Response to the editor review on the manuscript "Forearc density structure of the overriding plate in the northern area of the giant 1960 Valdivia earthquake" (se-2021-53)

Dear editor,

We would like to submit a new version of the manuscript se-2021-53. The new version of the paper includes minor changes (highlighted in green) to fix some writing errors and to include the suggestions from the reviewer Dr. Carla Braitenberg. Below, we write responses in blue after the reviewer's comments (black).

Best regards

The authors

Dear authors, I appreciate you have made considerable effort to improve the manuscript following the suggestions of the reviewers. Now that the data processing of the new gravity data has been explained, I find there is a problem which should be either corrected or made clearer, and justified, ideally also estimating the error which is introduced by using ellipsoidal heights and not sea level heights in the free air height correction. A further issue is the shift of different databases, which is an important point and should be documented giving the shifts in a table and some statistics. A few detailed comments follow:

Morphoestructural-> morpho-structural

R.- Morphoestructural was replaced by Morpho-structural

L. 152: Free-air correction of all onshore data was

calculated as 0.3086h (mGal), where h is ellipsoidal high in meters (Lowrie, 2007). The terrain correction of all data was calculated following a combination of the algorithms proposed by Kane (1962) and Nagy (1966) and with high resolution SRTM elevation grid.

h is ellipsoidal high in meters-> h is ellipsoidal height in meters

R.- This error was corrected through the entire text

 Please check- have you really used ellipsoidal heights for height correction for new data? This would correspond to calculation of gravity disturbances and not anomalies-

R.- We use ellipsoidal heights for all data processing. In particular, new differential GPS data were acquired and processed by us to obtain ellipsoidal heights.

th old data probably are anomalies, e.g. they used heights above sea level for the correction. Further you use SRTM for the topography correction, but these heights are given above sea level. Please check this point. You can fnd a recent discussion on the corrections, and use of normal or ellipsoidal heights in this paper published in:

 The first pan-Alpine surface-gravity database, a modern compilation that crosses frontiers Pavol Zahorec, Juraj Papčo, Roman Pašteka, Miroslav Bielik, Sylvain Bonvalot, Carla Braitenberg, Jörg Ebbing, Gerald Gabriel, Andrej Gosar, Adam Grand, Hans-Jürgen Götze, György Hetényi, Nils Holzrichter, Edi Kissling, Urs Marti, Bruno Meurers, Jan Mrlina, Ema Nogová, Alberto Pastorutti, Corinne Salaun, Matteo Scarponi, Josef Sebera, Lucia Seoane, Peter Skiba, Eszter Szűcs, and Matej Varga. Earth Syst. Sci. Data, 13, 2165–2209, https://doi.org/10.5194/essd-13-2165-2021, 2021.

R.- Old database (published, merged and described by Schmidt and Götze,2006) merged data from different campaigns and years. Oldest campaigns probably use "sea level" heights, but more recent data included dGPS measurements. Due to this inhomogeneity, we compile a "Bathymetric/topographic database merges onshore elevation grid (SRTM elevation grid, Jarvis et al., 2008) and swath bathymetry data of the studied zone (Flueh and Grevemeyer, 2005), complemented by Global Topography V18.1 (Smith and Sandwell, 1997)" as is

indicated in text. Then, in the case of the old data, Free-air and Bouguer correction was performed with this ellipsoidal height database. This point was clarified in the new version of the manuscript.

 Please give the maximum radius you used for the topographic masses in Bouguer correction.

R.- As is pointed in the new version “The terrain correction includes topographic data located up to ~300 km around each station”.

L. 157: The spatial coverages of different gravity databases (satellite, marine, and onshore) present areas of interception (Fig. 2) where they can be compared to determine the average gravity differences (constant average shifts).

 Please give some statistics about the shifts you introduce into the data. Justify why you think the terrestrial data are at the correct value, the marine data not.

R.- In the new version of the manuscript we include the shifts applied to merge gravity data. We did not think that the marine data are incorrect in comparison to the terrestrial data. However, we prefer to tide all gravity observation to our onshore observations because there we have direct gravity measurements linked to the absolute gravity stations. On the other hand, in terms of density modeling, the selection of this “common gravity level” is not relevant because finally represent a constant value in the Complete Bouguer signal which theoretically does not affect the result of the model.

L. 159: he Free-air -> The

R.- corrected in the new version.