

## The microwave palaeointensity technique

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For a complete understanding of the Earth's magnetic field it is necessary to know the temporal evolution of the intensity as well as the directional changes of the field. Unfortunately the global palaeointensity data set is still limited due to the inherent experimental difficulties. A key problem with the conventional, experimentally time consuming, method is that often thermochemical alteration occurs during laboratory heating so that the samples capacity to acquire remanence changes and thus it is not possible to deduce the ancient magnetic field intensity. This problem of sample alteration during the laboratory experiment was the motivation for the group at Liverpool in the 1990s (led by John Shaw and Derek Walton) to start experimenting with using microwaves to demagnetise and remagnetise samples rather than heating using conventional ovens. The microwaves directly excite the magnetic system so that it is not necessary to heat the whole bulk sample and excite the magnetic system via lattice vibrations, as is the case when heating in an oven. Thus using microwaves minimises sample alteration and the success rate of palaeointensity experiments is increased. I will describe the development of the microwave palaeointensity technique from the early experiments using a domestic microwave oven, to the current system operating at 14 GHz and the newest system in development. I will show results of studies comparing the conventional thermal and microwave techniques and discuss some of the microwave palaeointensity studies carried out at Liverpool by myself and others at the Geomagnetism Laboratory.