



“ORION” – the versatile Full-vector Sample Magnetometer for Paleointensity, Rock Magnetic and Paleomagnetic Studies

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We present “ORION” – the 3-axis top-of-the-edge multifunctional device for rock magnetic, paleomagnetic, archeomagnetic and paleointensity studies, constructed and assembled in the Geophysical Observatory “Borok”, Schmidt Institute of Physics of the Earth, Russian Academy of Sciences. A very similar device, the so-called Triaxe, was independently constructed by Maxim Le Goff in Paris (Le Goff and Gallet, 2004). The long-term usage of ORION magnetometers proved their reliability and extreme help in laborious archeo- and paleointensity, rock magnetic and paleomagnetic experiments. Some of exciting features of ORION are: (a) recording full behavior of the remanent magnetization (NRM/TRM/IRM) vector in the temperature range of 20-750°C: XYZ components of the remanent magnetization are measured simultaneously, without the need for sample position changing; (b) recording full-vector of the remanent magnetization as a function of temperature in the presence of magnetic field in any direction, selected by user; (c) thermal remanent magnetization (TRM) acquisition in a sample in any direction; (d) conducting Thellier-Coe (Thellier, Thellier, 1959; Coe, 1967) and Wilson (Wilson, 1962) experiments for determining the value of the Earth’s ancient magnetic field in fully automatic regime; (e) can be easily programmed for any experiment including a heating, cooling, annealing, etc. in any order.

ORION combines a water-cooled furnace, controlled DC-field, and ultra-sensitive magnetic sensors for full-vector measuring. The instrument is placed into a three-layer permalloy magnetic shield. The interface is a Windows-based user-friendly software with plain scripting language.

Below are some specifications of ORION magnetometer:

(1) magnetic moment sensitivity: $5E-08$ Am²; (2) magnetic field range: -200 .. +200 μ T (-160 .. +160 A/m); (3) heating temperatures range: +25 .. +800°C; (4) heating/cooling rate: 0.2 .. 2.0°C/sec; (5) shape of specimens: \sim 1 ccm cube or cylinder; (6) Windows-based software allows step-by-step set-up of fully automated routine measurements procedures (Thellier-Coe with check-points, Wilson); (7) water-cooled (\sim 0.5 L/min); (8) wall-mounted construction.

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References:

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