

Developing a magnetometer chariot to survive commercial survey

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Development work on and off over the last two years finally paid off last summer, when the time came to use our chariot on a routine commercial survey. We'd had some trial runs, which showed us where our designs had room for improvement, but the critical test was how well we could use the chariot in conditions we didn't have a choice about.

Firstly, we wanted to be able to run our usual caesium magnetometer on wheels, as we suspected there was a potential benefit to the data quality. (Low amplitude fluctuations in the measured magnetic field strength are introduced by the gait of the surveyor.) Secondly, a chariot opens up the possibility of a multi-sensor array.

The key factors influencing the design were:

- it had to be light enough for single-person operation and easy to manoeuvre
- it had to pack away into a short Land Rover van
- it had to be robust, for varied field conditions
- it had to be straightforward to repair.



Fig. 1 Early "gradiometer", 3x 1m-spaced sensors

After we had studied the few existing magnetometer chariots we decided on a wooden construction with large wheels for a smoother ride. Also, the power supply and electronics would be on board but kept away from the sensors to minimise interference.



Fig. 2 "Sabrina", the current chariot (2x1m /4x0.5m)

The most difficult part of the design was the bearings, which had to run smoothly and wear well but still allow the chariot to be dismantled for transport. We redesigned the bearing assembly following weeks of survey in wet conditions in western Britain and Ireland: the axles had swollen and softened in constant rain. Now we're satisfied – our chariots have been used a lot since last summer and they're running well. Also, we appreciate the data quality and being able to use total field data more fully for analysis and interpretation.

What next? We're developing a towed array with a GPS link, though spatial accuracy and interference with the sensors currently limit how useful it is. Meanwhile, "Sabrina" could do with another coat of paint ...

Fig. 3 Conditions aren't always ideal! (Co. Galway)

