

APPLICATIONS TO SYNTHETIC DATA - SENSITIVITY TO THE ISOSTATIC COMPENSATION DEPTH

We tested the sensitivity to the isostatic compensation depth and show the results of steps 2 and 3. 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 and Figure 2 show the estimated model obtained at the Step 2 and Step 3 of our algorithm with isostatic compensation depth (41 km) and true reference Moho thickness (43.2 km) adopted in the applications of the paper.

Figure 3 (First S0 guess) and Figure 5 (Second S0 guess) show the estimated model obtained at the end of Step 2 where the isostatic compensation depths was defined at 39 km and 43.2 km at interpretive model, respectively. The first S0 guess (39 km) was defined as the minimum depth below which there is no lateral density variations, while the second S0 guess (43.2 km) was defined as the maximum depth of the true model (true reference Moho depth). These models presented basement and Moho reliefs closer to the estimated surfaces in the Figure 1. In the same way, these results (Figures 3 and 5) show predicted gravity disturbance and lithostatic stress curves with the same behavior that presented in the Figure 1.

Figure 4 (First S0 guess) and Figure 6 (Second S0 guess) show the estimated model obtained at the end of Step 3. We used different σ constants for the tests. These models presented basement and Moho reliefs closer to the estimated surfaces in the Figure 2. We can also observe that both results present estimated reference Moho very close to the true one. These results (Figures 4 and 6) show predicted gravity disturbance and lithostatic stress curves with the same behavior that presented in the Figure 2.

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1 Properties of the volcanic margin model. The model extends from $y = 0$ km to $y = 383$ km, the Continent-Ocean Transition (COT) is located at $y_{COT} = 350$ km and the reference Moho is located at $S_0 + \Delta S = 43.2$ km, where $\Delta S = 2.2$ km. The density contrasts $\Delta\rho^{(\alpha)}$ are defined with respect to the reference value $\rho^{(r)} = 2870$ kg/m³, which coincides with the density $\rho^{(cc)}$ attributed to the continental crust.

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1 Application to synthetic data. Results obtained in Step 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.

2 Application to synthetic data. Results obtained in Step 3 by using $\sigma = 22$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

3 Application to synthetic data (First S_0 guess: $S_0 = 39 \text{ km}$). Results obtained in Step 2. The remaining informations are the same shown in the caption of Figure 1.

4 Application to synthetic data (First S_0 guess: $S_0 = 39 \text{ km}$). Results obtained in Step 3 by using $\sigma = 21$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

5 Application to synthetic data (Second S_0 guess: $S_0 = 43.2 \text{ km}$). Results obtained in Step 2. The remaining informations are the same shown in the caption of Figure 1.

6 Application to synthetic data (Second S_0 guess: $S_0 = 43.2 \text{ km}$). Results obtained in Step 3 by using $\sigma = 23$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

Geological meaning	$\rho^{(\alpha)}$ (kg/m ³)	$\Delta\rho^{(\alpha)}$ (kg/m ³)	α
water	1030	−1840	<i>w</i>
sediments	2350	−520	1
SDR	2855	−15	2
continental crust	2870	0	<i>cc</i>
oceanic crust	2885	15	<i>oc</i>
mantle	3240	370	<i>m</i>

Table 1: Properties of the volcanic margin model. The model extends from $y = 0$ km to $y = 383$ km, the Continent-Ocean Transition (COT) is located at $y_{COT} = 350$ km and the reference Moho is located at $S_0 + \Delta S = 43.2$ km, where $\Delta S = 2.2$ km. The density contrasts $\Delta\rho^{(\alpha)}$ are defined with respect to the reference value $\rho^{(r)} = 2870$ kg/m³, which coincides with the density $\rho^{(cc)}$ attributed to the continental crust.

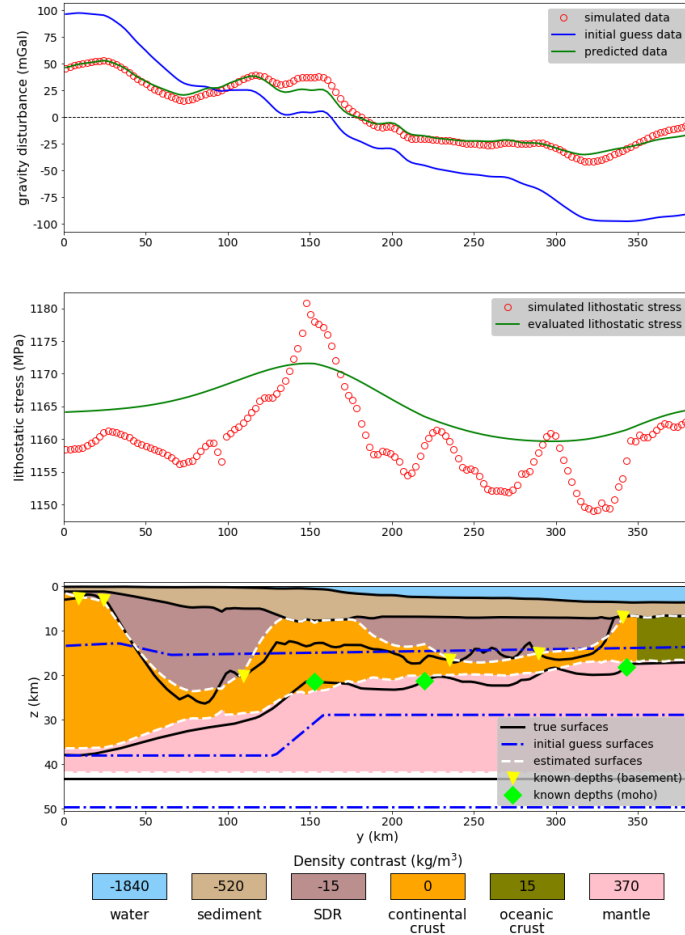


Figure 1: Application to synthetic data. Results obtained in Step 2. (Bottom panel) Estimated and true surfaces, initial basement and Moho used in the inversion (initial guess) and known depths at basement and Moho. (Middle panel) True and estimated lithostatic stress curves computed by using equation ???. 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.

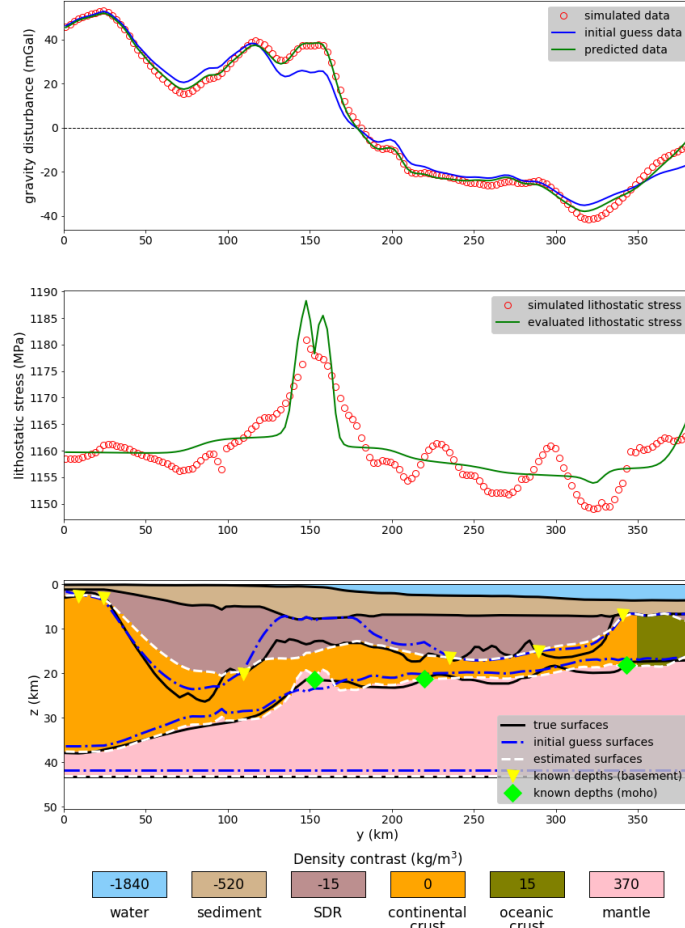


Figure 2: Application to synthetic data. Results obtained in Step 3 by using $\sigma = 22$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

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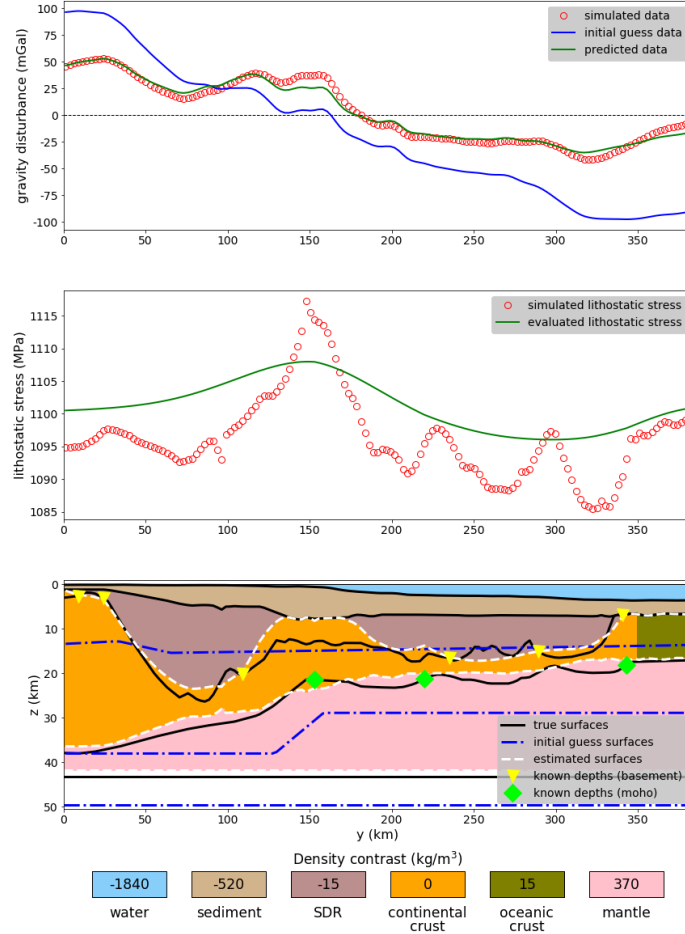


Figure 3: Application to synthetic data (First S_0 guess: $S_0 = 39$ km). Results obtained in Step 2. The remaining informations are the same shown in the caption of Figure 1.

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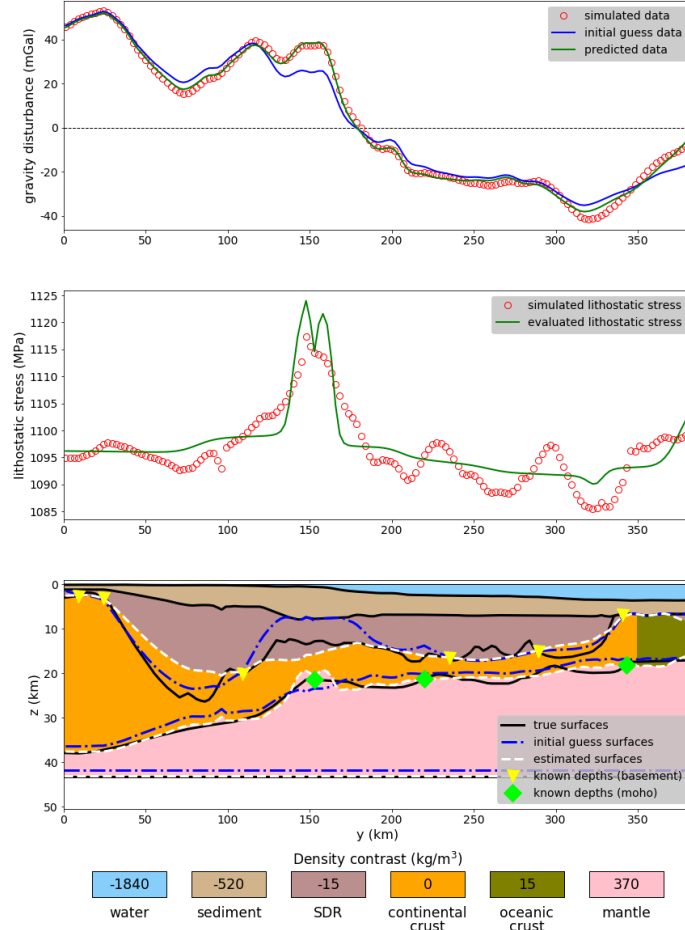


Figure 4: Application to synthetic data (First S_0 guess: $S_0 = 39$ km). Results obtained in Step 3 by using $\sigma = 21$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

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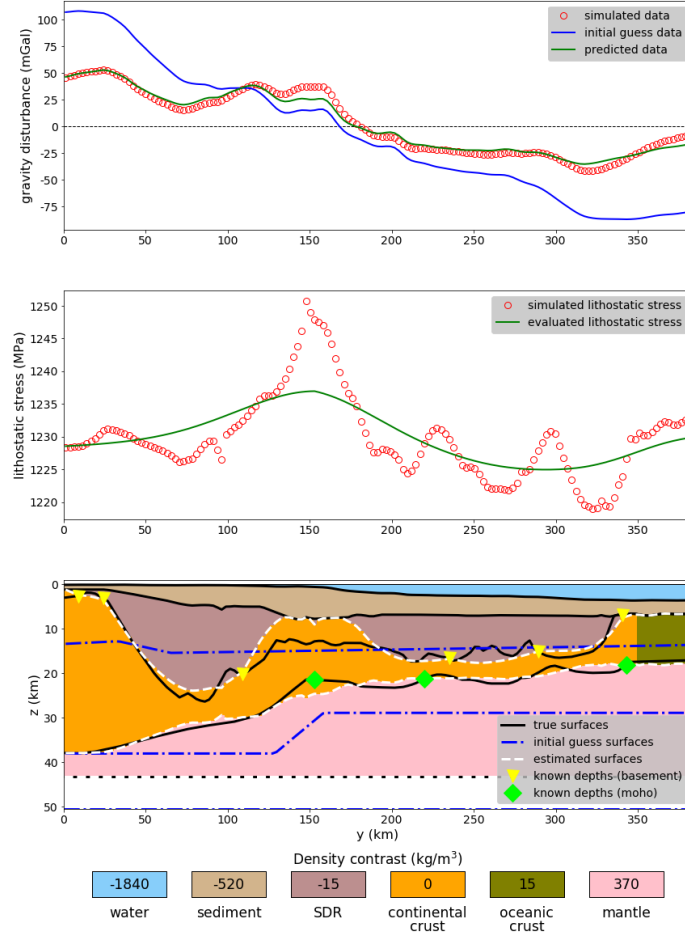


Figure 5: Application to synthetic data (Second S_0 guess: $S_0 = 43.2$ km). Results obtained in Step 2. The remaining informations are the same shown in the caption of Figure 1.

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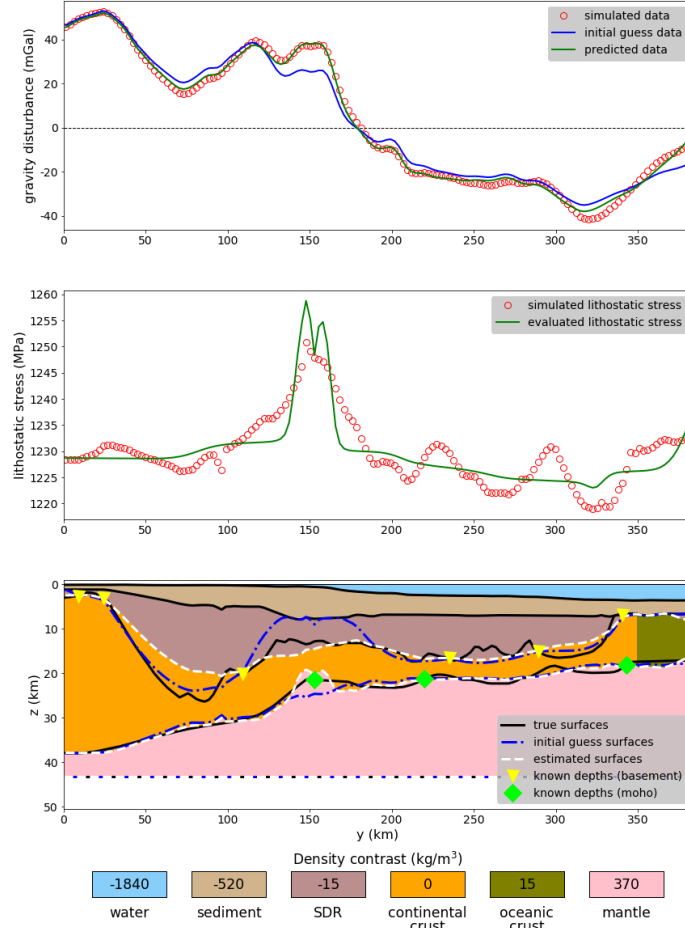


Figure 6: Application to synthetic data (Second S_0 guess: $S_0 = 43.2$ km). Results obtained in Step 3 by using $\sigma = 23$ (equation ??). The remaining informations are the same shown in the caption of Figure 1.

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