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GGOS activities related to the implementation of the International Height Reference System (IHRS)

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The International Height Reference System (IHRS) is defined as a geopotential reference system co-rotating with the Earth in its motion in space. Coordinates of points attached to the solid surface of the Earth are given by (1) geopotential numbers (C(P) = W0 - W(P)) referring to an equipotential surface of the Earth's gravity field defined by the conventional value W0 = 62 636 853.4 m2s-2 and, (2) geocentric Cartesian coordinates X referring to the International Terrestrial Reference System (ITRS). The determination of the coordinates C(P) and X(P) includes their variation with time. As W0 is a conventional constant value, C(P) basically depends on the potential value W(P). Thus, W(P) may be understood as a main coordinate of the IHRS. The present challenge is the realization of the IHRS; i.e. the establishment of the International Height Reference Frame (IHRF). This comprises, among others, (1) the selection of a global well-distributed set of stations as the IHRF core network, and (2) the development of strategies for the precise computation of the coordinates W(P) and X(P) at those core stations. While X(P) may be determined following the standards and conventions of the International Earth Rotation and Reference Systems Service (IERS), the estimation of the potential values W(P) is not a standardized procedure so far. Consequently, the implementation of the IHRS also includes the identification/formulation of harmonized standards for the consistent determination of W(P) and X(P), the precise modelling of the time-dependent changes of the coordinates, and the implementation of strategies for the collocation of IHRF reference stations with other reference frames (like the GGRF, the ITRF, geodetic observatories, time laboratories, etc.). These activities are developed under a strong international cooperation performed within the working group "Strategy for the realization of the International Height Reference System". It is a joint working group coordinated by the GGOS Focus Area for a Unified Height System with the contribution of IAG Commission 2 (Gravity field), IAG Commission 1 (Reference Frames), IAG Inter-commission Committee on Theory (ICCT), and the International Gravity Field Service (IGFS). This contribution describes the main achievements of this working group.