Preview

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Next generation of magnetic resonance tools

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Readers of *Preview* who work with groundwater may be interested in two next generation Magnetic Resonance (MR) tools. These are Vista Clara products, so, in the spirit of full disclosure, I should say that I have been working as Vista Clara's sales and equipment representative in Australia since 2017. Vista Clara is a US-based company exclusively focussed on MR instrumentation for geophysical applications. Among the many advantages of the MR technique are non-invasive measurements, and direct measurement of the presence of water in the subsurface.

The new tools are 1) The "GMRFlex", a new, more compact, surface NMR system (Figure 1), and 2) the Javelin® "Slim" a new integrated borehole wireline tool (Figure 2). Both of these tools represent the next generation of smaller, and easier to use tools that will be of use on many groundwater investigations that were not possible previously.

The GMRFlex uses a combined transmitter-receiver loop (similar to an exploration-style TEM survey) that produces a data sounding providing information on both water content and porosity distribution from near the surface down to about 75 m or so with the new compact system. If you have used or seen Vista Clara's workhorse GMR system, you will realise that what it makes up for in increased depth-of-investigation, is traded off against ease of use and portability. The new GMRFlex system is quite capable of being run with only the transmitter unit, a laptop, a pair of 12V batteries and transmitter cables. This means that it can be run from smaller vehicles - even a quad bike equipped with a small trailer.

The "Slim" is a more compact version of the original Javelin wireline system. The original Javelin system is built with the high-powered transmitting electronics on the surface, using a specialised winch (requiring non-standard winch cable) to carry the high-current transmitter signal to the probe. The new system runs on a standard four-core winch cable, removing the need for the special winch, making borehole NMR accessible to more users. The probe is separated into two parts: the top half houses the electronics and power supply, while the bottom half is the "sensor" part of the probe. The top comes in two sizes, either a 2.38" (60 mm) "Slim" version, or a 3.5" (90 mm) "Max" version. The Slim can be paired both with 2.38" (60 mm) or 3.5" (90 mm) sensors. The Max can be paired with both 3.5" (90 mm) and 5.25" (135 mm) sensors. In either case the entire probe weighs between 30 and 45 kg for the Slim (up to 85 kg for the Max), depending on which probes are used. Being modular the probe can be built "on the hole" by one or two people without the need for an overhead winch. As an option, these probes can be set up to read natural gamma simultaneously with the NMR. Like the GMRFlex surface system they are available for purchase or hire, and are offered with a full suite of processing software as well as support from Vista Clara to help with training, processing, and interpretation.

Figure 1. *The full FlexGMR system, including transmitter, laptop, connectors and transmitter cables. Also shown are the optional DC Capacitor expansion module and tuning expansion module.*

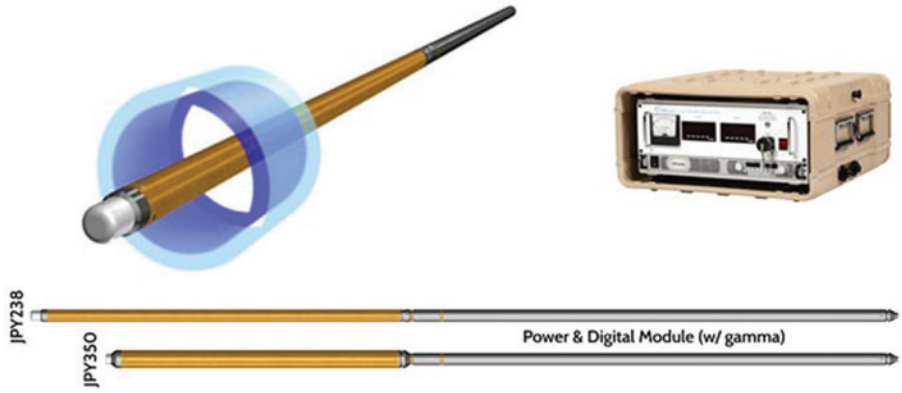

Figure 2. *The Javelin Wireline Slim probe including surface unit and both the 2.38" and 3.5" inch sensors. The system shown is also able to collect natural gamma delta data.*

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