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The integrated analyses of digital field mapping techniques and traditional field methods: implications from the Burdur-Fethiye Shear Zone, SW Turkey as a case-study

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The precise geological mapping is one of the most important issues in geological studies. Documenting the spatial distribution of geological bodies and their contacts play a crucial role on interpreting the tectonic evolution of any region. Although the traditional field techniques are still accepted to be the most fundamental tools in construction of geological maps, we suggest that the integration of digital technologies to the classical methods significantly increases the resolution and the quality of such products.
We simply follow the following steps in integration of the digital data with the traditional field observations. First, we create the digital elevation model (DEM) of the region of interest by interpolating the digital contours of 1:25000 scale topographic maps to 10 m of ground pixel resolution. The non-commercial Google Earth satellite imagery and geological maps of previous studies are draped over the interpolated DEMs in the second stage. The integration of all spatial data is done by using the market leading GIS software, ESRI ArcGIS. We make the preliminary interpretation of major structures as tectonic lineaments and stratigraphic contacts. These preliminary maps are controlled and precisely coordinated during the field studies by using mobile tablets and/or phablets with GPS receivers. The same devices are also used in measuring and recording the geologic structures of the study region. Finally, all digitally collected measurements and observations are added to the GIS database and we finalise our geological map with all available information.
We applied this integrated method to map the Burdur-Fethiye Shear Zone (BFSZ) in the southwest Turkey. The BFSZ is an active sinistral 60-to-90 km-wide shear zone, which prolongs about 300 km-long between Suhut-Cay in the northeast and Köyceğiz Lake-Kalkan in the southwest on land. The numerous studies suggest contradictory models not only about the evolution but also about the fault geometry of this wide deformation zone. In our study, we have mapped this complicated region since 2008 by using the data and the steps, which are described briefly above. After our joint-analyses, we show that there is no continuous single and narrow fault, the Burdur-Fethiye Fault, as it was previously suggested by many researches. Instead, the whole region is deformed under the oblique-sinistral shearing with considerable amount of extension, which causes a counterclockwise rotation within the zone.