



Towards a first realization of the International Height Reference System (IHRS)

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The IAG Resolution No. 1 released during the IUGG 2015 General Assembly outlines five conventions for the definition of the International Height Reference System (IHRS). The definition is given in terms of potential parameters: the vertical coordinates are geopotential numbers referring to an equipotential surface of the Earth's gravity field realized by the conventional value $W_0 = 62\,636\,853.4 \text{ m}^2\text{s}^{-2}$. The spatial reference of the position P for the potential $W(P) = W(X)$ is given by coordinates X of the International Terrestrial Reference Frame (ITRF). This Resolution also states that parameters, observations, and data shall be related to the mean tidal system/mean crust. At present, the main challenge is the realization of the IHRS; i.e. the establishment of the International Height Reference Frame (IHRF). It is expected that the IHRF follows the same structure as the ITRF: a global network with regional and national densifications, whose geopotential numbers referring to the global IHRS are known. According to the GGOS objectives, the target accuracy of these global geopotential numbers is $1 \times 10^{-2} \text{ m}^2\text{s}^{-2}$. In practice, the precise realization of the IHRS is limited by different aspects; for instance, no unified standards or methods for the determination of the potential values $W(P)$; application of different conventions for the gravity field modelling and the estimation of the position vectors X ; inhomogeneous distribution of the geodetic infrastructure; restricted accessibility to terrestrial gravity data to increase the GGM resolution; insufficient modelling of geodynamic phenomena, etc. This may restrict the expected accuracy of $1 \times 10^{-2} \text{ m}^2\text{s}^{-2}$ to some orders lower (from $10 \times 10^{-2} \text{ m}^2\text{s}^{-2}$ to $100 \times 10^{-2} \text{ m}^2\text{s}^{-2}$). This contribution discusses the required steps to outline a sustainable realization of the IHRS.