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3D structure and conductive thermal field of the sea of Marmara

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The Sea of Marmara and its basins mainly evolved due to the activities of the Thrace-Eskisehir Fault Zone (TEFZ) in Neogene and the North Anatolian Fault Zone (NAFZ) in Quaternary. At present-day, the Sea of Marmara is still evolving due to the NAFZ and the Marmara region is an earthquake danger zone while hosting around 20 million of inhabitants. For a better understanding of the tectonic processes and geodynamic evolution, it is important to model the geological structure and the thermal field of this region. The aim of this study is to build a 3D lithospheric-scale structural model and a 3D conductive thermal model for the Sea of Marmara and including its adjacent onshore areas. Therefore, we integrate different geological and geophysical data such as existing structural models, well data, seismic observations and gravity to build a new 3D lithospheric-scale structural model which is additionally constrained by 3D gravity modeling. The final 3D structural model differentiates various sedimentary, crustal and mantle units and is the base for the 3D thermal field calculation. The 3D conductive thermal model is a numerical solution to the Fourier's law equation in steady-state condition and considering the thermal properties of the corresponding structural model. Our 3D lithospheric-scale models of the geological structure and the conductive thermal field are the key points for further general research and useful particularly for mechanical modeling, considering variations in rheology and strength of the lithosphere in the Marmara region. In addition, our results have application in geo-resources exploration and would be helpful in risk management and hazard mitigation.