2014 PROGRESS REPORT OF THE PROJECT GROUP ON CARBONIFEROUS MAGNETOSTRATIGRAPHY

Chairman Mark Hounslow
Mark Hounslow[1] and Project Group
[1] Centre for Environmental Magnetism and Paleomagnetism,
Lancaster Environmental Centre, Geography Department, Lancaster University
Bailrigg, Lancaster LA1 4YW
United Kingdom
E-mail: m.hounslow@lancaster.ac.uk.

The magnetostratigraphy project group was formed in 2004 and chaired by Mark Hounslow to research the potential for identifying correlatable magnetostratigraphic events in the Carboniferous. Hounslow (2009) reported on some aspects of this approach in the 2009 issue of the Carboniferous Newsletter. Progress by the magnetostratigraphy project group has been hampered by a shortage of members and lack of integration with the activities of the other SCCS task groups.

There has been considerable progress in refining and integrating the magnetostratigraphy previously obtained from the Maritime Provinces in Canada and the Mauch Chunk Formation in the Appalachian Basin of the eastern U.S.A. by integrating magnetostratigraphy with palynostratigraphy through the work of Opdyke *et al*. (2014). An integrated graphical summary compiled from sections and sources described in their study with existing magnetostratigraphic data from lavas in the Asbian-Brigantian substages described in Hounslow *et al*. (2004) demonstrates a clear and validated pattern of polarity changes through the Brigantian, Pendleian and lower Arnsbergian substages (late Visean and Serpukhovian), from several overlapping sections. The data are predominantly from red-bed alluvial facies, with the sub-stage divisions related to the spore zones of eastern Canada (Utting *et al.* 2010). The Asbian-Brigantian boundary is not well defined, but occurs in the lower part of the Mauch Chunk sections measured. The position of this boundary, proposed by Opdyke *et al.* (2014) appears to approximately concur with the polarity pattern across this boundary seen in the British lava successions (data reviewed in Hounslow *et al*. 2004).

Opdyke *et al*. (2014) clearly identify the base of the Kiaman reverse superchron in the *Raistrickia saetosa* biozone (approximately near the base of the Langsettian substage), which they place at ~318 Ma using the 2012 timescale of Davydov *et al*. (2012). This date agrees closely with the base of the Kiaman Superchron identified in Australia where the normal polarity Wanganui Andesite Member (U-Pb date of 319.2 ± 2.8 Ma), is succeeded by the reversed polarity (within the base of the Kiaman Superchron) Peri–Eastons Arm Rhyolite (U-Pb date of 317.8 ± 2.8 Ma; Opdyke *et al*. 2000).

The new work shows potential to link the boundaries of the polarity chron MI12, in the late Brigantian to the Serpukhovian task forces debate about the definition of the GSSP at the base of the Serpukhovian. It is clear that the geomagnetic polarity stratigraphy as published in the 2012 timescale volumes (Davydov *et al*., 2012) bears little resemblance to the detailed work of Opdyke *et al.* (2014), which brings into question the reliability of the old Russian data (reviewed by Hounslow *et al*. 2004), on which the 2012 polarity timescale was constructed.

New palaeomagnetic and magnetostratigraphic data from Billefjorden on Spitsbergen across the Serpukhovian-Bashkirian boundary (Iosifi & Khramov, 2013), bear some similarity to the polarity pattern shown in Fig. 1 of Hounslow (in progress), with normal polarity dominating the lower Bashkirian. Unfortunately, insufficient section stratigraphic details, limits any more direct

comparisons. The Serpukhovian- Bashkirian interval has also recently been studied in the Tengiz reservoir (Kazakhstan), where a geomagnetic polarity stratigraphy has contributed to a detailed chronostratigraphic sub-division of the reservoir units (Ratcliffe *et al*. 2013). Hopefully this work will eventually be published, and develop the magnetostratigraphic pattern through the Mississippian - Pennsylvanian boundary.

References

DAVYDOV, V.I., KORN, D. & M.D. SCHMITZ (2012): The Carboniferous Period. *In*: GRADSTEIN, F.M., OGG, J.G., SCHMITZ, M.D. and G.M. OGG (eds.) The geologic time scale 2012. ─ Elsevier, Amsterdam, p. 603-651

HOUNSLOW, M.W. (2009): Report for the project group Carboniferous magnetostratigraphy. ─ *Newsletter on Carboniferous Stratigraphy,* **27**: 18─19.

HOUNSLOW M.W, DAVYDOV, V.I., KLOOTWIJK, C.T., & P. TURNER (2004): Magnetostratigraphy of the Carboniferous: a review and future prospects. - *Newsletter On Carboniferous Stratigraphy*, **22**: 35-40.

IOSIFIDI A.G. & A.N. KHRAMOV (2013): Paleomagnetism of Devonian and Carboniferous Sedimentary Rocks of Spitsbergen: to the Paleozoic History of the Barents–Kara Basin. - *Izvestiya, Physics of the Solid Earth,* **49**: 725–742.

OPDYKE, N.D. GILES, P.S. & J. UTTING (2014): Magnetic polarity stratigraphy and palynostratigraphy of the Mississippian-Pennsylvanian boundary interval in eastern North America and the age of the beginning of the Kiaman. - *Geological Society of America Bulletin*, **126**: 1068-1083.

OPDYKE, N.D., ROBERTS, J., CLAOUE-LONG, J., IRVING, E., & P.J. JONES (2000): Base of the Kiaman: Its definition and global significance. *Geological Society of America Bulletin*, **112**: 1315-1341.

RATCLIFFE, K., URBAT, M., EMMA, D. PLAYTON, T. & D. Katz (2013): Using chemo and magnetostratigraphy to define a chronostratigraphic framework in an isolated carbonate platform: the Tengiz Field, Republic of Kazakhstan. - AAPG abstract, May 19-22. http://www.searchanddiscovery.com/abstracts/html/2013/90163ace/abstracts/rat.htm

UTTING, J., GILES, P.S., & G. DOLBY (2010): Palynostratigraphy of Mississippian and Pennsylvanian rocks, Joggins area, Nova Scotia and New Brunswick, Canada. - *Palynology*, **34**: 43–89.