STRUCTURAL INTERPRETATION OF PALEOMAGNETIC DATA FROM THE SARROCH VOLCANICS (SARDINIA)

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RESUME

Les directions paléomagnétiques du secteur de Sarroch ont des valeurs différentes du restant Tertiaire sarde. Les solutions géométriques les plus simples, concordantes avec la tectonique de la zone, admettent soit un basculement de 25° vers NNE, soit une rotation antihoraire de 40° avec un basculement moins important.

Il s'ensuit que les mouvements du bloc de Sarroch ne sont pas liés aux directrices du Graben pliocène du Campidano, aligné NNO-SSE.

Within the Tertiary volcanism from the Sarroch area well-clustered paleomagnetic directions were found with mean D – 279°, I – 61,2° and α_{95} – 7,3°, whose pole position lies at 31° N, 312° E. All declinations from Sarroch deviate consistently with respect of Tertiary directions from the adjacent areas and from other areas of Sardinia.

The deviating directions are interpreted as caused by subsequent displacements of the tectonic block to which Sarroch belongs.

Displacements may be reconstructed geometrically. In Fig. 1 (where S_1 and S_2 are two paleomagnetic Tertiary mean directions for all Sardinia according to Manzoni & Ferriani 1975 and to Edel 1979 respectively, M_2 the Sarroch mean direction, all in the lower hemisphere of stereographic projection) two simple geometric solutions are shown, the first requiring a 25° tilting towards the NNE around an oblique axis (P) or an horizontal axis (R). The second model requires a rotation of about 40° about a local vertical axis, accompanied by gentle tilting of about 8° around the (A) horizontal axis or to the (B) axis according to the tilt preceding or following the rotation about the vertical axis. When more subsequent motions are hypothesized, complex possibilities of combined tilts and rotations are found.

The structural trends known in the area can now be considered, in order to check whether any of these may be compatible with the models based on geometrical requirements. An anticlockwise rotation of 40° about a vertical axis is compatible with the geotectonic motion of the Sardinian microplate, but it can be entertained only speculatively because favourable or unfavourable local geologic evidence is not know.

Structural trends representing possible axes of tilting are shown in Fig. 2, where broken arrows represent the directions after displacements from the mean Tertiary paleomagnetic direction for Sardinia (S_1). It is evident that a NNE tilting as inferred from the displacement of the paleomagnetic directions of Sarroch may only be controlled by the tilt axis (T) transverse to the Campidano Graben or by the transverse fault set (F_1) associated to the dyke set (D_1).

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The structural block to which Sarroch belongs could not be displaced by any assumed antiform structure along the Campidano trend (C) nor by stepwise foundering along the Graben, nor by the (F_2) fault set.

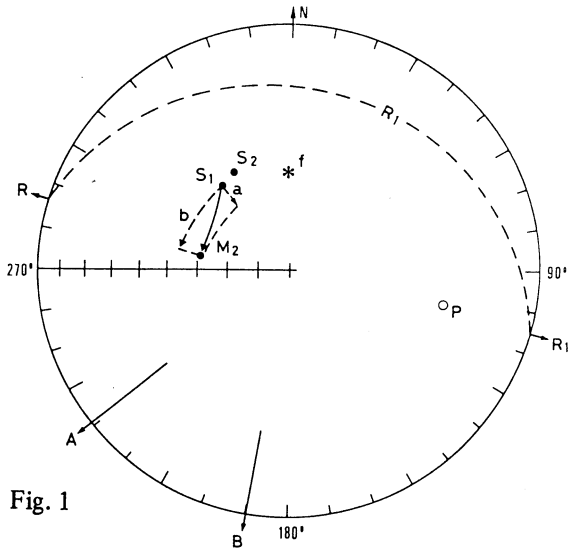

Fig. 1

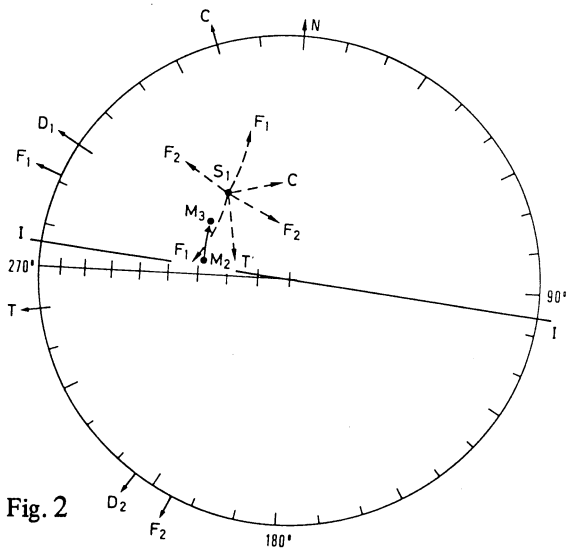

Fig. 2

Independent geologic evidence favours this interpretation: in fact the Tertiary Cixerri formation underlying the Sarroch volcanics dips 12° to the NNE. If this correction for dip is applied to the mean paleomagnetic direction of Sarroch (M_2) il becames closer (M_3) to the directions of the other Sardinian areas.

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