Geomorphometric Characteristics of Major Badland Landscapes of Turkey

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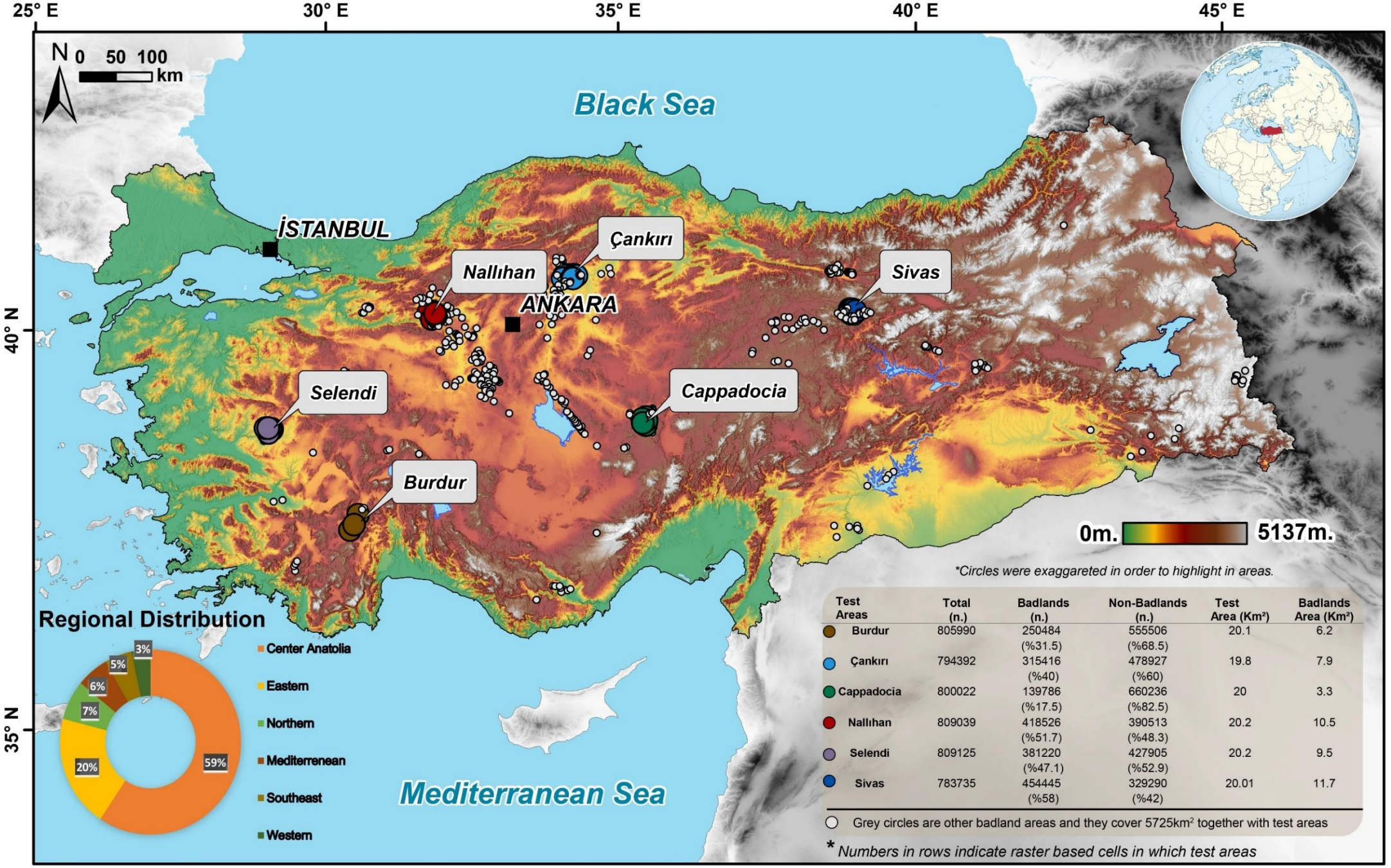
Study area and Aim of this study

In this study, we present results from a quantitative analysis of a new inventory of badland areas (~756 km^2) at six major badland landscapes in Turkey. Previously partly known but not documented badland geomorphological units were expanded by mapping badland forms from aerial photos and high-resolution multispectral image interpretations focused on the Western and Central Anatolia.

Our aim is to compare six major badland areas in the different arid and semi-arid sections of Anatolia to characterize their distribution using local morphometric variables like Slope Gradient, Lenght Slope and Steepness (LS), Elevation Texture, Plan-Profile-Tangential Curvatures, Terrain Ruggedness Index (TRI).

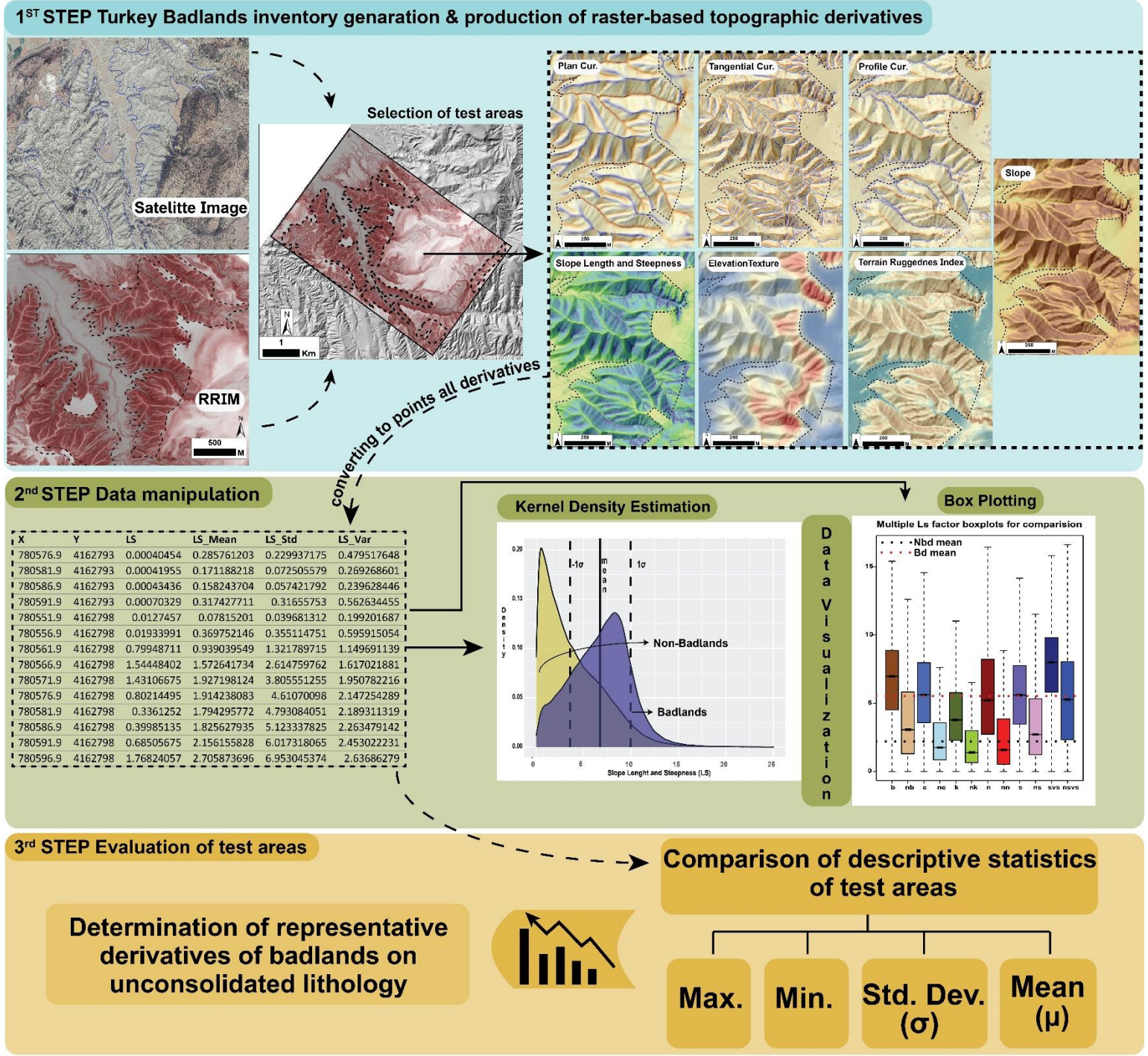
STUDY AREA



Test Areas	Total (n.)	Badlands (n.)	Non-Badlands (n.)	Test Area (Km²)	Badlands Area (Km²)
Burdur	805990	250484 (%31.5)	555506 (%68.5)	20.1	6.2
Çankırı	794392	315416 (%40)	478927 (%60)	19.8	7.9
Cappadocia	800022	139786 (%17.5)	660236 (%82.5)	20	3.3
Nallıhan	809039	418526 (%51.7)	390513 (%48.3)	20.2	10.5
Selendi	809125	381220 (%47.1)	427905 (%52.9)	20.2	9.5
Sivas	783735	454445 (%58)	329290 (%42)	20.01	11.7

Figure 1: The distribution of major badland areas in Turkey.

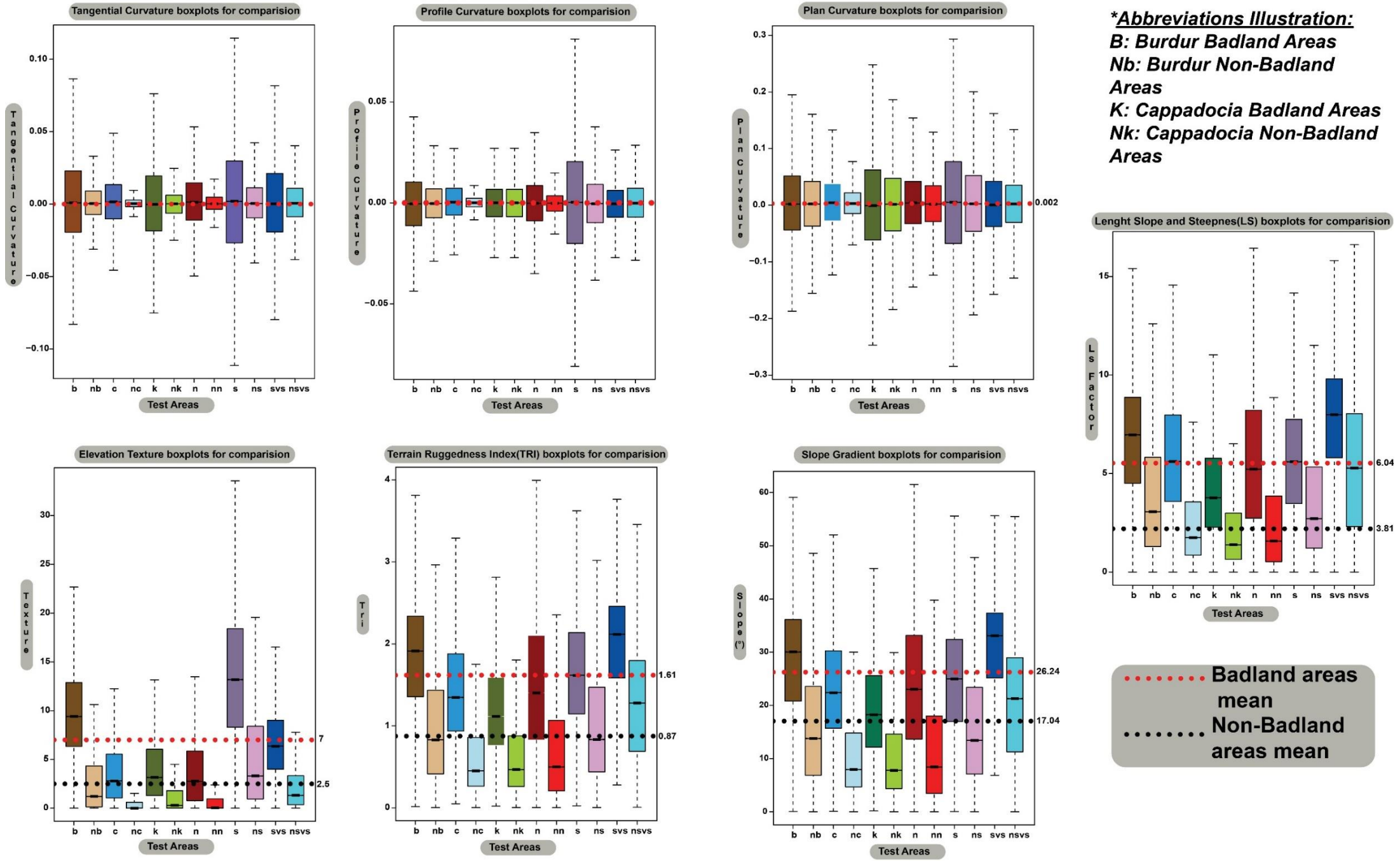
METHOD



X	Y	LS	LS_Mean	LS_Std	LS_Var
780576.9	4162793	0.00040454	0.285761203	0.229937175	0.479517648
780581.9	4162793	0.00041955	0.171188218	0.072505579	0.269268601
780586.9	4162793	0.00043436	0.158243704	0.057421792	0.239628446
780591.9	4162793	0.00070329	0.317427711	0.31655753	0.562634455
780551.9	4162798	0.0127457	0.07815201	0.039681312	0.199201687
780556.9	4162798	0.01933991	0.369752146	0.355114751	0.595915054
780561.9	4162798	0.79948711	0.939039549	1.321789715	1.149691139
780566.9	4162798	1.54448402	1.572641734	2.614759762	1.617021881
780571.9	4162798	1.43106675	1.927198124	3.805551255	1.950782216
780576.9	4162798	0.80214495	1.914238083	4.61070098	2.147254289
780581.9	4162798	0.3361252	1.794295772	4.793084051	2.189311319
780586.9	4162798	0.39985135	1.825627935	5.123337825	2.263479142
780591.9	4162798	0.68505675	2.156155828	6.017318065	2.453022231
780596.9	4162798	1.76824057	2.705873696	6.953045374	2.63686279

Figure 2: Flow-chart of the methodology that followed for this study

SUMMARY RESULTS



Abbreviations Illustration:

B: Burdur Badland Areas
Nb: Burdur Non-Badland Areas
K: Cappadocia Badland Areas
Nk: Cappadocia Non-Badland Areas

Badland areas mean

Non-Badland areas mean

Figure 3: Multiple comparision of test areas in terms of applied geomorphometric analyzes

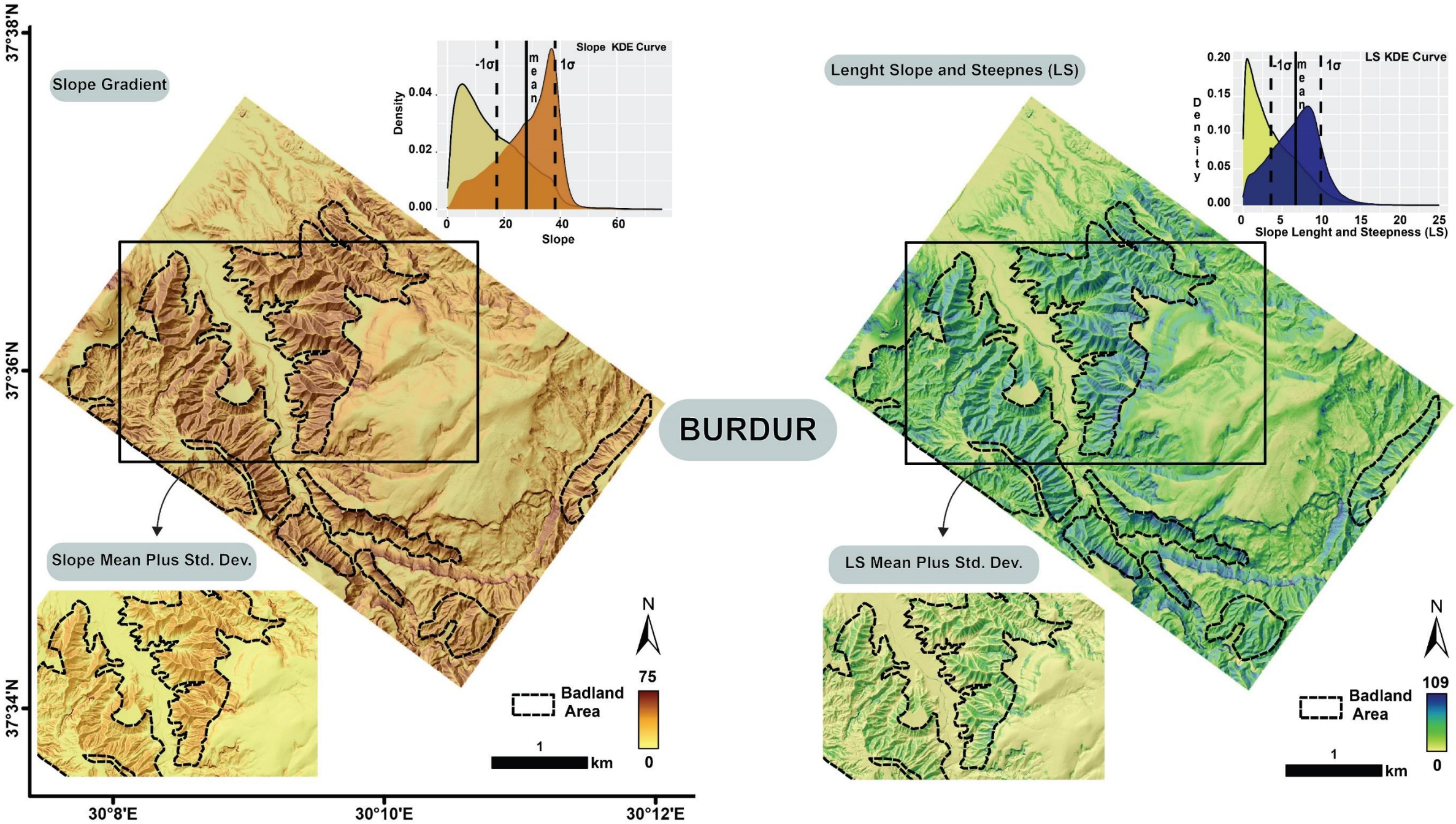


Figure 4: The display of standart deviation values of Slope and LS variables in badlands areas from non-badlands areas (i.e. Burdur)

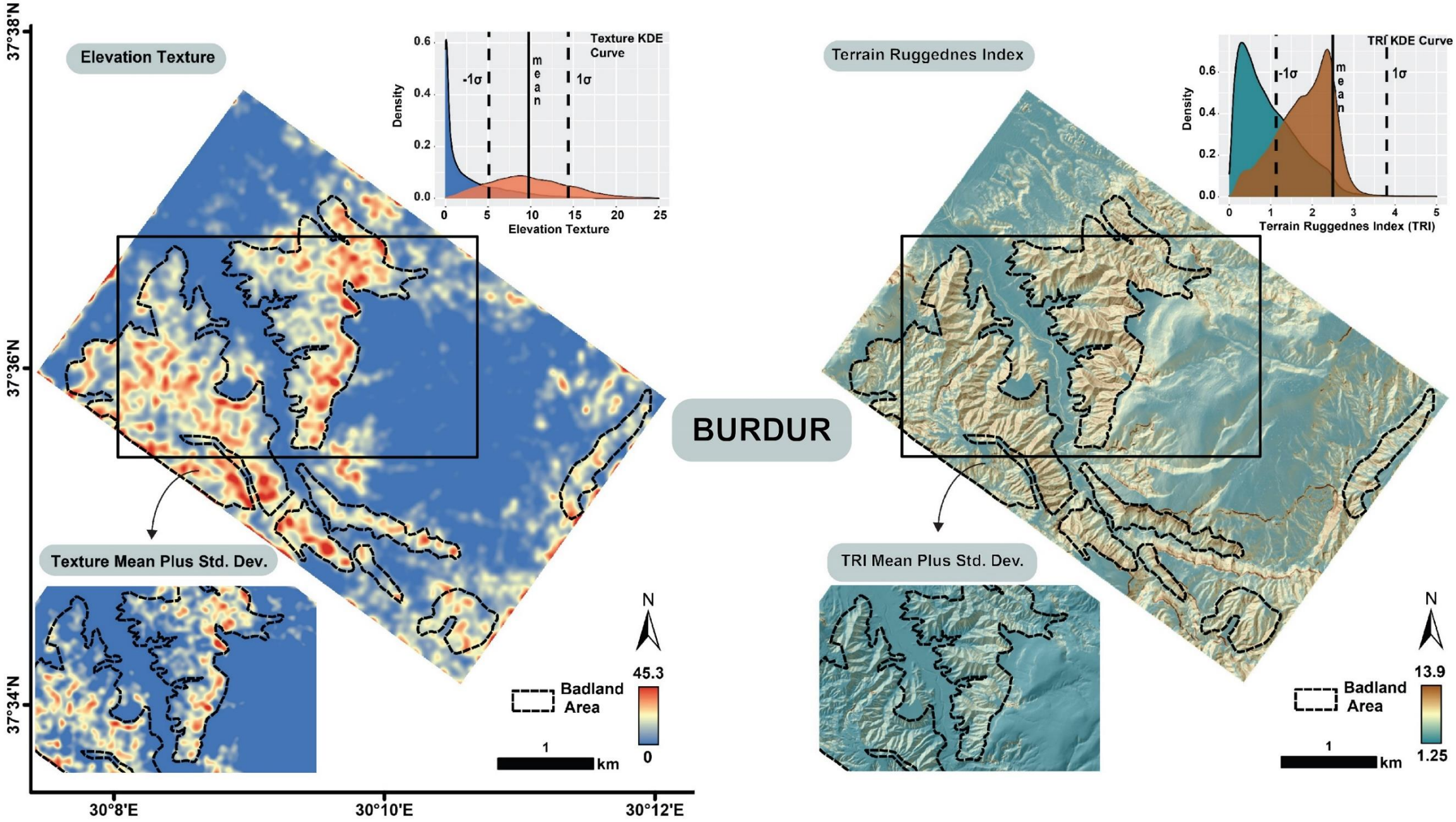


Figure 5: The display of standart deviation values of Texture and TRI variables in badlands areas from non-badlands areas (i.e. Burdur)

Conclusion

From our visual interpretation and descriptive statistical results of six major badlands areas we concluded that:

1) Topographic curvatures do not reflect significant statistical differences in badland and non-badland areas.

2) However, slope gradient and related morphometric derivatives (i.e., LS, Texture, TRI) bear clear signatures of badland and non-badland areas.