From Urals to Altaids-structural continuity?

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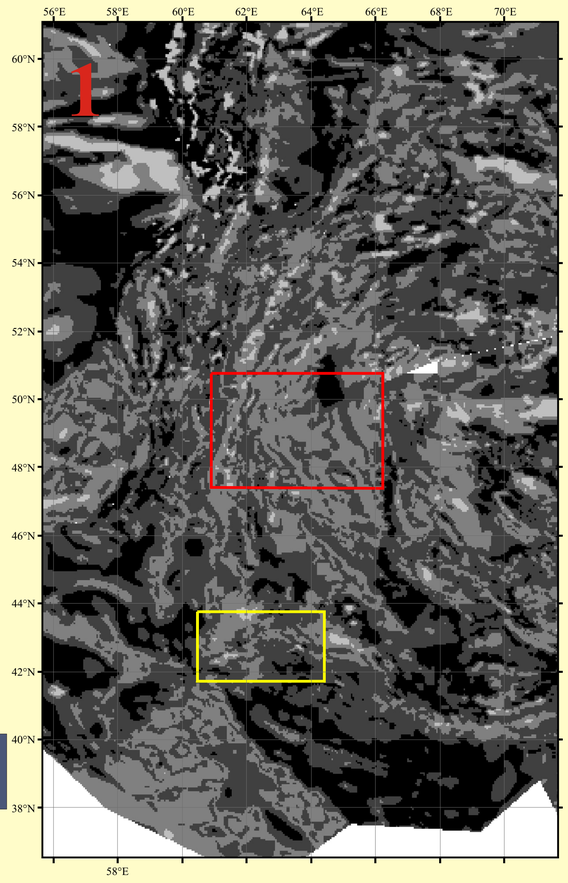
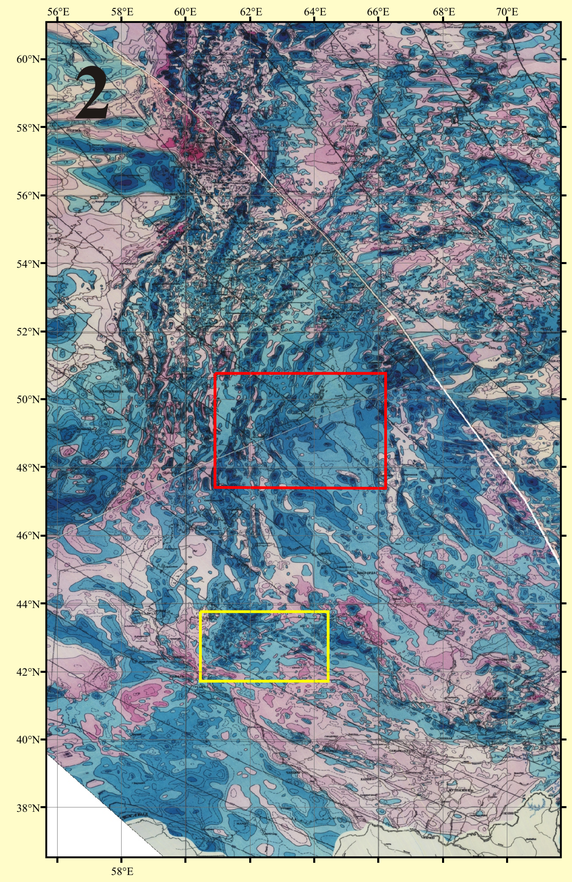
In view of the known mineral endowment of the exposed late Palaeozoic arcs in western Kazakhstan, Uzbekistan, Kyrgyzstan, and Turkmenistan, the continuity of these arcs below Cenozoic sediments in the Aral Sea region must, eventually, be of interest in exploration.

Magnetic data suggest continuity between the Valerianov Arc in the eastern Urals and the Beltau-Kurama Arc in the Tien Shan (Herrington et al., in press). However, the magnetic anomaly patterns in the NGDC database (1996), reproduced from the original map (Makarova et al., 1974), with a final grid between -1199 and +1200 nT, are difficult to assess, particularly in grey-scale text figures.

Here, we examine the original magnetic anomaly map in conjunction with satellite images ("Mr. Sid" format) and the Mineral Deposits Map of Central Asia (Seltmann and Shatov, 2001). Maps and images are projected to WGS84.





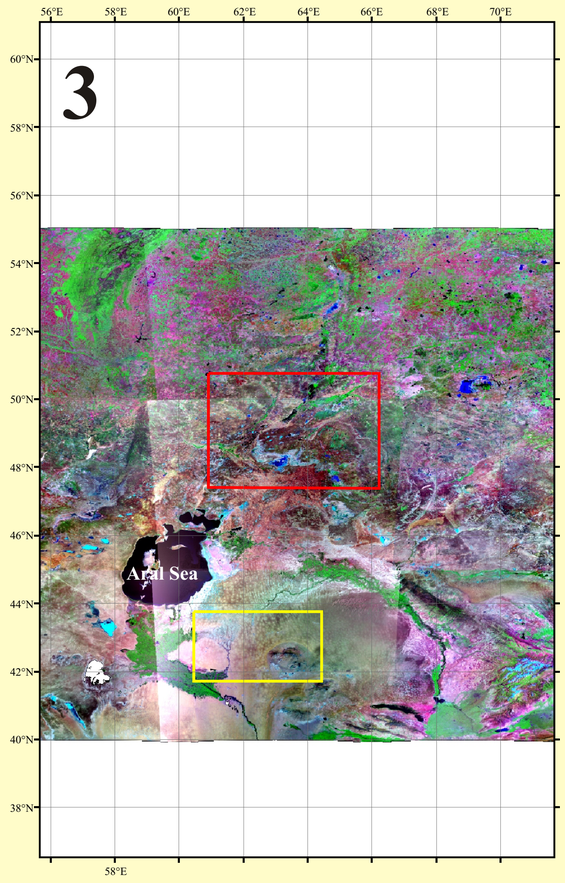
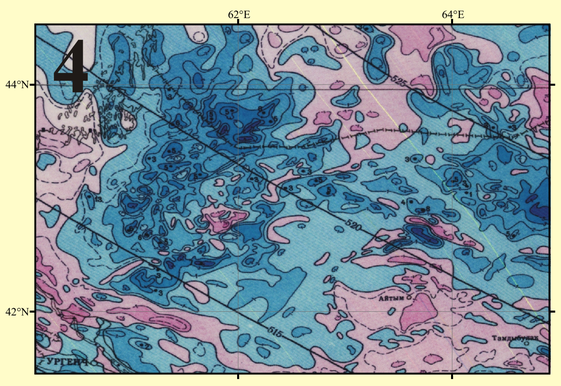


Fig. 1 - Magnetic Anomaly Map of the Aral Sea region (NGDC, 1996).

Fig. 2 - Parts of four sheets of the original magnetic anomaly map (Makarova et al., 1974) of the Aral Sea region. Note that positive values are here in blue and negative values in pink. Local highs and lows help to identify continuity and extent of regional anomalies. Sheet matching is problematical. Area in yellow box is enlarged in Figs. 4 and 4A.

Fig. 3 - Satellite imagery of Aral Sea region. "Mr. Sid" format of Landsat TM frames; RGB bands 7, 4 and 2. Area in red box is enlarged in Figs. 5 and 5A.



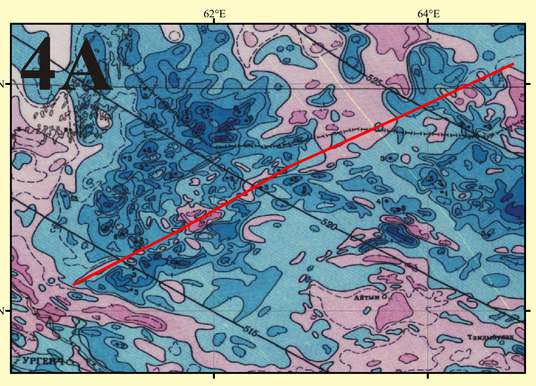
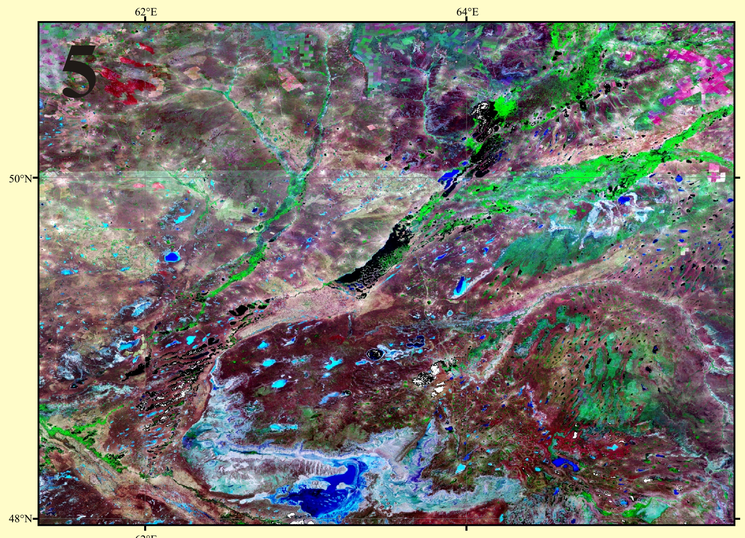


Fig. 4 - Enlargement of magnetic anomaly map in Fig. 2 (yellow box). A long positive, NNE-striking anomaly belt (see also Figs. 6 and 7) diverts to ESE strike across a ca. 400 km long ENE-striking discontinuity ("Aral Fault System", Fig. 4A). The NNE-striking branch of the regional anomaly is thought to represent the Valerianov Arc on the basis of the distribution of iron ore deposits (Seltmann and Shatov, 2001) between 51and 54 degrees N (Figs. 6 and 7).



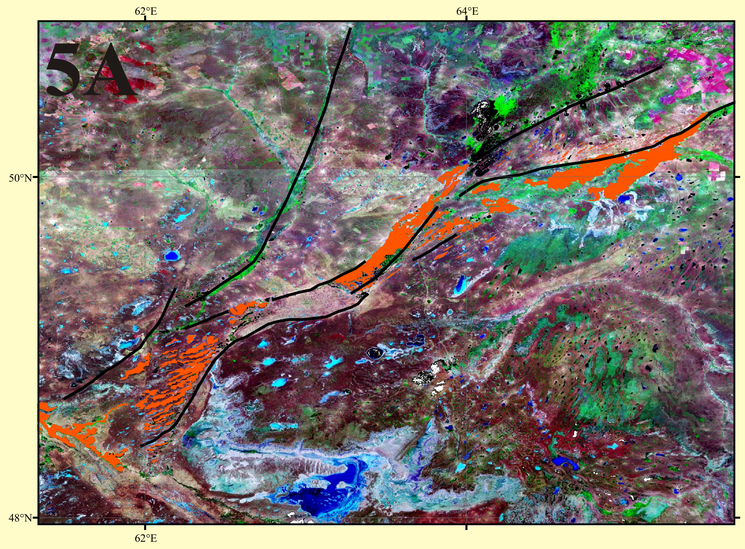
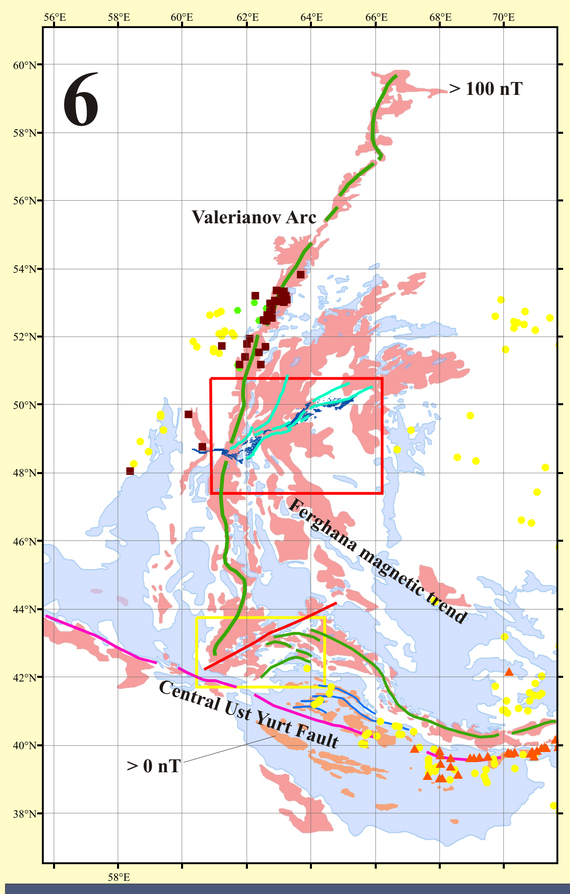


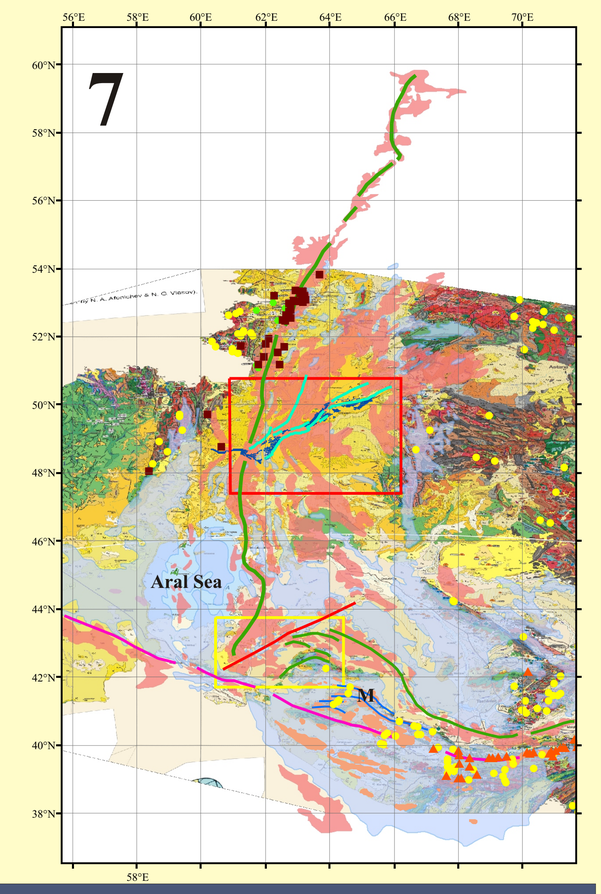
Fig. 5 - Enlargement of satellite imagery in Fig. 3 (red box). The pattern of variably sized lakes (black) along the Turghai River is thought to reflect an over 400 km long, ENE striking shear zone complex by *en echelon* - and horsetail - like features ("Turghai Shear Zone") in the Cenozoic-covered Palaeozoic basement. In Fig. 5A lakes are marked red and inferred principal shear trends in black).

Although hardly believable on the ground of the lake pattern alone, its reality finds support in *(i)* the strike of magnetic anomalies along its northeastward projected extent which leads into fault systems with the same strike in the northwestern part of the Kazakhstan block and *(ii)* the curvature in the anomalies associated with the Ferghana Fault System (see Figs. 6 and 7).

Fig. 6 - Magnetic anomaly pattern with interpreted Valerianov Arc and its southern branch, the Aral Fault System (Fig. 4), the Turghai Shear Zone (Fig. 5), arcs south of the southern branch of the Valerianov Arc and known ore deposits (Seltmann and Shatov, 2001).

Fig. 7 - Fig.6 superimposed on the Mineral Deposits Map of Central Asia (Seltmann and Shatov, 2001).





Magnetic anomalies are here generalized, with negative anomalies in light blue, anomalies >100 nT in pink and small anomalies > 0 nT along the Central Ust Yurt Fault (cf. Natal'in and Sengor, 2005) in brighter pink.

Ore deposits (Seltmann & Shatov, 2001)

- iron skarn deposit
- copper-molybdenum porphyry deposit
- mercury deposit
- gold deposit

M - Muruntau

Preliminary results

Magnetic anomalies suggest continuity below Cenozoic cover of the Valerianov Arc from the Urals to the Altaids; the arc is deflected and probably strongly deformed along the ENE-striking Aral Fault Zone.

Lake distribution along the Turghai River suggests an ENE-striking tectonic discontinuity below Cenozoic cover; this tends to find support in magnetic anomalies with similar strike that extend into the Kazakhstan block.

Across this discontinuity, the SE-NW Ferghana magnetic trend deflects to NE.

The kinematics and mineral potential of the inferred ENE-striking deep discontinuities are unknown.

The Muruntau gold deposit is hosted by an arc system south of the southern branch of the Valerianov Arc.

A group of mercury deposits tends to cluster along the Central Ust Yurt Fault.

References

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