$^{40}Ar/^{39}Ar$ ages of CAMP in North America (Hartford, Deerfield and Fundy basins)

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The Central Atlantic magmatic province (CAMP) is one of the largest igneous provinces on Earth (>1x10[7] km²) and spans four continents. Recent high-precision $^{40}Ar/^{39}Ar$ dating of mineral separates have provided important constraints on the age, duration, and geodynamic history of CAMP (e.g. [1]). Yet, the North American CAMP is strikingly under-represented in this dating effort.

Here we present 13 new statistically robust, mostly plagioclase separates, plateau and mini-plateau ages obtained on lava flows from the Hartford and Deerfield (n=3; USA) and Fundy (n=10; Nova Scotia, Canada) basins. Ages mostly range from 198.6 ± 1.1 to 201.5 ± 1.1 Ma (2σ), with 1 date substantially younger at 190.6 ± 1.0 Ma. Careful statistical regression show that ages from the upper (200.0 ± 2.0 Ma) and bottom (200.1 ± 0.9 Ma) units of the lava pile in the Fundy basin are statistically indistinguishable, confirming a short duration emplacement (<< 2 Ma). These results are in agreement with the minimum duration estimates (> 0.6 Ma) obtained by cyclostratigraphy for the Newark basin CAMP [2]. Three ages obtained on the Hartford (198.6 ± 2.0 Ma and 199.8 ± 1.1 Ma) and Deerfield (199.3 ± 1.2 Ma) basin were measured on sericite from the higher lava flow units. We interpret these dates as reflecting syn-emplacement hydrothermal activity within these units. Altogether, CAMP ages gathered so far (cf. compilation in [1] and this study) suggest a short duration of the main magmatic activity (2-3 Ma), but also address the possibility of a temporal migration of the active magmatic centers (e.g. Nova Scotia at 200.3 ± 0.7 Ma and Brazil at 198.0 ± 0.3 Ma). Such a migration challenges a plume model that postulates a radial outward migration of the magmatism and is more compatible with different models such as the supercontinent global warming hypothesis [3]

A possibly significant age at 191 Ma confirms a minor CAMP late tailing activity (190-194 Ma) already observed for dykes and sills in Africa [4] and Brazil [5]. We speculate that this late activity may be due to a major extensional event, possibly heralding the oceanisation process at ~190 Ma [6].

[1] Nomade *et al*, *PPP* **234**, 326-344;
[2] Whiteside *et al*., *PPP* 234, 345-367 ;
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[4] Verati *et al*., *EPSL* **235**, 391-407;
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The model of the four-sub-grate ferrimagnetic

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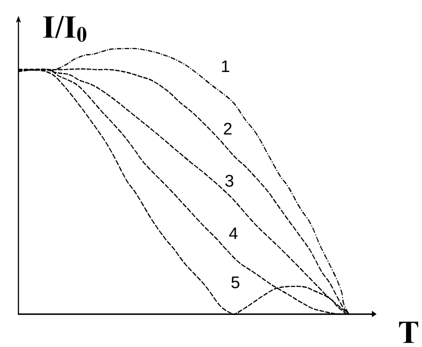
There were investigated the magnetic properties of Ferrous sulphides in a metastable phase condition and the change of magnetization of non-stehiometric pyrrotites depending on the concentration of vacancies in their structure. Ferrous sulphides with composition Fe_7S_8 decrease of magnetization practically to a zero when hardening with the temperature of synthesis. It is shown that the observed effect is explained not only by the redistribution of the vacancies of iron in a base plane of the crystalline structure of the type NiAs, but by the process of the spin flip on the node. For the first time in the frame of the model of the four-sub-grate ferrimagnetic it is given a theoretical description of magnetic transformations in non-stechiometric ferrimagnetics. For explaining the effect of the ordering of vacancies it is used the method of the secondary quantization. It should be noted that the operators correspond to the quantum statistics of Pauli. The calculations are made considering the interactions between the cation vacancies. It is noted that the appearance of the vacancy interaction is explained by breaking the connections of d-electronic tracks and forming of non-compensated electrical charge on the vacant unit consequently.

Based on the proposed model of the vacancies theoretically possible magnetization depending on the temperature are presented.

Figure 1: Theoretical dependence relative magnetization of non-stehiometric ferrimagnetic from temperature.



All theoretical curves except the curve 2, are in agreement with experimental curves for pyrrotites. Curve 2 probably predicates new types of thermocurves for pyrrotites.