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On the capability of helicopter gravimetry.

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Affordable, high performance inertial navigation systems, their integration with GPS, and modern high performance airborne vertical sensors make helicopter gravimetry an attractive alternative to other methods for obtaining gravity data.

As part of the Dead Sea Integrated Research Project (DESIRE) in late spring 2007 a helicopter borne gravimetry survey was conducted over the Dead Sea Basin along and across the rift between Aquaba and the Dead Sea. A German Sikorsky S-76B helicopter system was used to carry a GT-1A gravity meter system supplied by Canadian Micro Gravity. The GT-1A is an airborne, single vertical sensor, GPS-INS scalar gravity meter with a Schuler-tuned three-axis gyro-stabilized inertial platform, that uses intelligent platform control to maintain platform verticality during turbulent motion.

Low speed and terrain following helicopter gravity flights were performed to acquire the best possible data quality and high resolution, considering extreme elevation differences associated with the Dead Sea Basin. The Dead Sea Valley lies more than 400 m below sea level, while the shoulders are more than 1500 m high. The resulting initial airborne gravity data were merged with existent ground based data for enhanced mapping and modelling providing a seamless gravity map of the area.

During terrain following flights the vertical accelerations effecting the helicopter and also the vertical sensor of the gravity meter are logically much higher compared to straight level flights. To investigate the effects of this two different flight performances on the gravity measurements, a test flight over flat terrain at a constant altitude with very small vertical accelerations was performed. The acceleration data occurred during this simulated airborne survey flight were recorded using an inertial measurement unit iVRU-FC constructed by iMAR-Navigation, which was also part of the equipment used during the gravimetry survey flights of DESIRE. This means that the differences between the vertical accelerations of this two flight realizations can be compared and it's possible to derive the corresponding consequences and error impacts on the gravimeter measurements.