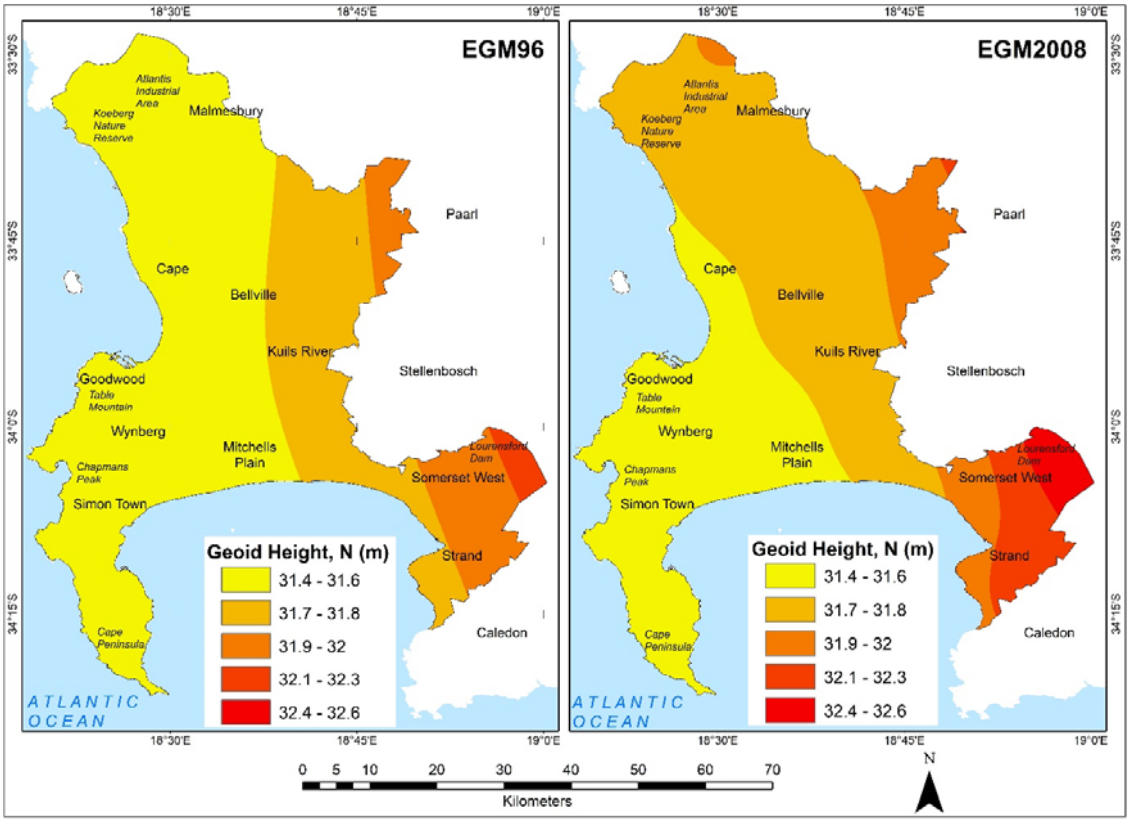
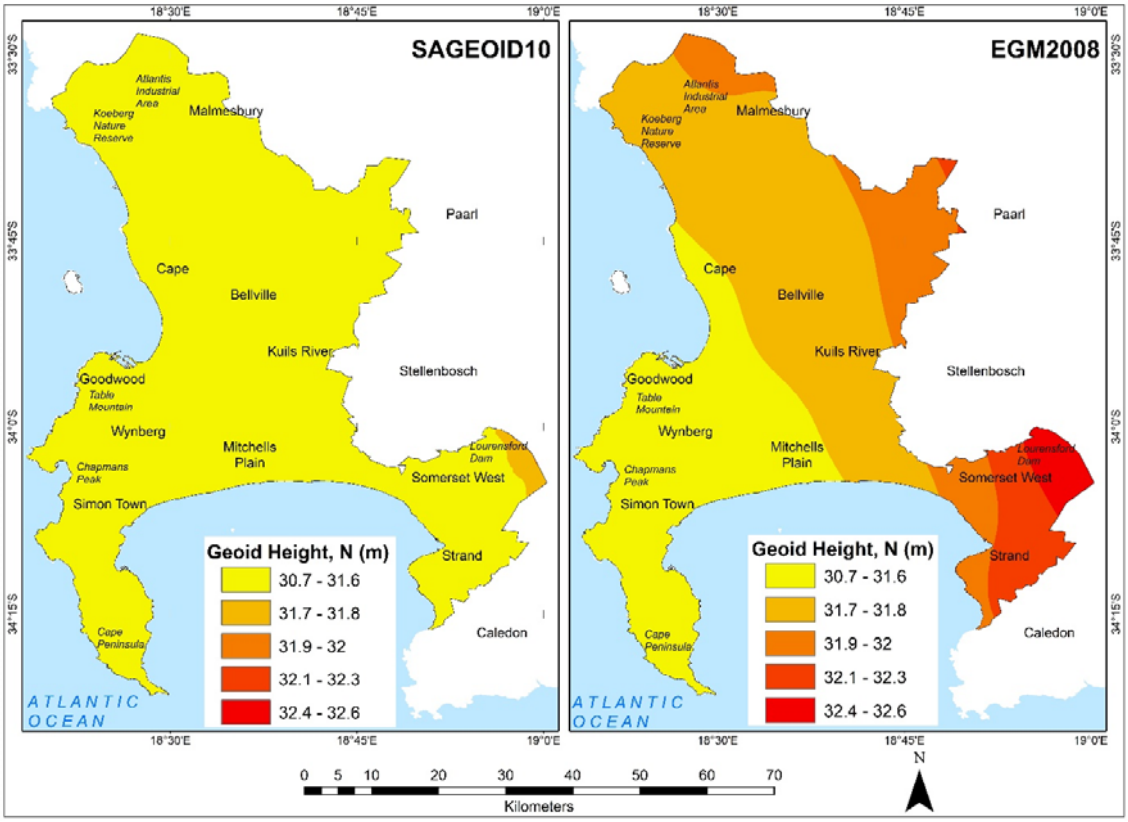
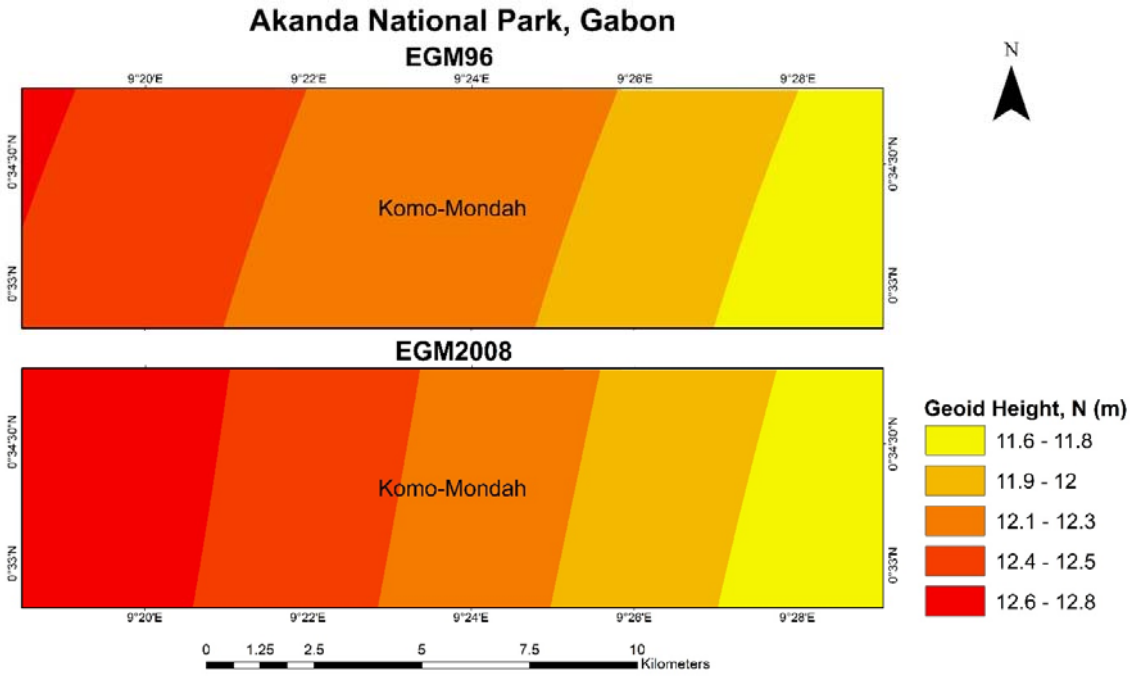


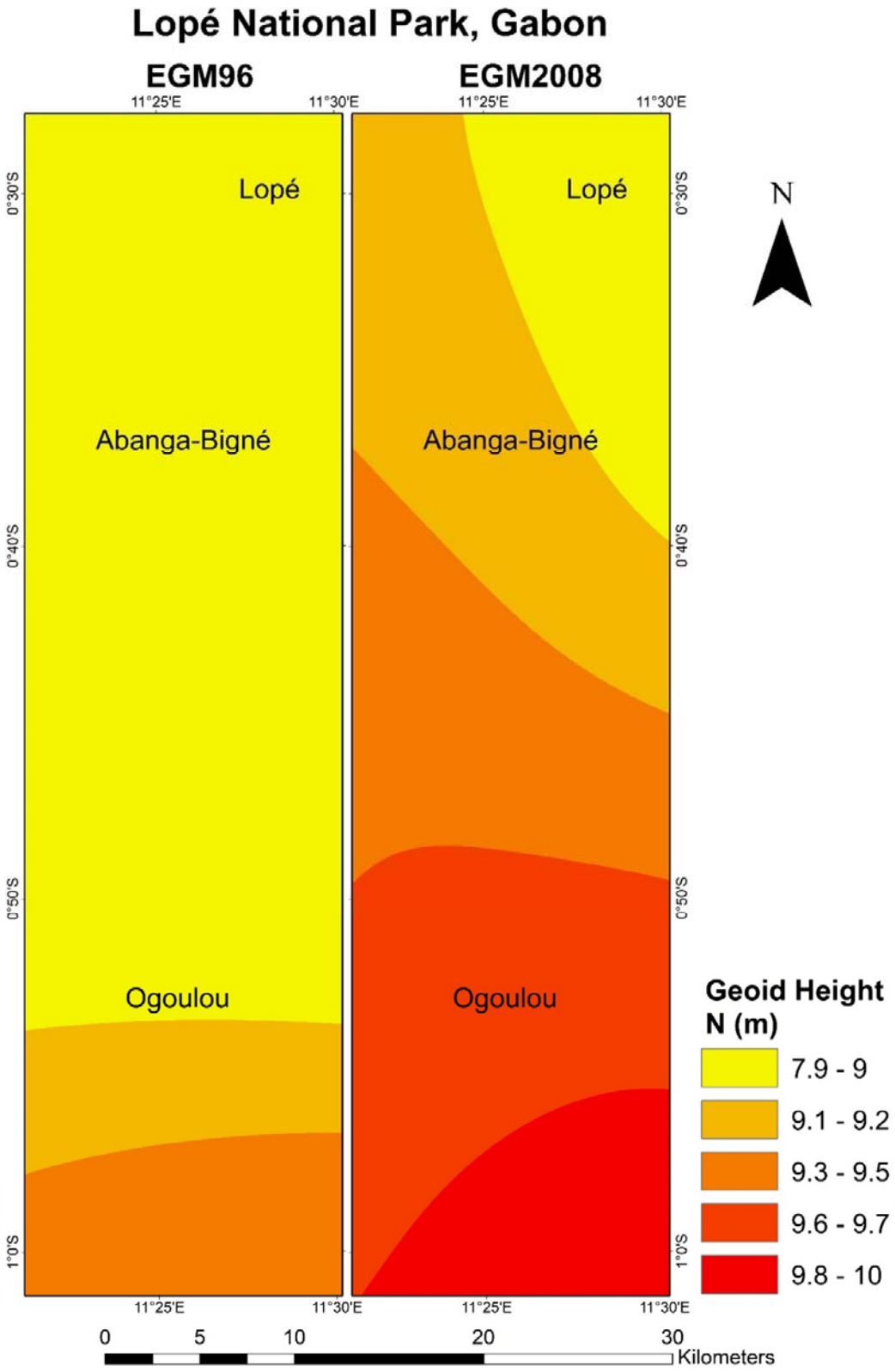
Supplementary Figure 1: EGM96 and EGM2008 geoid models for Cape Town



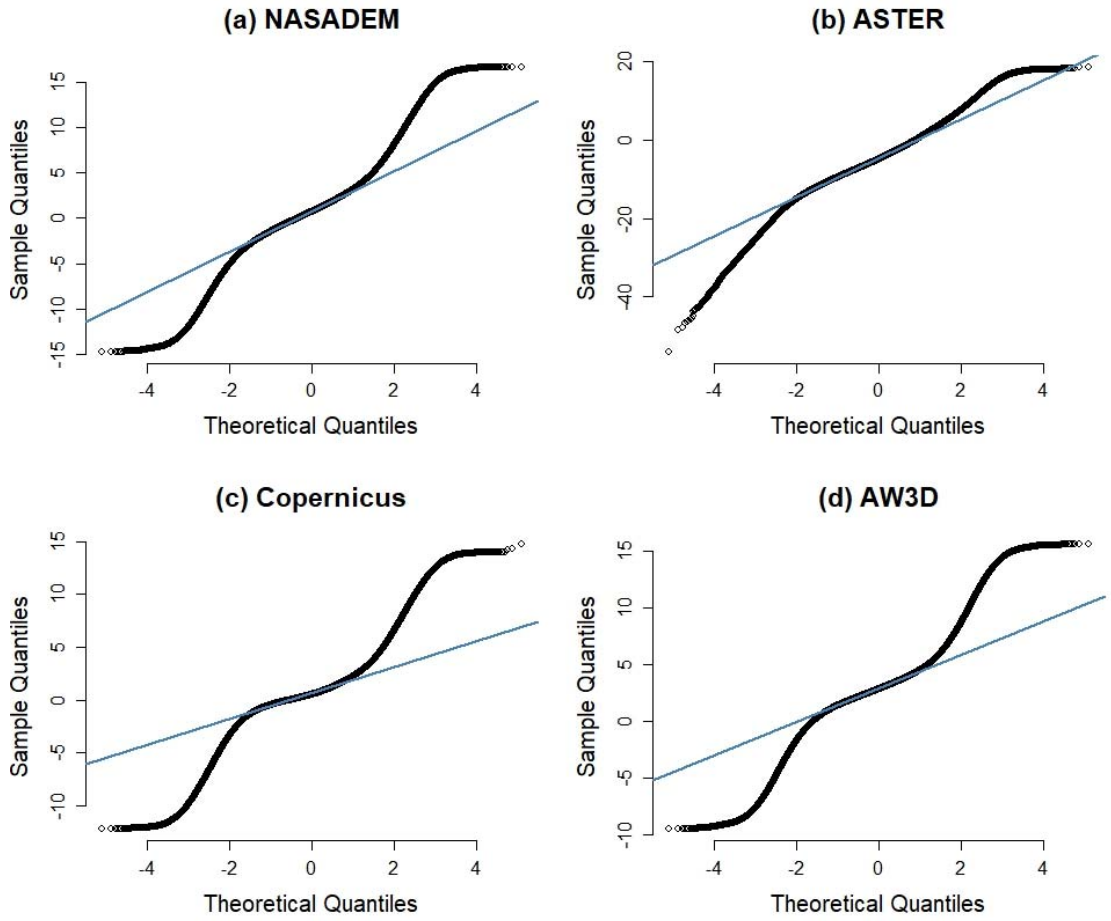
Supplementary Figure 2: SAGEOID10 and EGM2008 geoid models for Cape Town



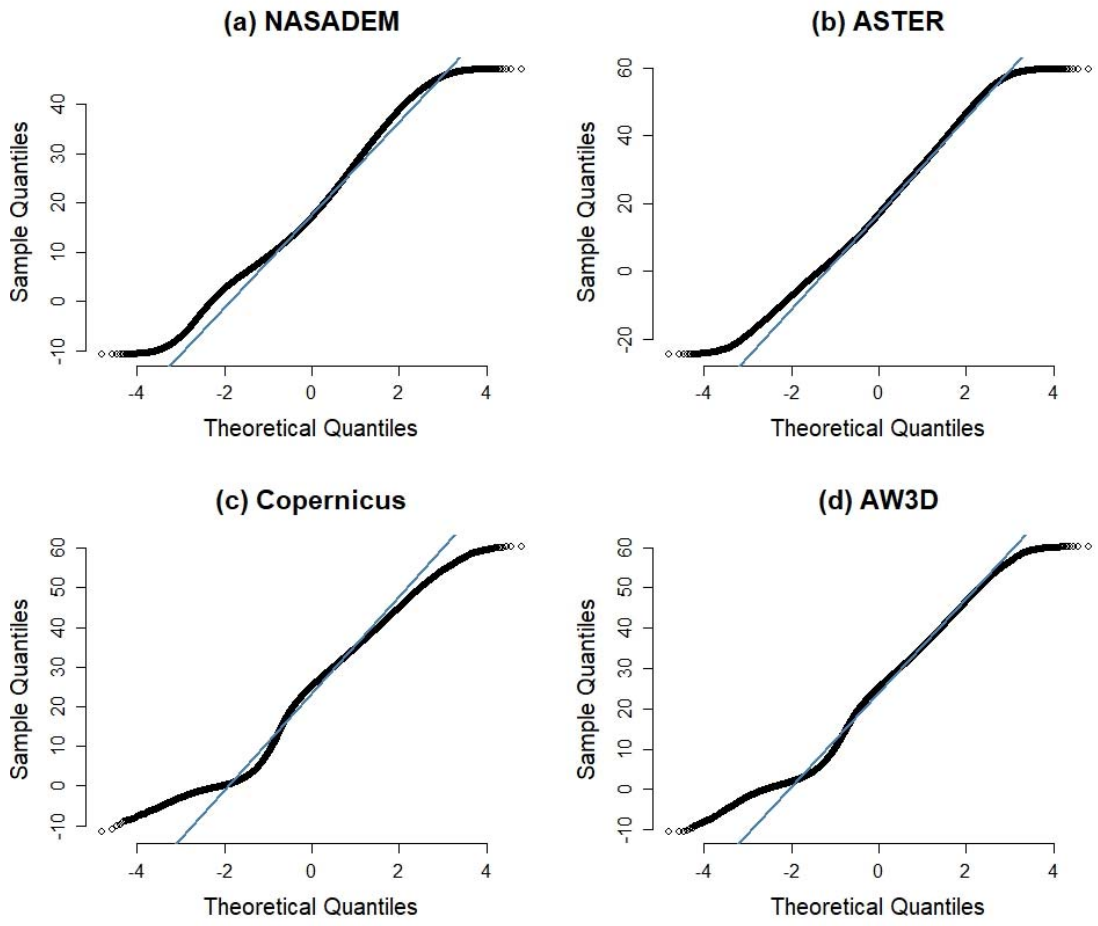
Supplementary Figure 3: EGM96 and EGM2008 geoid models for Akanda National Park, Gabon



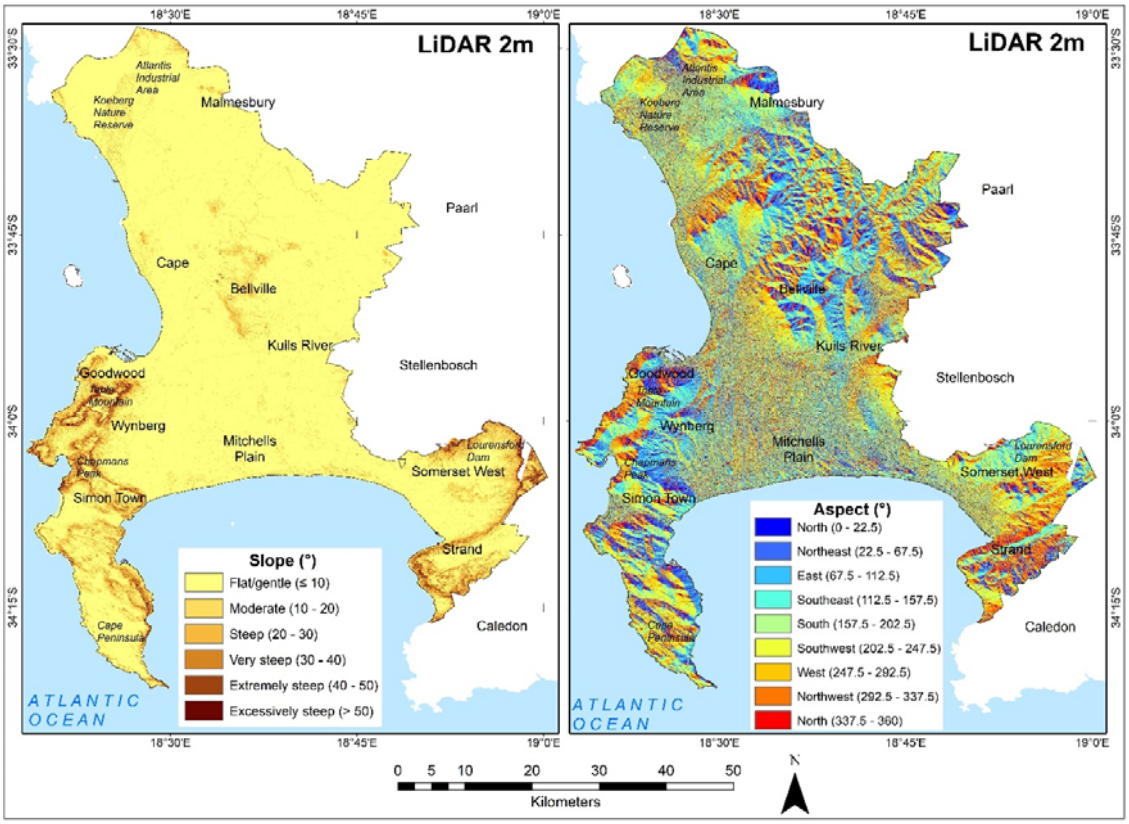
Supplementary Figure 4: EGM96 and EGM2008 geoid models for Lope National Park, Gabon



Supplementary Figure 5: Normal Q-Q plot for the height error distribution in Cape Town, after outlier filtering



Supplementary Figure 6: Normal Q-Q plot for the height error distribution in Gabon



Supplementary Figure 7: Slope (left) and aspect (right) classification for Cape Town using airborne LiDAR

Supplementary Table 1: Parameters defined for retrieving the geoid models through ICGEM online

ICGEM Parameters:
Calculation Service: Regular grids
Model selection: (i) EGM96 (ii) EGM2008
Functional selection: geoid
Grid selection: 18.26 – 19.03E; 33.45 – 34.38S
Grid step: 0.0005 deg
Reference System: WGS84

Supplementary Table 2: Vertical error in Cape Town based on slope. The lowest vertical errors are highlighted

Slope category	Description	DEM	ME (m)	SD (m)	RMSE (m)	MAE (m)
≤ 10°	Flat/ gentle	NASADEM	0.88	2.47	2.62	1.90
		ASTER	-4.59	4.93	6.74	5.68
		Copernicus	**0.83**	**1.64**	**1.83**	**1.17**
		AW3D	2.94	1.75	3.42	3.00
10° - 20°	Moderate	NASADEM	**0.70**	4.18	4.24	3.18
		ASTER	-4.60	6.91	8.30	6.71
		Copernicus	0.82	**3.16**	**3.27**	**2.40**
		AW3D	2.77	3.33	4.33	3.45
20° - 30°	Steep	NASADEM	0.76	5.51	5.56	4.36
		ASTER	-4.41	8.89	9.92	7.91
		Copernicus	**0.73**	**4.56**	**4.62**	**3.60**
		AW3D	2.81	4.73	5.50	4.39
30° - 40°	Very steep	NASADEM	0.79	6.37	6.42	5.17
		ASTER	-3.87	10.21	10.92	8.73
		Copernicus	**0.64**	**5.46**	**5.50**	**4.44**
		AW3D	2.99	5.57	6.32	5.13
40° - 50°	Extremely steep	NASADEM	0.66	6.91	6.94	5.67
		ASTER	-3.37	10.69	11.21	8.99
		Copernicus	**0.61**	**6.06**	**6.09**	**5.03**
		AW3D	3.09	6.11	6.85	5.65
> 50°	Excessively steep	NASADEM	**0.48**	7.42	7.43	6.16
		ASTER	-3.05	11.13	11.54	9.30
		Copernicus	0.88	6.52	**6.58**	**5.48**
		AW3D	3.36	**6.49**	7.30	6.08

Supplementary Table 3: Vertical error in Cape Town based on aspect. The lowest vertical errors are highlighted

Aspect (°)	DEM	ME (m)	SD (m)	RMSE (m)	MAE (m)
North	NASADEM	1.00	3.12	3.28	2.32
$(0 - 22.5°)$	ASTER	-5.64	5.57	7.93	6.58
$(337.5-360°)$	Copernicus	**0.78**	**2.33**	**2.46**	**1.53**
	AW3D	3.09	2.42	3.92	3.32
North-east	NASADEM	1.08	3.13	3.31	2.32
$(22.5 - 67.5°)$	ASTER	-5.60	5.78	8.05	6.61
	Copernicus	**0.71**	**2.27**	**2.38**	**1.50**
	AW3D	3.01	2.34	3.81	3.22
East	NASADEM	1.00	2.96	3.13	2.20
$(67.5 - 112.5°)$	ASTER	-5.19	5.74	7.74	6.36
	Copernicus	**0.81**	**2.12**	**2.27**	**1.43**
	AW3D	3.01	2.21	3.74	3.19
South-east	NASADEM	0.93	3.00	3.14	2.19
$(112.5 - 157.5°)$	ASTER	-4.96	5.38	7.31	6.10
	Copernicus	**0.90**	**2.15**	**2.33**	**1.47**
	AW3D	2.93	2.25	3.69	3.15
South	NASADEM	**0.83**	3.02	3.13	2.21
$(157.5 - 202.5°)$	ASTER	-3.96	5.28	6.60	5.53
	Copernicus	0.89	**2.23**	**2.41**	**1.53**
	AW3D	2.84	2.36	3.69	3.11
South-west	NASADEM	**0.67**	2.94	3.02	2.14
$(202.5-247.5°)$	ASTER	-3.15	5.44	6.28	5.22
	Copernicus	0.83	**2.17**	**2.32**	**1.48**
	AW3D	2.75	2.31	3.59	3.03
West	NASADEM	**0.68**	2.84	2.92	2.07
$(247.5 - 292.5°)$	ASTER	-3.85	5.30	6.55	5.46
	Copernicus	0.81	**2.03**	**2.19**	**1.37**
	AW3D	2.85	2.20	3.60	3.06
North-west	NASADEM	0.83	3.08	3.19	2.25
$(292.5 - 337.5°)$	ASTER	-5.17	5.41	7.48	6.26
	Copernicus	**0.82**	**2.27**	**2.41**	**1.49**
	AW3D	3.00	2.36	3.82	3.24