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Program and Abstracts

The Planalto da Serra Alkaline-rock Complex: New $^{40}\text{Ar}/^{39}\text{Ar}$ ages and paleomagnetic results, and implications for the Gondwana formation

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The Planalto da Serra Suite is composed of alkaline bodies that cut deformed and metamorphosed sedimentary rocks of the Cuiabá and Araras Group. These alkaline rocks are composed of pyroxenite, apatite-pyroxenite, phlogopite-pyroxenite, apatite, carbonatite and phenite. Previous ^{40}Ar - ^{39}Ar datings in phlogopite yielded ages of 604 ± 16.2 and 615 ± 4.5 Ma for the alkaline rocks. Here we present new ^{40}Ar - ^{39}Ar datings on phlogopite of two alkaline samples and on muscovite of a meta-sedimentary rock at the contact with the alkaline rock. Datings were performed at the Centro de Pesquisas Geocronológicas (CPGeo) at the São Paulo University. A paleomagnetic study was also carried out on 105 oriented cylindrical cores from 12 sites of the alkaline rocks. Samples were cut using a drill-machine, and magnetic and solar compasses were used for their orientation. All magnetic measurements were conducted at the paleomagnetic laboratory of the Instituto de Astronomia, Geofísica e Ciências Atmosféricas of the São Paulo University (IAAG-USP). The new dating of the alkaline rocks corroborates earlier results, yielding ages between 603.2 ± 5.8 Ma and 617.7 ± 5.2 Ma. Muscovites from the meta-sedimentary rock furnished very similar results, with ages between 595.8 ± 6.4 Ma and 611.2 ± 5.3 Ma. After AF and thermal treatment, samples from all sites of the alkaline rocks presented a coherent magnetic component (north-northeast direction with steep to moderate downward inclination) which greatly contrasts with the present geomagnetic field. A mean direction of $\text{Dec}=11.1^\circ$, $\text{Inc}=45.9^\circ$ ($\alpha_{95}=9.0^\circ$, $K=11.4$) was calculated for the 12 sites, which yielded a paleomagnetic pole at 45.6°N , 318.5°E ($K=19.0$, $A_{95}=10.2^\circ$). The age of the pole is estimated to be between 588 and 623 Ma based on the ^{40}Ar - ^{39}Ar datings in phlogopites. The Planalto da Serra pole is close to the coeval Adma pole (610 Ma) from the West Africa Craton, after South America is restored to Gondwana configuration. These poles suggest that west Gondwana was not yet formed at 600 Ma ago.