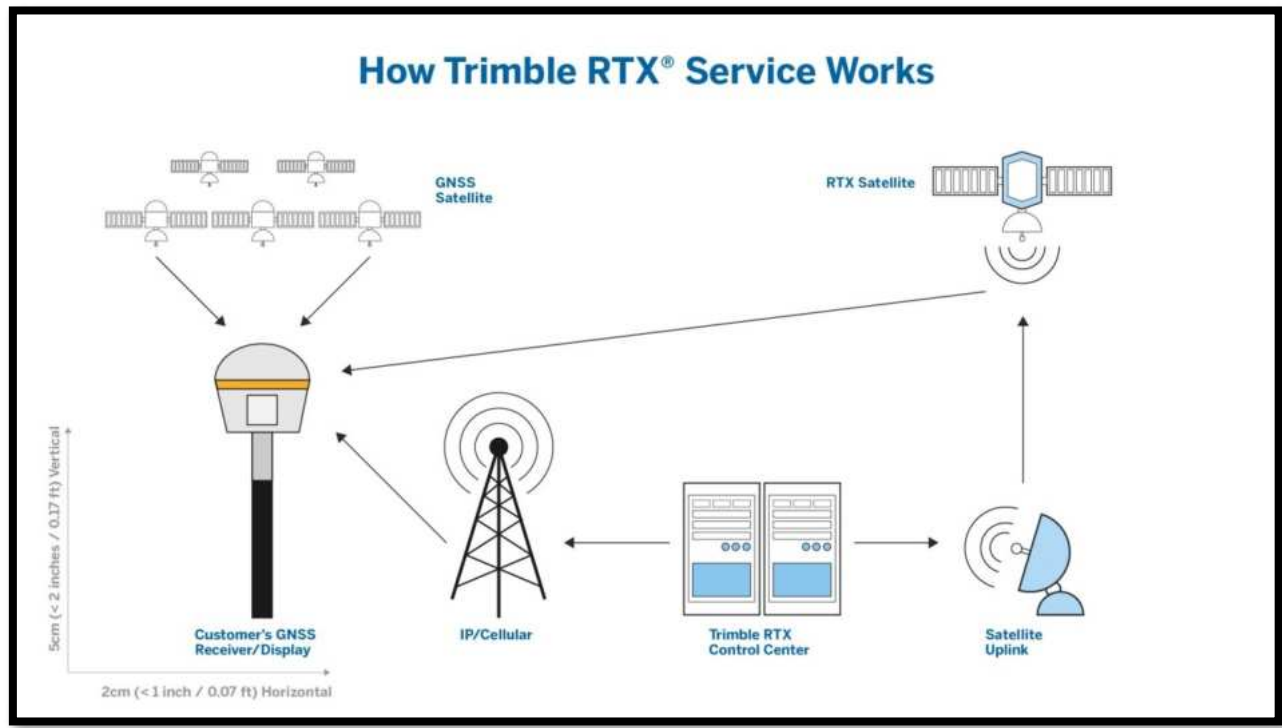
Accra, Ghana

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

Processing and Computation



DGPS



Trimble RTX service



FIG Working Week 2024

19-24 May

Accra, Ghana

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

Processing and Computation (cont.)

DGPS RESULTS

GHANA			Meters		TOGO		
ID	NORTHINGS (X)	EASTINGS (Y)	ΔX	ΔY	NORTHINGS (X)	EASTINGS (Y)	ID
GC2 TF2	682241.662	300751.289	-0.071	0.091	682241.733	300751.198	GC10B GT10B
GC4 GT4	678642.296	300739.277	-0.099	0.103	678642.395	300739.174	GC4 GT4
GC5 GT5	679207.734	300740.268	-0.157	0.075	679207.891	300740.193	GC5 GT5
GC6 GT6	680283.378	300744.001	-0.108	0.14	680283.486	300743.861	GC6 GT6
GC7 GT7	680807.366	300745.107	0.225	-0.349	680807.141	300745.456	GC7 GT7
GC10 GT10	682240.662	300751.24	-0.092	0.063	682240.754	300751.177	GC10 GT10
GC11 GT11	682242.825	300298.46	-0.091	0.099	682242.916	300298.361	GC11 GT11
GC12 GT12	682247.427	298945.848	NA		NA		
GC13 GT13	682251.142	297677.656	-0.106	0.097	682251.248	297677.559	GC13 GT13
GC14 GT14	682255.102	296897.12	-0.108	0.103	682255.21	296897.017	GC14 GT14



FIG Working Week 2024

19-24 May

Accra, Ghana

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

Processing and Computation (cont.)

RTX RESULT

GHANA			Meters		TOGO		
ID	NORTHINGS (X)	EASTINGS (Y)	ΔX	ΔY	NORTHINGS (X)	EASTINGS (Y)	ID
GC2 TF2	682244.239	300751.955	0.024	-0.006	682244.215	300751.961	GC10B GT10B
GC4 GT4	678644.874	300739.942	-0.003	0.005	678644.877	300739.937	GC4 GT4
GC5 GT5	679210.312	300740.933	-0.062	-0.023	679210.374	300740.956	GC5 GT5
GC6 GT6	680285.955	300744.666	-0.013	0.042	680285.968	300744.624	GC6 GT6
GC7 GT7	680809.944	300745.772	0.32	-0.447	680809.624	300746.219	GC7 GT7
GC10 GT10	682243.24	300751.905	0.004	-0.035	682243.236	300751.94	GC10 GT10
GC11 GT11	682245.403	300299.125	0.005	0	682245.398	300299.125	GC11 GT11
GC12 GT12	682250.005	298946.513	NIL		NIL		
GC13 GT13	682253.72	297678.321	-0.01	-0.001	682253.73	297678.322	GC13 GT13
GC14 GT14	682257.68	296897.785	-0.013	0.005	682257.693	296897.78	GC14 GT14



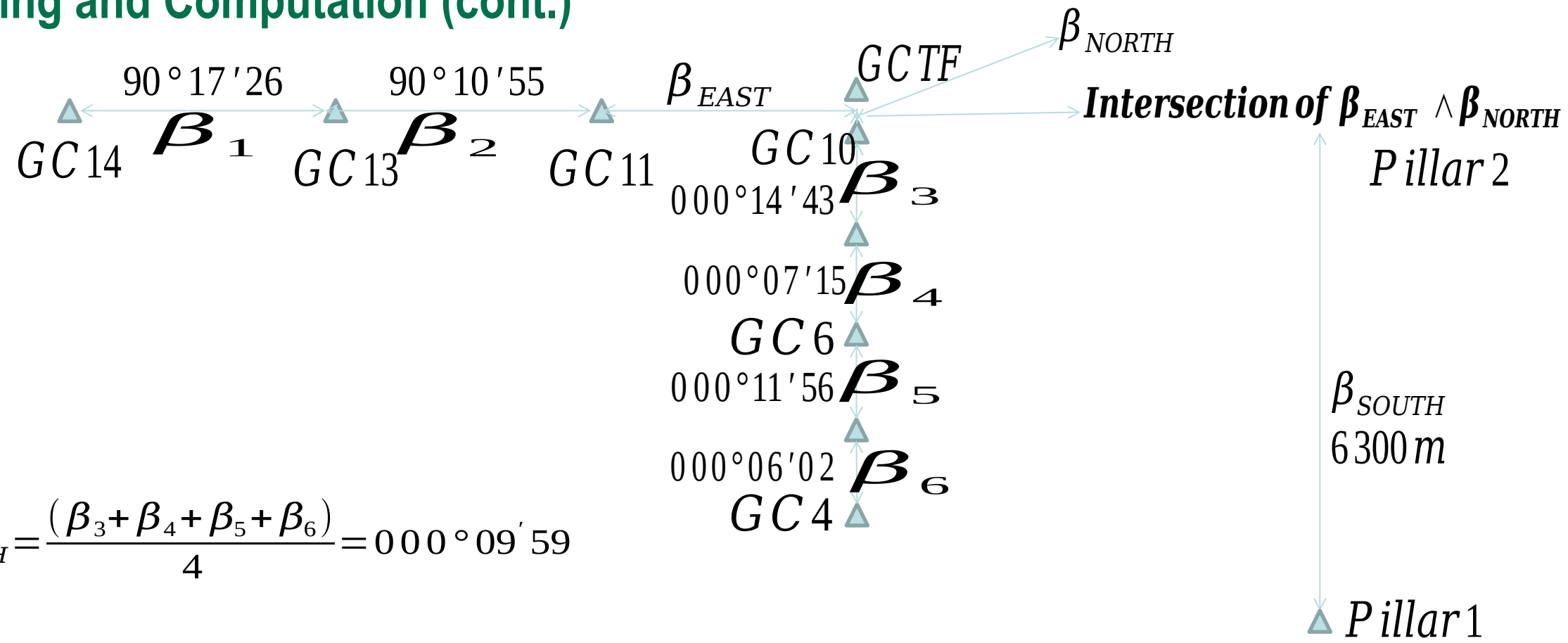
FIG Working Week 2024

19-24 May

Accra, Ghana

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

Processing and Computation (cont.)



= 0

$$\beta_{NORTH} = \frac{(\beta_3 + \beta_4 + \beta_5 + \beta_6)}{4} = 000^\circ 09' 59''$$



FIG Working Week 2024

19-24 May

Accra, Ghana

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

SUSTAINABLE DEVELOPMENT GOALS | International Federation of Surveyors supports the Sustainable Development Goals

Commission 5

Positioning and Measurements

Serving Society for the Benefit of People and Planet

