

Supplementary Material to the paper:

”Evaluation of TanDEM-X DEMs on selected Brazilian sites:
comparison with SRTM, ASTER GDEM and ALOS AW3D30“

by C.H.Grohmann

Institute of Energy and Environment, University of São Paulo, Brazil

Contents

1	Satellite images of the selected study areas	2
2	Shaded relief images of the selected study areas	3
3	Summary statistics of elevation	10
4	Analysis of slope	13
5	Analysis of Contour Lines	24
6	Differences of elevation	29

1. Satellite images of the selected study areas

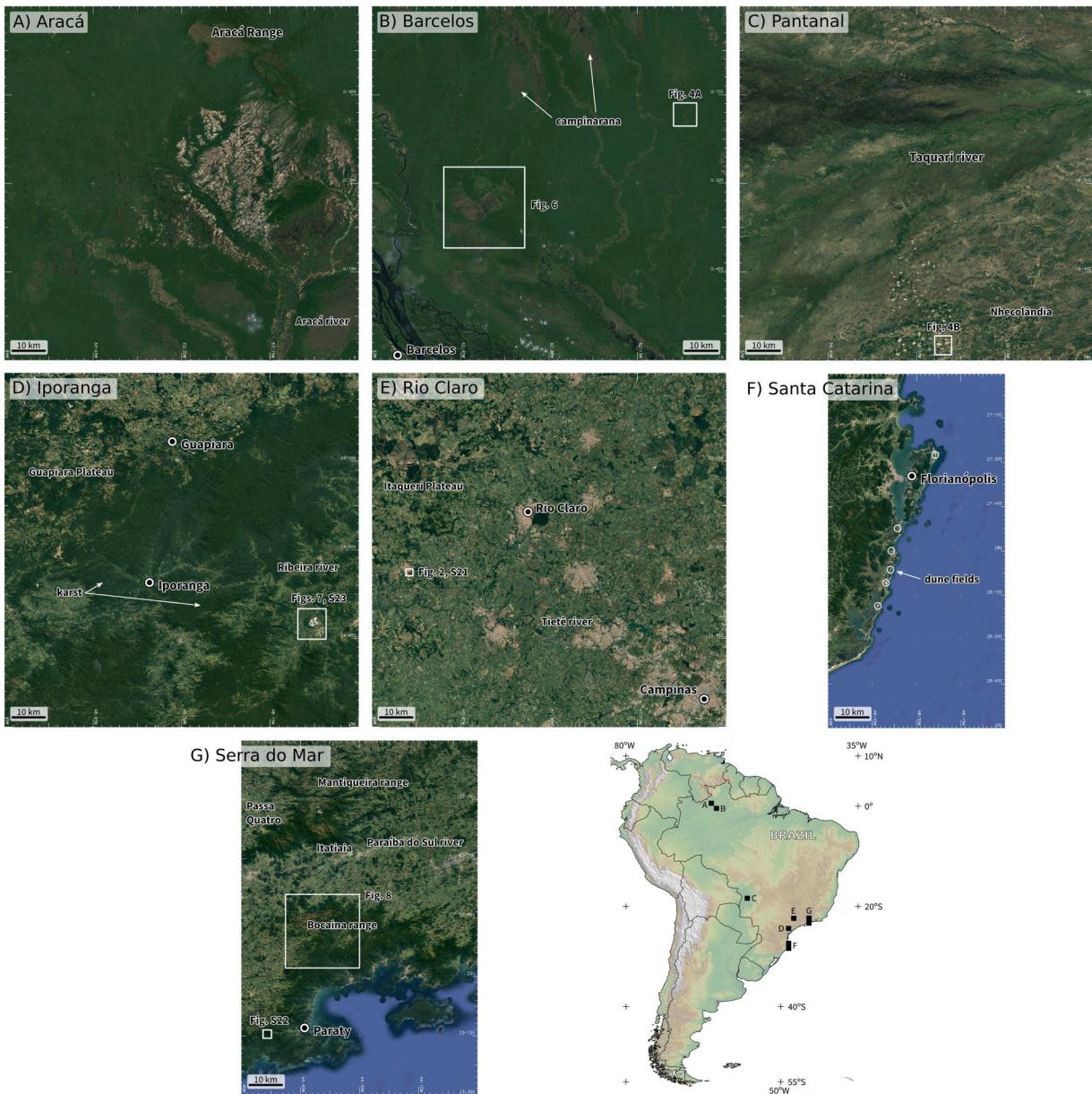


Figure S.1.1. Satellite imagery of studied areas with indication of places or landscape features referred in the text. Satellite imagery ©2017 TerraMetrics, powered by Google.

2. Shaded relief images of the selected study areas

2.1. Aracá

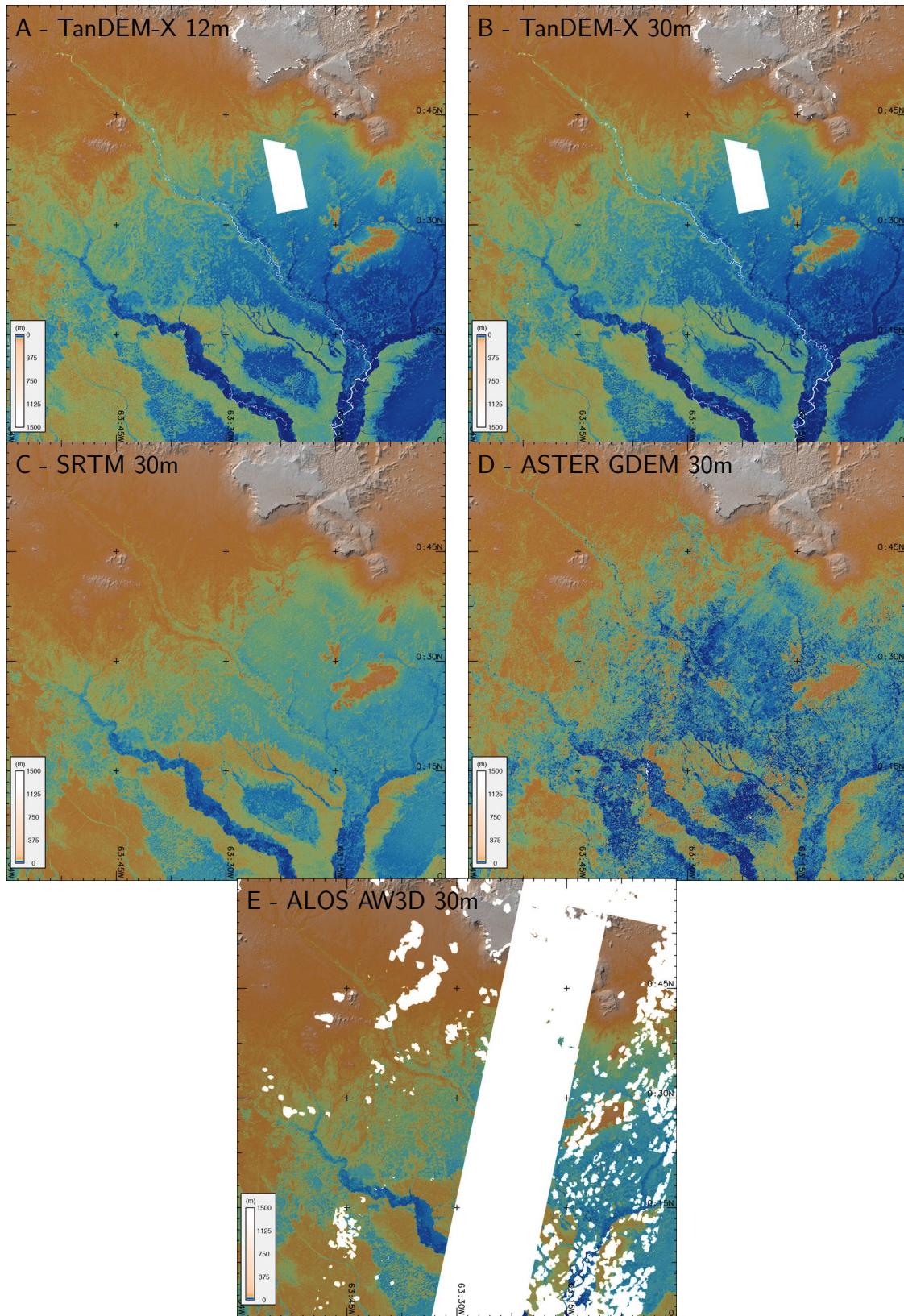


Figure S.2.1. Datasets for Aracá area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.2. Barcelos

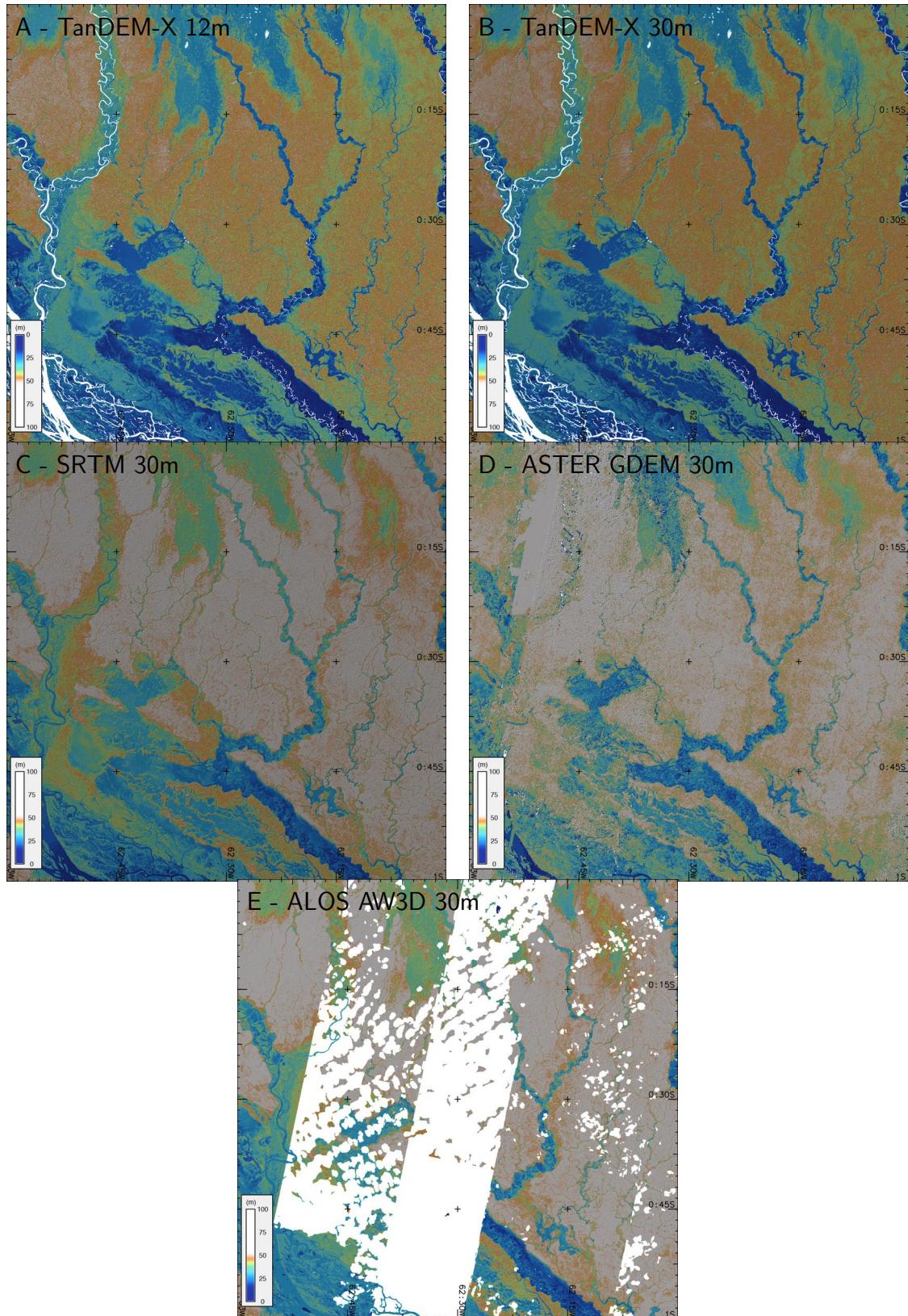


Figure S.2.2. Datasets for Barcelos area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.3. Pantanal

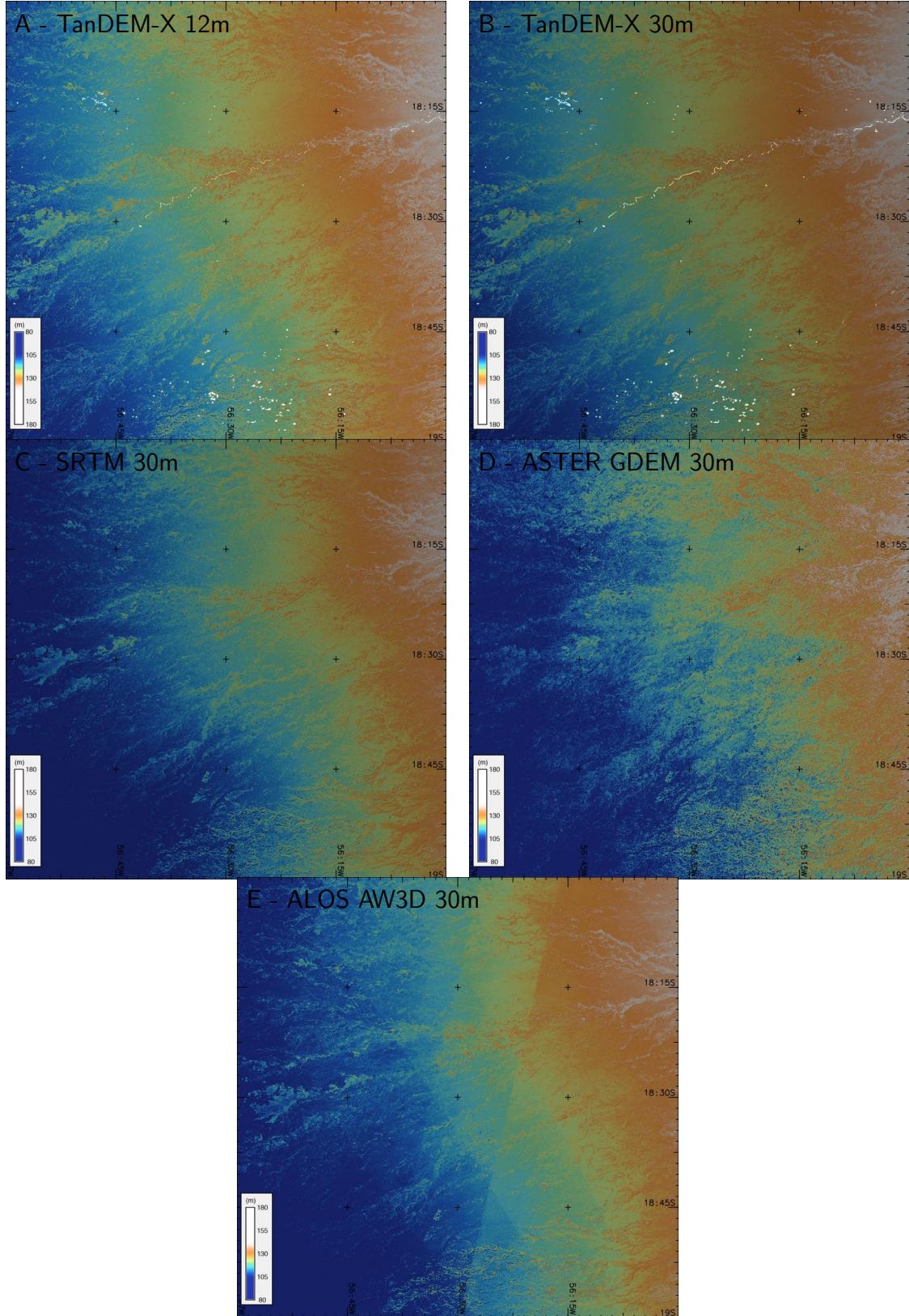


Figure S.2.3. Datasets for Pantanal area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.4. Iporanga

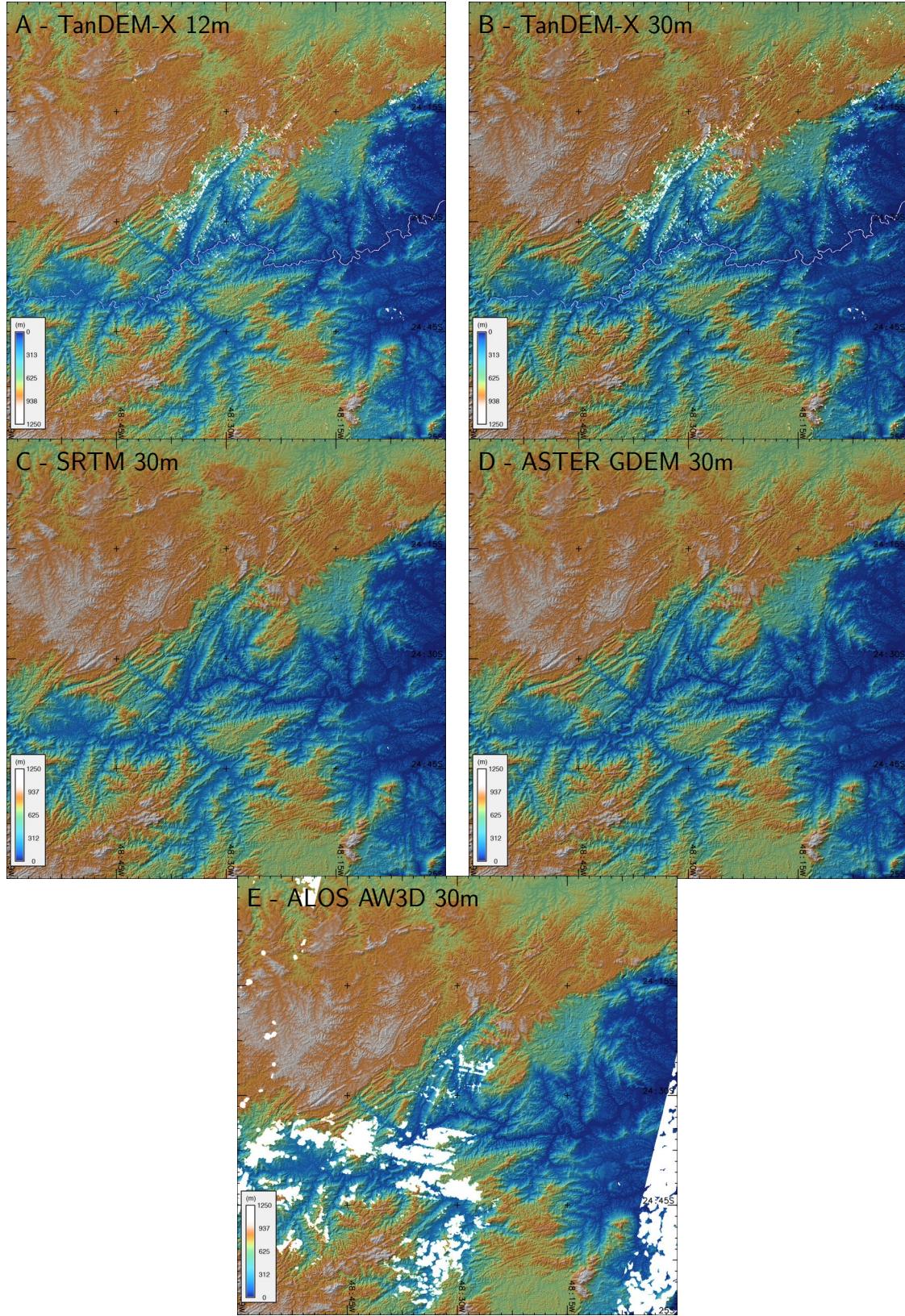


Figure S.2.4. Datasets for Iporanga area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.5. Rio Claro

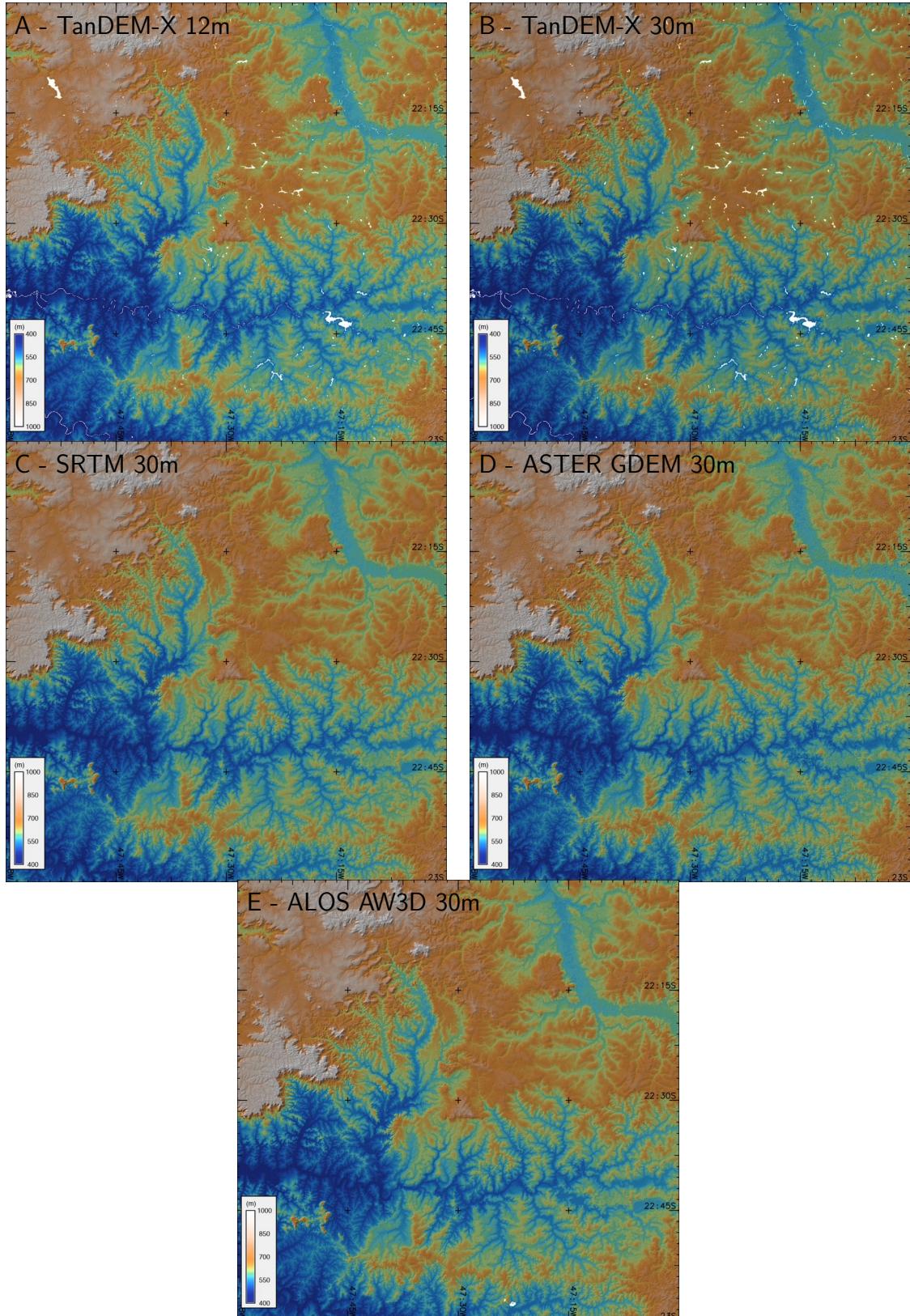


Figure S.2.5. Datasets for RioClaro area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.6. Santa Catarina

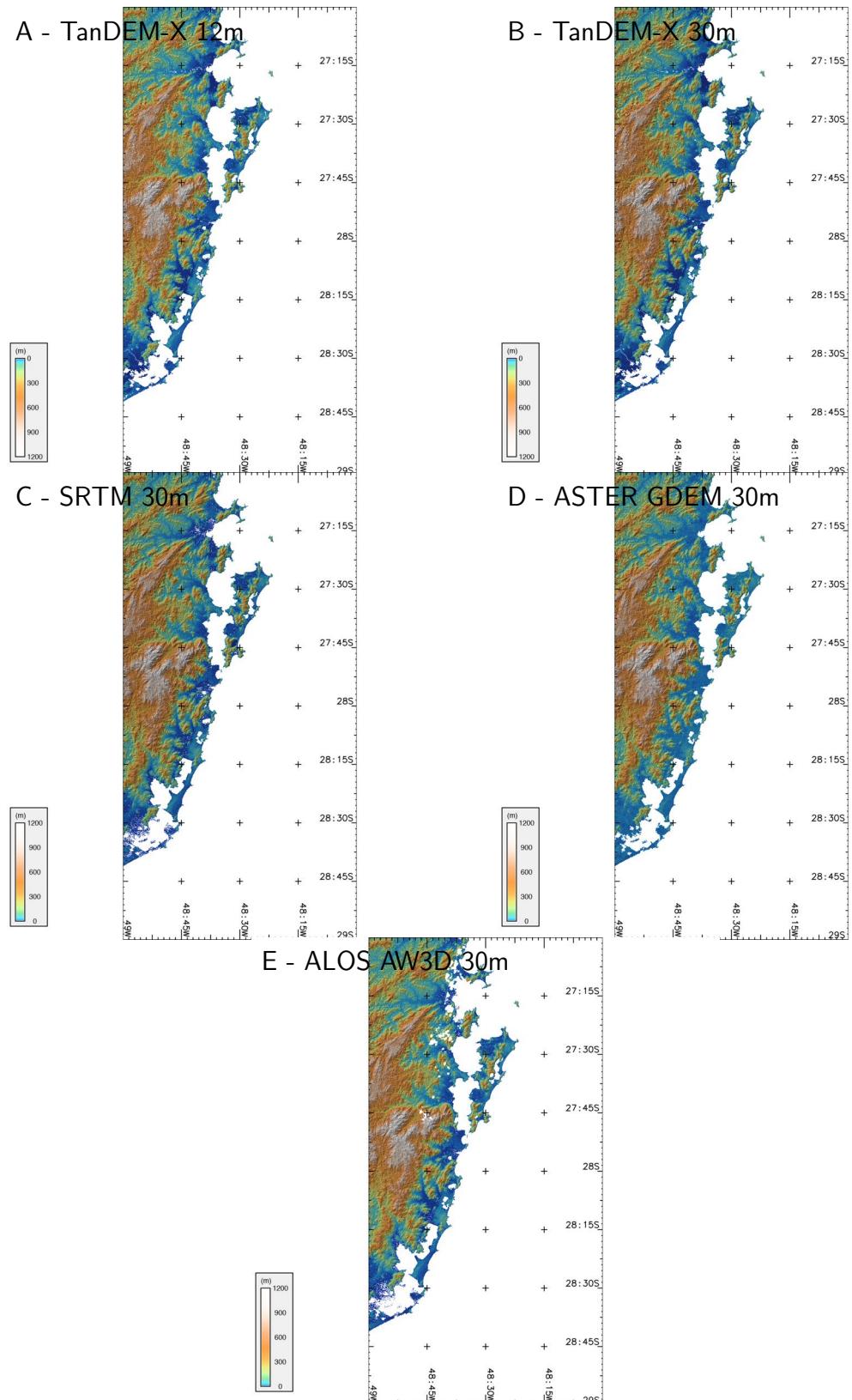


Figure S.2.6. Datasets for Santa Catarina area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

2.7. Serra do Mar

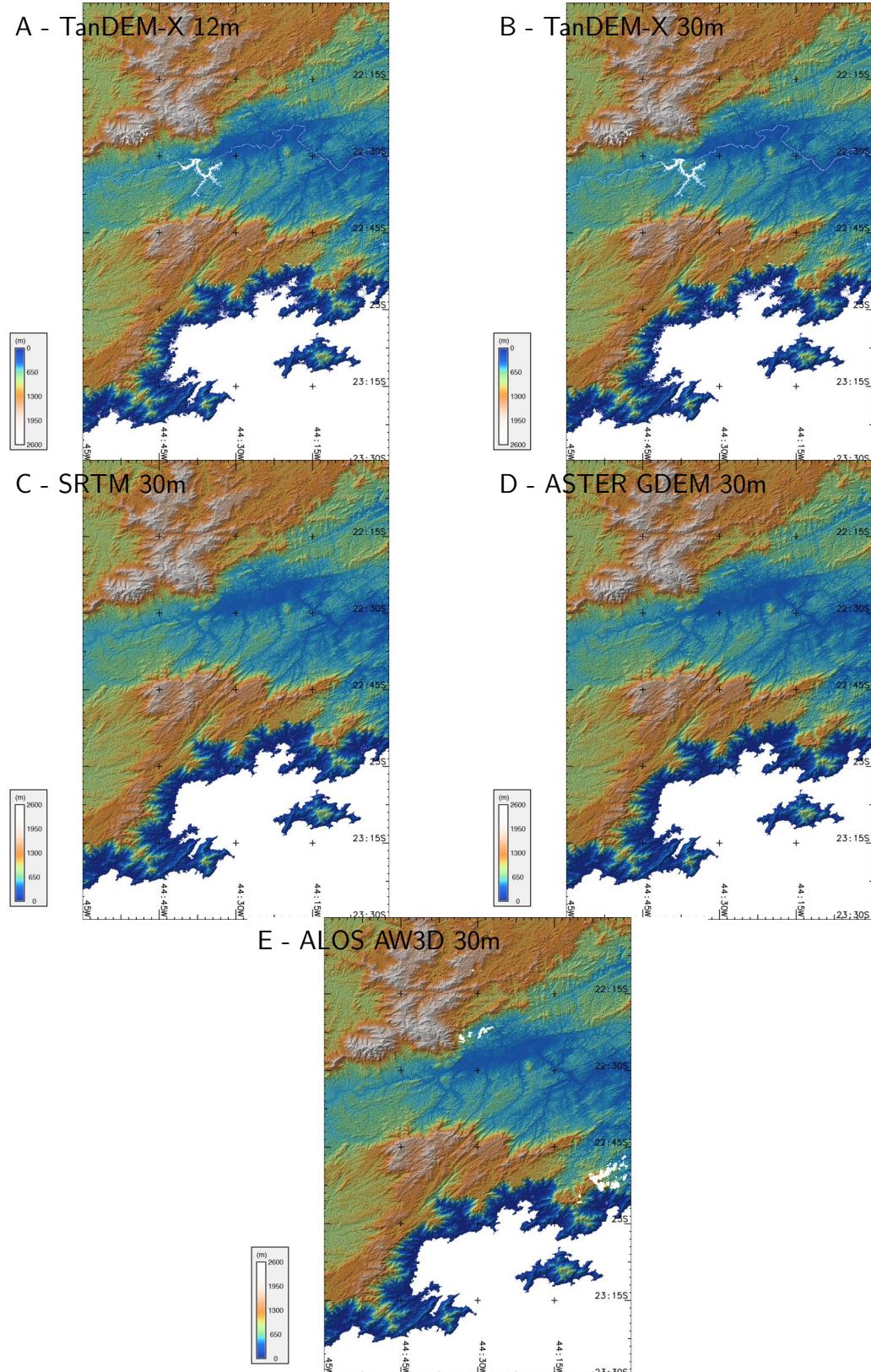


Figure S.2.7. Datasets for Serra do Mar area. A) TanDEM-X, 12 m resolution; B) TanDEM-X, 30 m resolution; C) SRTM, 30 m resolution; D) ASTER GDEM, 30 m resolution; E) ALOS AW3D, 30 m resolution.

3. Summary statistics of analysed DEMs

Table S.1. Summary statistics of elevation - Aracá area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	0.02	1755.79	1755.78	105.15	51.73	208.68	4.21	17.36	40.45	65.79
tdx30	6.35	1753.06	1746.71	105.13	51.72	208.64	4.22	17.36	40.47	65.79
srtm30_egm96	5.00	1765.00	1760.00	113.01	58.00	210.01	4.19	17.13	48.00	73.00
srtm30_wgs84	-0.99	1758.14	1759.13	106.73	52.34	209.86	4.19	17.14	41.71	67.27
aster30_egm96	0.00	4443.00	4443.00	108.62	55.00	211.55	4.38	21.42	43.00	70.00
aster30_wgs84	-7.13	4436.15	4443.28	102.34	49.12	211.40	4.39	21.44	36.84	63.57
aw3d30_egm96	0.00	1516.00	1516.00	89.90	60.00	156.87	5.98	36.17	50.00	73.00
aw3d30_wgs84	-7.22	1509.19	1516.41	83.81	53.87	156.76	5.98	36.18	44.09	67.42

Table S.2. Summary statistics of elevation - Barcelos area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	0.00	115.00	115.00	37.58	41.01	10.10	-0.64	-0.73	29.62	45.61
tdx30	0.03	102.26	102.23	37.58	41.22	9.98	-0.67	-0.75	29.65	45.61
srtm30_egm96	0.00	111.00	111.00	44.76	48.00	10.47	-0.73	-0.49	37.00	53.00
srtm30_wgs84	-8.34	103.65	111.99	37.70	40.86	10.21	-0.71	-0.45	30.51	45.73
aster30_egm96	0.00	174.00	174.00	46.67	48.00	12.84	-0.04	0.93	38.00	55.00
aster30_wgs84	-8.51	167.34	175.86	39.61	40.96	12.79	0.01	1.01	31.61	47.66
aw3d30_egm96	0.00	157.00	157.00	45.50	50.00	10.49	-0.79	-0.38	38.00	54.00
aw3d30_wgs84	-8.52	150.13	158.64	38.36	42.11	10.21	-0.78	-0.29	31.12	46.19

Table S.3. Summary statistics of elevation - Pantanal area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	20.17	185.49	165.33	122.08	121.67	9.51	0.15	-0.87	114.22	129.53
tdx30	44.57	167.04	122.47	122.08	121.67	9.45	0.15	-0.90	114.24	129.51
srtm30_egm96	78.00	173.00	95.00	116.02	115.00	11.02	0.15	-0.84	107.00	125.00
srtm30_wgs84	88.92	180.26	91.34	125.45	124.93	9.89	0.16	-0.82	117.43	133.12
aster30_egm96	61.00	184.00	123.00	115.73	115.00	11.63	0.18	-0.65	107.00	124.00
aster30_wgs84	72.28	194.29	122.01	125.17	124.76	10.57	0.20	-0.58	116.90	132.81
aw3d30_egm96	44.00	191.00	147.00	116.21	115.00	10.87	0.15	-0.89	108.00	125.00
aw3d30_wgs84	54.66	199.42	144.75	125.64	124.92	9.74	0.17	-0.87	118.04	133.39

Table S.4. Summary statistics of elevation - Iporanga area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	0.00	1308.87	1308.87	586.07	687.63	296.72	-0.50	-1.11	312.40	830.80
tdx30	0.01	1304.80	1304.79	586.10	687.68	296.70	-0.50	-1.11	312.45	830.80
srtm30_egm96	0.00	1296.00	1296.00	587.04	689.00	296.46	-0.50	-1.13	313.00	832.00
srtm30_wgs84	-0.61	1296.25	1296.86	587.03	689.32	296.47	-0.50	-1.12	313.15	832.01
aster30_egm96	2.00	1294.00	1292.00	583.09	685.00	296.48	-0.49	-1.13	308.00	829.00
aster30_wgs84	1.92	1294.24	1292.32	583.08	685.19	296.49	-0.49	-1.13	308.43	829.10
aw3d30_egm96	0.00	1307.00	1307.00	610.03	712.00	292.37	-0.62	-0.97	353.00	843.00
aw3d30_wgs84	-0.58	1307.25	1307.83	610.00	712.06	292.38	-0.63	-0.96	352.83	843.26

Table S.5. Summary statistics of elevation - Rio Claro area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	388.06	1086.25	698.20	625.50	607.98	99.56	1.10	1.47	562.65	664.81
tdx30	416.05	1080.69	664.65	625.51	607.99	99.54	1.10	1.47	562.67	664.81
srtm30_egm96	441.00	1081.00	640.00	633.87	616.00	99.70	1.10	1.47	571.00	673.00
srtm30_wgs84	437.30	1076.98	639.68	630.14	612.82	99.40	1.10	1.48	567.44	669.43
aster30_egm96	423.00	1086.00	663.00	632.74	614.00	100.53	1.15	1.50	569.00	671.00
aster30_wgs84	419.67	1081.99	662.32	629.01	610.26	100.22	1.15	1.52	565.17	667.04
aw3d30_egm96	431.00	1084.00	653.00	633.85	616.00	99.66	1.10	1.46	571.00	673.00
aw3d30_wgs84	427.28	1079.99	652.71	630.12	612.82	99.35	1.10	1.47	567.45	669.48

Table S.6. Summary statistics of elevation - Santa Catarina area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	0.00	1300.44	1300.44	249.73	160.03	260.77	1.10	0.40	26.00	402.52
tdx30	0.00	1298.63	1298.63	249.52	159.70	260.71	1.10	0.40	25.90	402.20
srtm30_egm96	1.00	1290.00	1289.00	248.78	158.00	260.17	1.10	0.41	26.00	401.00
srtm30_wgs84	2.39	1292.23	1289.85	251.12	160.78	260.30	1.10	0.41	28.56	403.35
aster30_egm96	1.00	1283.00	1282.00	245.31	153.00	257.37	1.13	0.47	24.00	394.00
aster30_wgs84	2.39	1285.23	1282.84	247.65	155.70	257.50	1.13	0.46	26.53	396.65
aw3d30_egm96	1.00	1299.00	1298.00	253.81	165.00	261.74	1.08	0.34	28.00	410.00
aw3d30_wgs84	2.39	1301.23	1298.84	256.15	167.67	261.86	1.07	0.34	30.33	412.36

Table S.7. Summary statistics of elevation - Serra do Mar area

stats	min	max	range	mean	median	stddev	skew	kurt	p25	p75
tdx12	0.00	2802.00	2802.00	886.13	866.77	462.70	0.45	-0.11	525.20	1201.56
tdx30	0.00	2790.81	2790.81	885.88	866.47	462.93	0.45	-0.11	525.01	1201.52
srtm30_egm96	1.00	2792.00	2791.00	884.27	858.00	466.41	0.43	-0.11	525.00	1203.00
srtm30_wgs84	-4.05	2787.67	2791.72	879.70	853.88	466.46	0.43	-0.11	520.75	1198.51
aster30_egm96	1.00	2777.00	2776.00	880.70	856.00	463.16	0.44	-0.12	522.00	1199.00
aster30_wgs84	-4.05	2772.67	2776.72	876.13	850.99	463.21	0.44	-0.12	517.77	1194.23
aw3d30_egm96	1.00	2798.00	2797.00	886.42	862.00	466.68	0.43	-0.12	527.00	1206.00
aw3d30_wgs84	-4.04	2793.67	2797.71	881.85	857.00	466.74	0.43	-0.12	522.05	1201.11

3.1. Histograms of Elevation

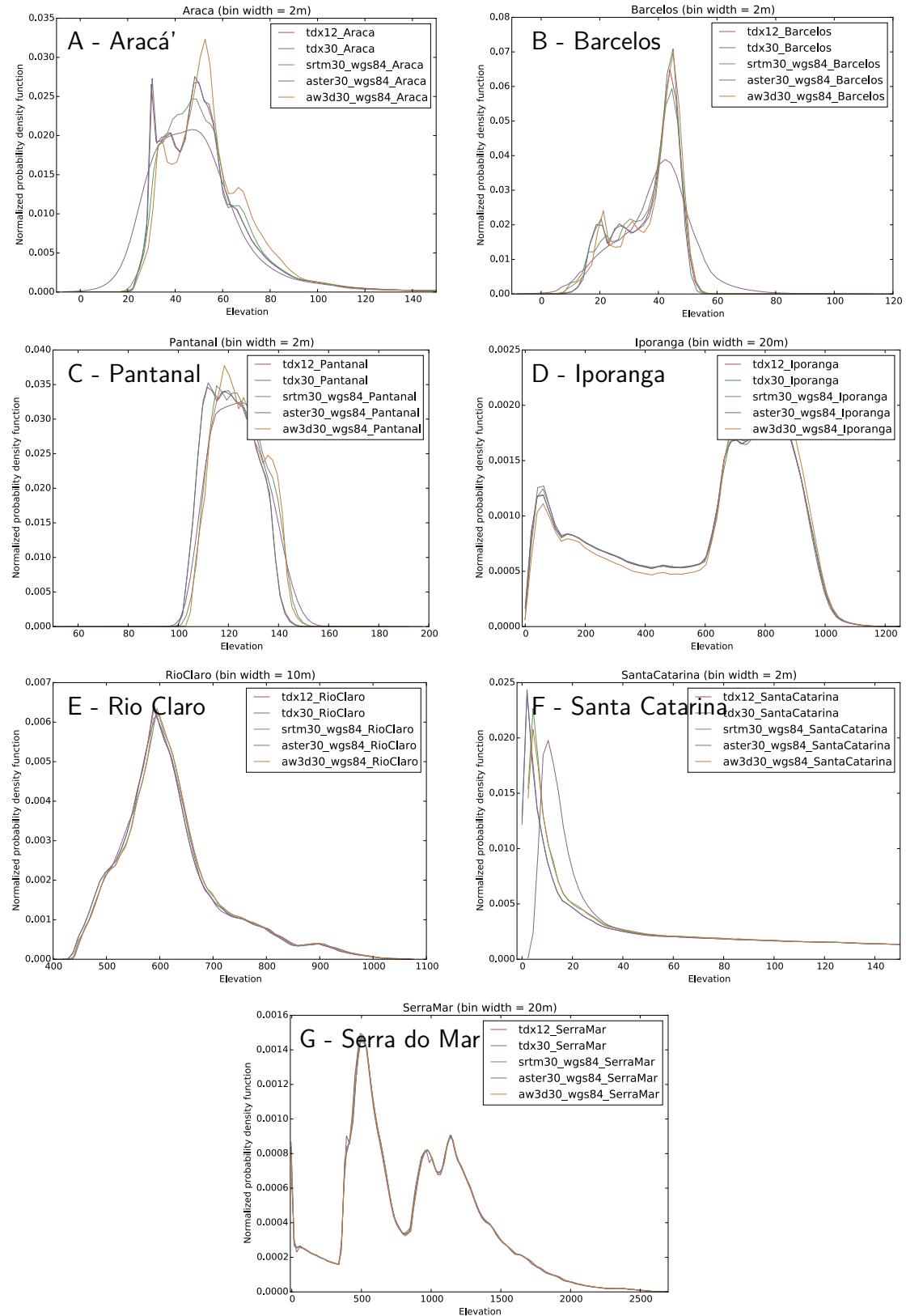


Figure S.3.1. Histograms of elevation for each study area. A) Aracá; B) Barcelos; C) Pantanal; D) Iporanga; E) Rio Claro; F) Santa Catarina; G) Serra do Mar.