National Geospatial Policy: perspectives on height systems, vertical datums and gravimetric geoid modelling in India

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The National Geospatial Policy (NGP) and guidelines of India mention that the threshold value for vertical or elevation shall be 3 m. However, the terms 'height', 'elevation' or 'vertical' alone are not sufficiently self-explanatory. Therefore, this article provides an overview of India's height systems, vertical datums and vertical reference surfaces. The ellipsoidal heights obtained from GNSS have been discussed briefly, but the main focus remains on the physical height, commonly known as heights above mean sea level. This is because only the latter is used for large infrastructural projects and contouring in topographical maps. The geoid, a geopotential surface by definition, is the best candidate for a vertical reference surface. Some countries also employ quasigeoid, but India has always pursued geoid. Developing a geoid model is also one of the milestones for 2025 in the NGP. Geoid modelling has been studied in India for over a century but has never been discussed in detail. This article comprehensively discusses all the pertinent information on heights and vertical reference surfaces used in the country, which is important for various stakeholders and users of the NGP and guidelines. Some suggestions towards the successful implementation of the NGP in terms of maintaining consistency and avoiding duplication in densifying the national fundamental elevation dataset and a roadmap for developing the consistently precise national geoid model have also been provided for consideration by the national agencies and engineering surveyors.

Keywords: Geoid model, geospatial guidelines, height system, National Geospatial Policy, vertical datum.