Review Report

Title: "Joint modeling gravity, geoidal and geothermal of the Lithosphere in Sergipano Belt and tectonic implications, NE Brazil"

Manuscript Number: se-2021-81

The manuscript presents a study on the lithospheric structure, temperature distribution, density and seismic velocities distribution in the Sergipano Belt Borborema Province, northeast of Brazil by integration of geological, petrological and geophysical data including gravity, magnetic, geoid, geological, seismic data and mantle chemistry among others. Based on these data, different modelling were performed and the results revealed a relationship between crust features and Moho and lithosphere-asthenosphere boundary in the region. The results from crustal thickness showed that the mantle thickness became smaller in thickness below Sergipano belt, an increase of 14km in thick below Girau do Ponciano and intermediate below Rio Coruripe with the thicker layer below Pernambuco-Alagoas reaching 202km. The maximum value of lithosphere-asthenosphere boundary (LAB) was estimated to be nearly 201km in Pernambuco-Alagoas. An agreement with previous works was achieved and documented. Best fit of the seismic velocities waves P and S, and the density distribution was achieved based on variation in lateral chemical composition of the lithospheric mantle.

I would recommend this article for publication after minor reviews as listed below and ask authors to send their paper for English proofreading and enhance the quality of the figures.

Line 127: … figure 2 shows

Line 130: … I think is better to use database instead of data base…

Line 131-132: same comment as line 130

Line 134: … are widely used in ~~to~~ studies …

Line 135: In Figure 3a illustrating the Bouguer anomaly map, the positive anomalies have amplitude~~s~~ rang~~e~~ing from…

Line 136: remove repeated with next to basement… and add from next to ranging….

Line 137: … to interpret anomalies, the sentence is not clear. What type of anomalies?

Line 138: Figure 3b shows …

Line 141: …with amplitude range of …

Line 144: …Figure 3c shows …

Line 145: …with amplitude ranging from …

Line 167: … calculated by selecting …

Line 168: …selected according to ~~as~~ …

Line 169: … table 1 shows … parameters …

Line 174: our modeling area are given in table 1.

Line 176: The model consists of ~~on~~ a…

Line 194: The Figure 5a shows … calculations.

Line 195: …crust varies from 12 to 40 km …

Line 196: … is thinner and varies from …

Line 199: calculations,… reaching 205 km or 202km as presented in the abstract?check

Line 214: .. we ~~were~~ used two …

Line 237: starting from 32 …

Line 241: The figures… shows …Calculates or calculated?

Line 255: … whose thickness is 175 unit is missing (km) on the…

Line 268: … is dependent of …

Line276: … 10 shows…dependent of ~~on~~…

Line 286: … we plotted geotherms …

Line 301-302: Thermophysical parameters and … were coupled it would be better is you use instead combined …

Line 306: the depths … reach~~es~~(ed)… These results shown(ed) …~~to our~~ along ~~to~~ the …

Line 318: our calculat~~es~~(ed) heat flow belong~~s~~ to … indicates that …

Figures:

Figure 1: Explain the meaning of the black lines and dashed-lines inside Fig.1. Are these contacts or faults? or boundaries of geological formations? Please explain in details in the caption and in the legend of the figure.

Figure 2: Its enough to have lat. And long. in one axis (top and left). Same remark for Figure 3 (a, b, c). Also what are the black lines inside Figs. 2 & 3? Its good to add a

location of Figs.2,3 inside Fig.1. It would be also interesting to add the main geological features from Fig.1 in geophysical maps (Figs.2, 3).

Figures 4, 7, 8: try to enhance these figures (quality low) and difficult to read numbers and text inside.

Figure 5(a),(b): add definition of axes and units.

Figure 6: in the caption please correct (A')

Figure 9: Increase text size for the names at the top of Fig. 9(a). The Vs numbers inside the figure are difficult to read.

Figure 10: same comments as Fig.9

Figure 11: increase font size of the numbers and text (legend) for both (a) and (b). same thing for Fig. 12

	Excellent (1)	Good (2)	Fair (3)	Poor (4)
Scientific significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Solid Earth (substantial new concepts, ideas, methods, or data)?	*			
Scientific quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?	*			
Presentation quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)?		*		