PREFACE

Quantitative modeling in Earth Sciences

Nowadays, it is well established that quantitative analyses and techniques account for cross-disciplinary research topics in earth sciences and related fields. Moreover, through predictive earth models in all scales and dimensions (2D and 3D), varying temporally and spatially, we develop a better understanding about how small pieces can fit into a "big" picture. Akin to trending research topics around the globe, modeling is an emerging field in Türkiye's earth sciences. This special issue published under the Geological Bulletin of Türkiye, consists of 5 papers in which each publication addresses the fundamental concepts of modeling in the broad field of earth sciences.

The work by ***Şengül Uluocak*** *provides a mini review and valuable discussion on how algorithms in geodynamic modeling may overlook the important role of data acquisition and analyses. Author suggests that contemporary problem based solutions that may help to diminish the uncertainities in modeling applied to tectonics.*

Şengül Uluocak with Emin Ulugergerli *combines numerical modeling with observations derived from geophysics, namely the resistivity method. According to authors, this data-model feedback can describe a new workflow between the two and may be used for current urban environmental problems, such as revealing the extent of the waste disposal site.*

Eski and Sözbilir *interprets the SAR interferometry data to one of the most actively deforming (extending) regions in western Anatolia. Specifically, authors emphasize that a-seismic (probably creep) motion during interseismic earthquake cycle is one of the main reasons for transient surface displacements in the graben margin.*

Numerical model by ***Karaoğlu*** *provides an estimate for the temperature variation beneath the magma chamber in the central Anatolia's Cappadocia volcanic province. These calculations can delineate the potential geothermal targets in the top few kms of the earth's crust, supported by postulations from magnetotelluric studies.*

Finally, the analytical calculations of ***Bodur*** *shows us how topographic transients on earth can be controlled by mantle flow related stresses. This adds a new dimension into the concept of dynamic topography where recent discoveries highlight this in addition to isostasy. Furthermore, such basal stresses exerted to the plates not only drive topographic changes but also control tilting of the continents.*

Considering future directions in this field, I would like to reiterate that testable quantitative modeling is NOT meant to be a replacement for geology, geophysics and engineering rather it is a profound and practical method for complementing these major disciplines while providing key control for distinguishing among competing hypotheses.

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