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Joining airborne geomagnetic maps of Romania and Republic of Moldova. Consistent geomagnetic models crossover the state borders

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Despite latest achievements in satellite observation of the geomagnetic field, near surface (airborne) magnetics are still largely used in deciphering tectonic features of the Earth's crust. Eastern Romania, Republic of Moldova and SW Ukraine represent the area where major tectonic units met each other: East European Plate, Scythian Plate, Moesian Plate, Carpathian Alpine Orogene, and North Dobrogea folded belt. Merging national airborne geomagnetic maps might help in investigating the area, but previously gathered information has distinct peculiarities within each national territory: instruments and methodology used for data acquisition and processing, survey epoch, geomagnetic datum, reference field, etc. The achievement of joint geomagnetic images crossover the state borders faces two major difficulties: a space-inconsistency (due to the different level of the survey flights), and a time-inconsistency (generated by the various epochs of the geomagnetic surveys in the two countries). Space-inconsistency was simply removed by upward continuing all data to the highest flight level in the two maps (1000 m). In order to overcome time-inconsistency, a joint ground geomagnetic reference network (JGGRN) covering both the Romanian and Moldavian territories was designed and achieved in a short enough period of time (two months) do not be affected by the secular variation (SV) of the geomagnetic field. It mainly consisted of base stations belonging to the national SV networks to which several control points (CPs) were added. A consistent set of annual means of the total intensity scalar of the geomagnetic field valid at the epoch of JGGRN were finally obtained and upward continued to the flight level of the two maps. By comparing the maps datum with the consistent set provided by JGGRN some corrective functions were determined and applied to the previous data in order to provide data consistency. An additional problem

was encountered when handling airborne data for the Moldavian territory. Here the raw data were represented by contour maps of the geomagnetic anomaly as obtained after the graphical removal of a local geomagnetic reference field constructed by LO-IZMIRAN for the epoch 1980. Therefore, the first step in comparing previous data (anomaly of the geomagnetic field) with data provided by JGGRN (absolute values o the total intensity scalar) was the reconstruction of the absolute values of the geomagnetic field for the survey epoch. It should be also mentioned that all the base stations of JGGRN were designed in areas of geomagnetic calm in order to maintain errors due to mislocation to the lowest level. After applying the SV corrective functions and upward continuation of previous data a consistent dataset of total intensity scalar of the geomagnetic field was available. Based on it, a total intensity scalar geomagnetic map at the altitude of 1000 m and the geomagnetic epoch of JGGRN was constructed. The accuracy of the joining operation was checked up by deriving a map of the horizontal gradient of the total intensity scalar. The derivative is well known for its sensitiveness in revealing any datum discrepancy, but inspection made did not show any anomaly along the state borders. Finally, a map of the geomagnetic anomaly in the area, as obtained after the removal of the DGRF for the JGGRN epoch, was prepared and some other filtered images discriminating between regional and local effects were achieved and briefly discussed.