

# Changeable geomagnetic activity during the time of Nebuchadnezzar II

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In recent years there has been work to reconstruct the earth's magnetic field across the Ancient Near East from dateable artefacts or from Mediterranean ocean sediments.<sup>1</sup> The process has been termed 'archaeomagnetic analysis'. More recently, scientists working with inscribed clay bricks from Mesopotamia, which record a list of kings from the third to first millennium BC, have found evidence of a strong and changeable geomagnetic field.<sup>2</sup> The inscriptions of 12 kings, from the 32 bricks, give identifiable ages for the artefacts, which have been used to measure the strength of the regional magnetic field. Magnetic measurements of the bricks produced during the time of the Babylonian King Nebuchadnezzar II (c. 604 to 562 BC) (figure 1) indicate that the field strength was changing quite rapidly at this time (figure 2).

Information about the regional magnetic field has been recovered from examining grains or particles of iron oxide from within the clay tablets. When the clay artefacts are heated, either fired at high temperatures, above 570°C in an industrial oven, or subsequently burned through calamitous circumstances, the magnetic field of the iron oxide grains becomes aligned with that of the earth and fixed when cooled. This latest research follows other studies

from the region, thus helping to piece together knowledge of the magnetic field some 2,500 to 4,500 years ago in the Middle East.

It is believed that such analyses will enable scientists to date other ancient material, such as bricks and pottery shards, where there is currently uncertainty over their age. This method may overcome the limitations of carbon dating; if organic carbon is not present in clay objects, then direct carbon-14 dating is impossible.

The main findings of this technique are based primarily upon measurements of the *strength* of the magnetic field as opposed to the *direction* (which would be measured as a *declination* from true north). Determining the direction of the field would require knowledge of how the bricks were laid against the earth's coordinates, which, in many cases, is unknown.

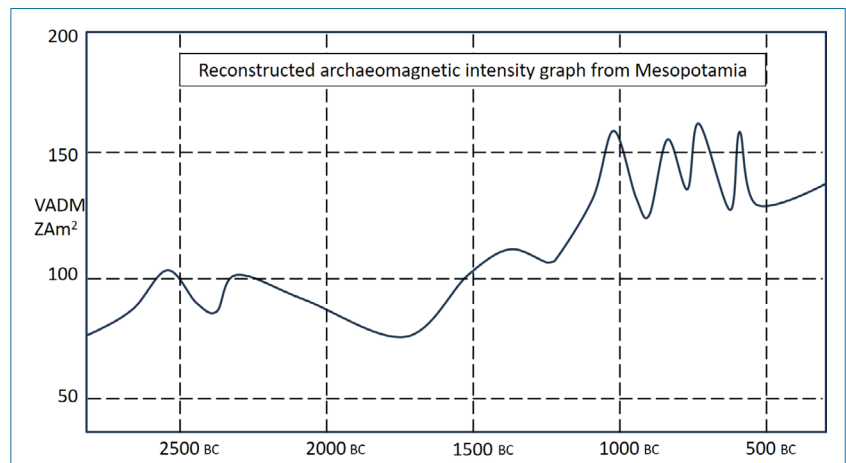
A group of Israeli researchers have also confirmed an event recorded in the Second Book of Kings (2 Kings 12:17),<sup>3</sup> using a similar technique involving measurements of the magnetic field identifiable from burnt clay.<sup>4</sup> Through experiments, the researchers were able to identify the characteristics of the magnetic field

recorded in clay bricks, even burnt at relatively low temperatures during the destruction of the city.<sup>5</sup> Where burnt artefacts were found in-situ it was also possible to discern the direction of the field.

Previous studies indicated a strong positive geomagnetic anomaly in the Middle East, called the 'Levantine Iron Age Geomagnetic Anomaly (LIAA)', which is believed to have peaked between 1050 BC and 550 BC. Evidence for the LIAA has come from as far afield as the Atlantic Azores, Bulgaria, and China. The latest research confirms this anomaly. It is not clear what has



**Figure 1.** Fired mudbrick mentioning the name and titles of the Babylonian King Nebuchadnezzar II (c. 604–562 BC). Located in the British Museum, London, from Babylon, Iraq.



**Figure 2.** Reconstructed magnetic intensity graph from Mesopotamia showing variation in the field strength. VADM = Virtual Axial Dipole Moment,  $ZAm^2 = 10^{21}$  ampere metre<sup>2</sup>. (After figure 4 in Howland *et al.*, ref. 2)

caused this LIAA, although a negative anomaly has developed in recent decades in the southern hemisphere, known as the South Atlantic Anomaly.

### Implications for creationist research

Overall, this technique helps with understanding regional and temporal changes in the earth's magnetic field, especially with variation in intensity in the Middle East. Creation scientists have previously discussed the possibility that the earth's magnetic field is decaying with time, and observational reconstructions of the intensity will help shed light on this for creation research (figure 2).<sup>6</sup> However, the reconstructed LIAA is a regional anomaly; it doesn't, in itself, indicate a declining global magnetic field.

Russell Humphreys' model has the earth's magnetic field decaying steadily prior to the Flood. He has further argued that rapid geomagnetic field reversals would have occurred during the Flood year, if the earth had been subjected to cataclysmic changes, including varying, and often rapid, rates of sedimentation.<sup>7</sup> In 1990 Humphreys proposed that convection within the earth's core may have been responsible for the rapid reversals of the magnetic field during the Flood,<sup>8</sup> and such field reversals may also be expected with a period of catastrophic plate tectonics.<sup>9</sup> Following the Flood year, fluctuations may have continued for centuries afterwards, but on a diminishing trend. Further decay in the field strength is suggested to have resumed in the last 2,000 years (see figure 6 in Humphreys' article).<sup>7</sup> This is supported by archaeomagnetic evidence over the past 1,000 years that indicates a steady decline<sup>10</sup> and by direct measurements from the year 1829 to the present day.<sup>11</sup>

The research by Howland suggests that regional fluctuations were occurring around the time of

Nebuchadnezzar II, although this is somewhat remote from the Flood, and it is not clear why this would be so. Secular reasoning for the cause of the LIAA and subsequent geomagnetic fluctuations remains uncertain. In addition, for creationist research there is the possibility that measuring the strength of the regional magnetic field will enable more accurate dating of artefacts, which may support the accurate dating of biblical events.

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