APPLICATIONS TO SYNTHETIC DATA - PERFECT ISOSTATIC EQUILIBRIUM MODEL

We tested our method in two simple models and show the results of steps 1 and 2. These models have similar characteristics, but they exhibit graphs of lithostatic stress with different behaviors. While the model I presents graph of lithostatic stress with abrupt variations exerted by a model in local isostatic equilibrium in some regions of the profile, the model II presents graph of approximately constant lithostatic stress exerted by a model in perfect isostatic equilibrium. Parameters defining the interpretation model are shown in Table 1. We used the same parameters for inversion used in the synthetic applications of the paper.

Figure 1 (model I) and Figure 3 (model II) show the estimated model obtained at the end of Step 1. These models presented basement, Moho reliefs and reference Moho closer to the true surfaces. In the same way, these results (Figures 1 and 3) show predicted gravity disturbance and lithostatic stress curves with the same behavior that presented in the simulated one.

Figure 2 (model I) and Figure 4 (model II) show the estimated model obtained at the end of Step 2. These models presented basement, Moho reliefs and reference Moho closer to the true surfaces. In the same way, these results (Figures 2 and 4) show predicted gravity disturbance and lithostatic stress curves with the same behavior that presented in the simulated one.

The estimated models Figure 1 (model I) and Figure 2 (model I) have few differences, being the most important in the relief region of the highest frequency. On the other hand, the estimated models Figure 3 (model II) and Figure 4 (model II) do not present significant differences. Thus for models close to a perfect isostatic equilibrium, the application of Step

1 of our method is enough.

LIST OF TABLES

LIST OF FIGURES

Geological meaning	$\rho^{(\alpha)}$ (kg/m^3)	$\Delta\rho^{(\alpha)}$ (kg/m^3)	α
water	1030	-1640 (model I) and -1760 (model II)	w
sediments	2550 (model I) and 2600 (model II)	-120 (model I) and -190 (model II)	1
continental crust	2670 (model I) and 2790 (model II)	0	cc
oceanic crust	2840 (model I) and 2800 (model II)	170 (model I) and 10 (model II)	oc
mantle	3200	530 (model I) and 410 (model II)	m

Table 1: Properties of the simple model. The model extends from $y = 0$ km to $y = 195$ km, the Continent-Ocean Transition (COT) is located at $y_{COT} = 117$ km and the reference Moho is located at $S_0 + \Delta S = 27$ km (model I) and $S_0 + \Delta S = 31.2$ km (model II), where $\Delta S = 0.5$ km (model I) and $\Delta S = 1.7$ km (model II). The density contrasts $\Delta\rho^{(\alpha)}$ are defined with respect to the reference value $\rho^{(r)} = 2670$ kg/m^3 (model I) and $\rho^{(r)} = 2790$ kg/m^3 (model II), which coincides with the density $\rho^{(cc)}$ attributed to the continental crust.

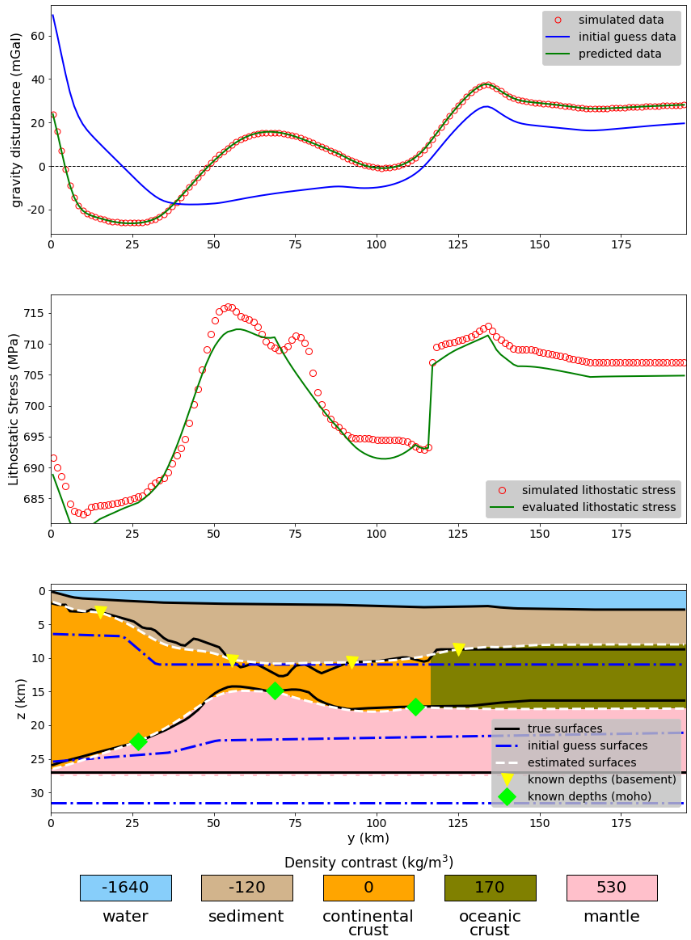

Figure 1: Application to synthetic data. Results obtained in Step 1 by using $\tilde{\alpha}_1 = 10^1$, $\tilde{\alpha}_2 = 10^1$ and $\tilde{\alpha}_3 = 10^2$. (Bottom panel) Estimated and true surfaces, initial basement and Moho used in the inversion (initial guess) and known depths at basement and Moho. (Middle panel) True and estimated lithostatic stress curves computed by using equation **??**. The values are multiplied by a constant gravity value equal to 9.81 m/s^2. (Upper panel) Gravity disturbance data produced by the volcanic margin model (simulated data), by the estimated model (predicted data) and by the model used as initial guess in the inversion (initial guess data). The contour of the prisms forming the interpretation model were omitted. The density contrasts were defined according to Table 1.

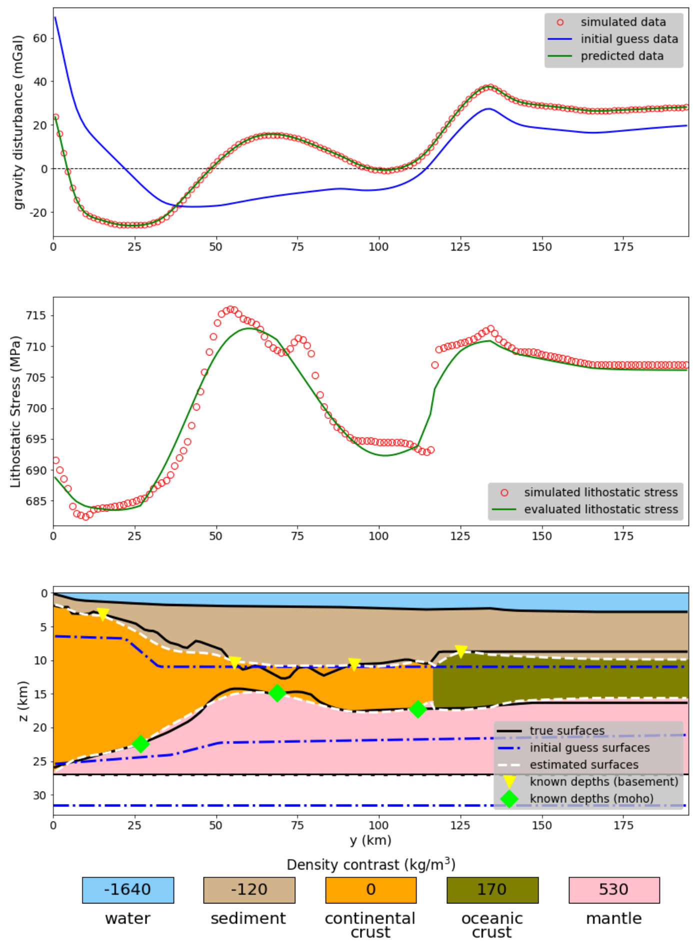

Figure 2: Application to synthetic data. Results obtained in Step 2 by using $\tilde{\alpha}_0 = 10^1$, $\tilde{\alpha}_1 = 10^1$, $\tilde{\alpha}_2 = 10^1$ and $\tilde{\alpha}_3 = 10^2$. The remaining informations are the same shown in the caption of Figure 1.

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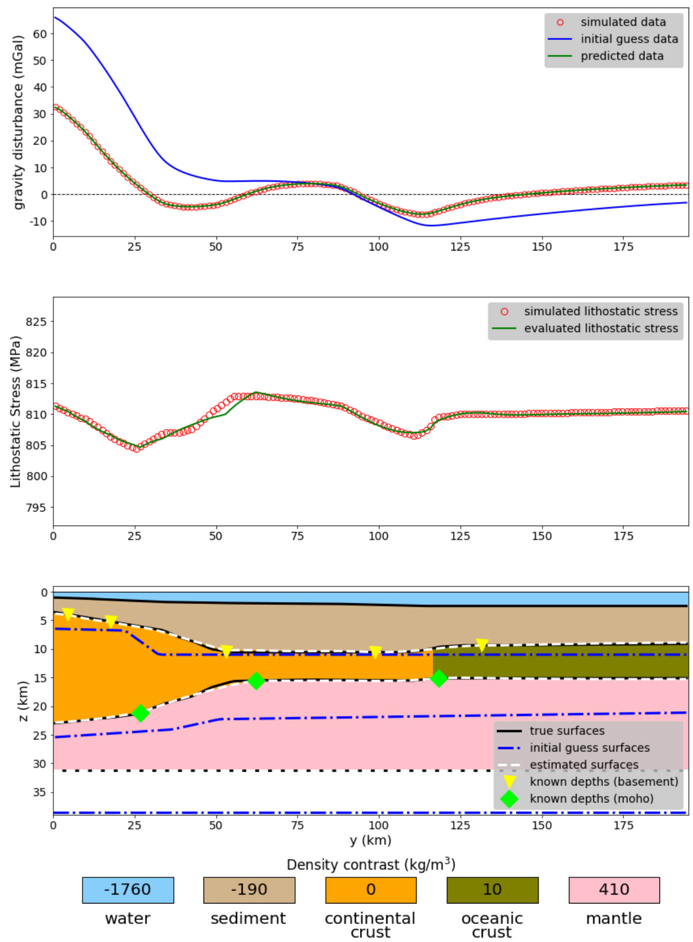

Figure 3: Application to synthetic data. Results obtained in Step 1 by using $\tilde{\alpha}_1 = 10^1$, $\tilde{\alpha}_2 = 10^1$ and $\tilde{\alpha}_3 = 10^2$. The remaining informations are the same shown in the caption of Figure 1.

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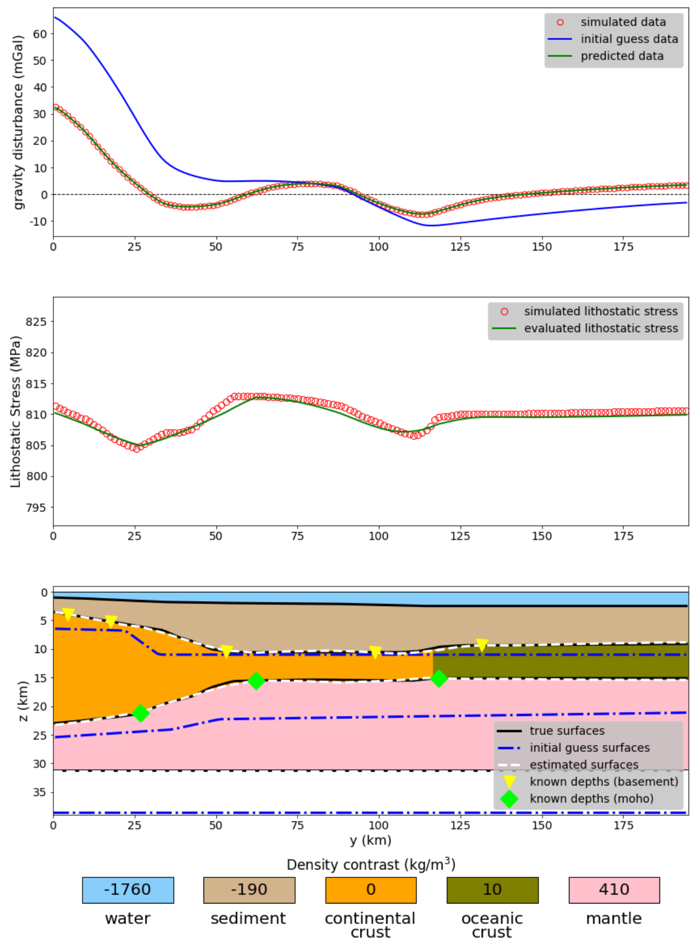

Figure 4: Application to synthetic data. Results obtained in Step 2 by using $\tilde{\alpha}_0 = 10^1$, $\tilde{\alpha}_1 = 10^1$, $\tilde{\alpha}_2 = 10^1$ and $\tilde{\alpha}_3 = 10^2$.. The remaining informations are the same shown in the caption of Figure 1.

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