

# Height Modernization in the Emirate of Sharjah: Determination of a Gravimetric Geoid, Precise Orthometric Heights and the Mean Sea Level Variation Around the Strait of Hormuz

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## SUMMARY

Bayanat and Fugro recently carried out the modernization works of the geodetic and hydrographic infrastructure of the Emirate of Sharjah in the United Arab Emirates, which led to a redefinition of all the datums in force.

This project was exceptional in that it integrated, with regard to terrain, geodetic GNSS measurements, geodetic levelling, tide gauge observations, absolute and relative gravimetry, then in office, computations of geodetic GNSS and levelling networks, hydrographic reference levels, and finally a gravimetric geoid model and its hybrid declination.

So, the project gave us the opportunity to determine different forms of heights, from Mean Sea Levels (MSL) or Lowest Astronomical Tides (LAT) to ultimate rigorous orthometric heights, through ellipsoidal heights, geopotential numbers, heights resulting from standalone geodetic levelling, and geoidal undulations.

As this work was carried out from start to finish according to the rules of art and using the latest computation methodologies available - notably taking into account the lateral variations in density of the topographic masses for geoid computation, or applying topography, density and geoid effect corrections for computing orthometric heights, the project also made it possible to answer the question of the variation of Mean Sea Level (MSL) on both sides of the Strait of Hormuz, or more exactly along the Arabo-Persian Gulf and the Gulf of Oman as well as between these two gulfs, variation still uncertain due to the unreliability of satellite altimetry in coastal areas.

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