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Bio-location for stress forecasting in Vrancea seismically active region

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Large and destructive intermediate-depth earthquakes in Vrancea, Romania,have been generated about every century in the last millenium. Possible precursors, such as bio-location reactions obtained across crustal faults, or three component geomagnetic continuous recordings, have been used in the last decade in and around the Vrancea region. After-the-fact correlations to earthquakes have been published, but the interpreation was not accepted due to a subjective evaluation. As a result, a real-time methodology was implemented. A successful real-time stress forecasting for a large normal-depth regional earthquake at Van, Eastern Turkey, and a few small-moderate intermediate-depth events in Vrancea are presented. The stress forecasting was able to offer limited data for the expected event, so no true earthquake prediction was possible for the location or the actual magnitude. Our data suggest the so called precursors were not related to physical anomalies at an intermediate-depth of 70-150 km in Vrancea, but they have been generated by resistivity anisotropy variations and magnetotelluric wave splitting (MWS) around faults in the crust. On the other hand, resistivity anisotropy anomalies can be related to principal compressive/extensional stress variations in magnitude and direction observed around crustal faults before, during and after local and/or regional earthquakes if they are large enough. Finally, an earthquake prediction for the next expected destructive earthquake in Vrancea is not possible. Instead, successful stress forecasting in real-time can be issued for some local and/or regional earthquakes.