

Completion of the GGOS Focus Area Unified Height System

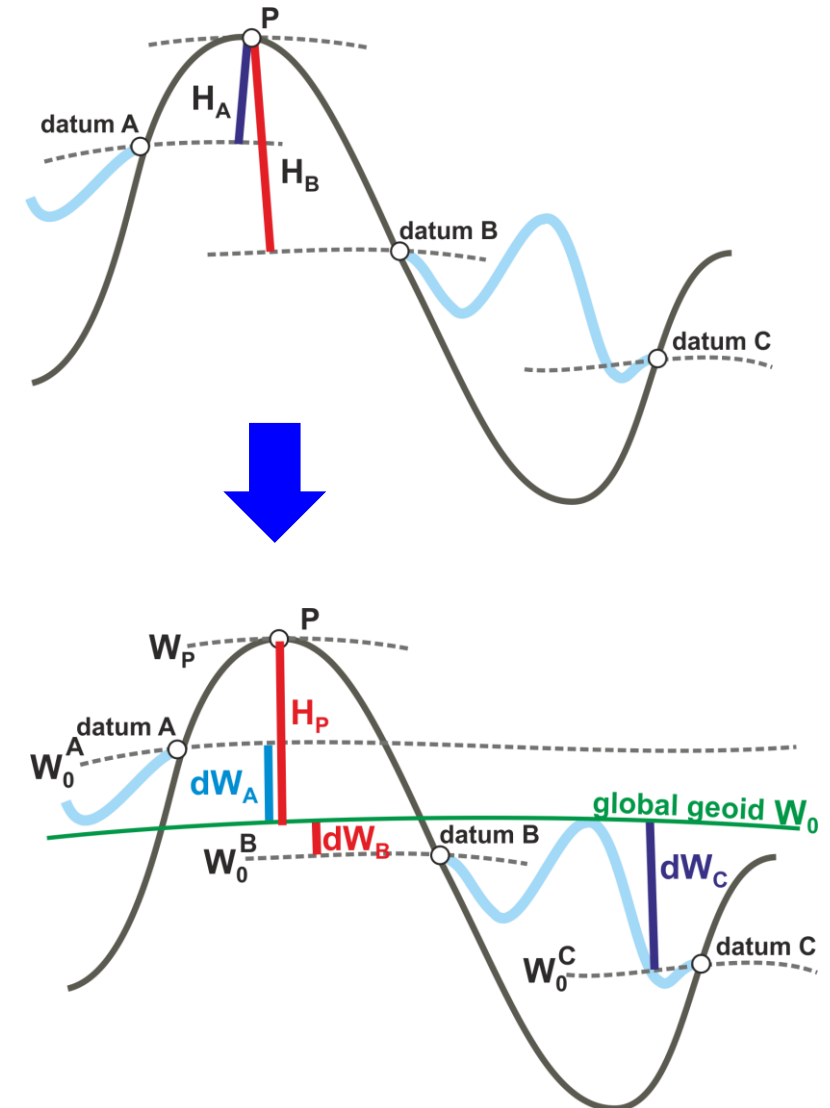
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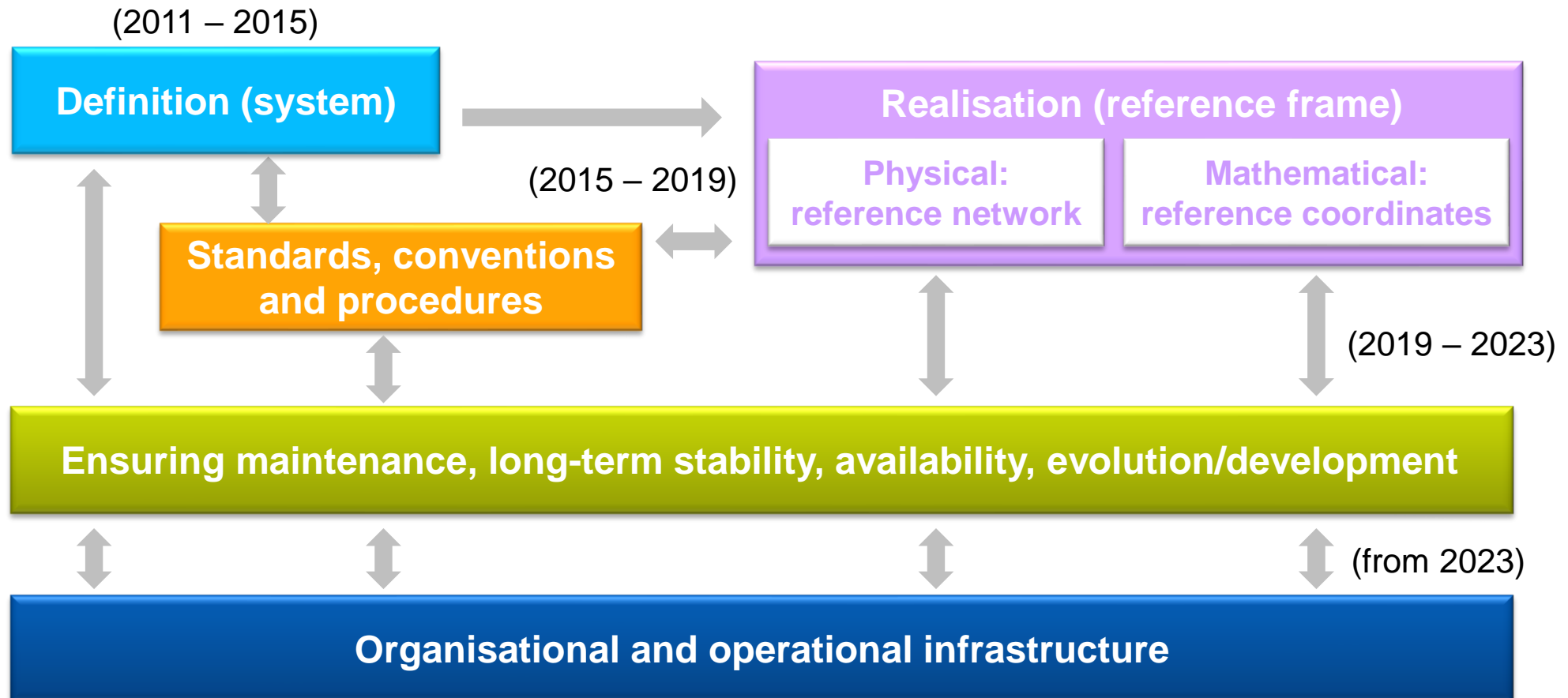
Motivation

- Existing height systems are usable in limited regions, not globally
- The vertical datum unification problem (**all physical heights referring to the same equipotential surface**) is a topic with long tradition in the IAG
- The same objective with different names:
 - global vertical network (Colombo 1980)
 - global vertical datum (Rapp 1983)
 - height datum connection (Rummel and Teunissen 1988, Rummel and Ilk 1995)
 - height or vertical datum problem (Heck and Rummel 1990, Sacerdote and Sansò 2001, Sacerdote and Sansò 2004)
 - vertical datum connection (Xu and Rummel 1991, van Onselen 1997)
 - world height system (Rapp and Balasubramania 1992)
 - world vertical datum (Balasubramania 1994, Rapp 1995)
 - global unification of height systems (Rummel 2001)
 - global unified height reference system (Ihde and Sánchez 2005, Sánchez 2007, Kutterer et al. 2012)



GGOS Focus Area Unified Height System

In 2010, GGOS established the Focus Area Unified Height System with the objective to *provide an international standard for the precise determination of physical heights worldwide* → The **International Height Reference System (IHR)** with its realisation the **International Height Reference Frame (IHRF)**

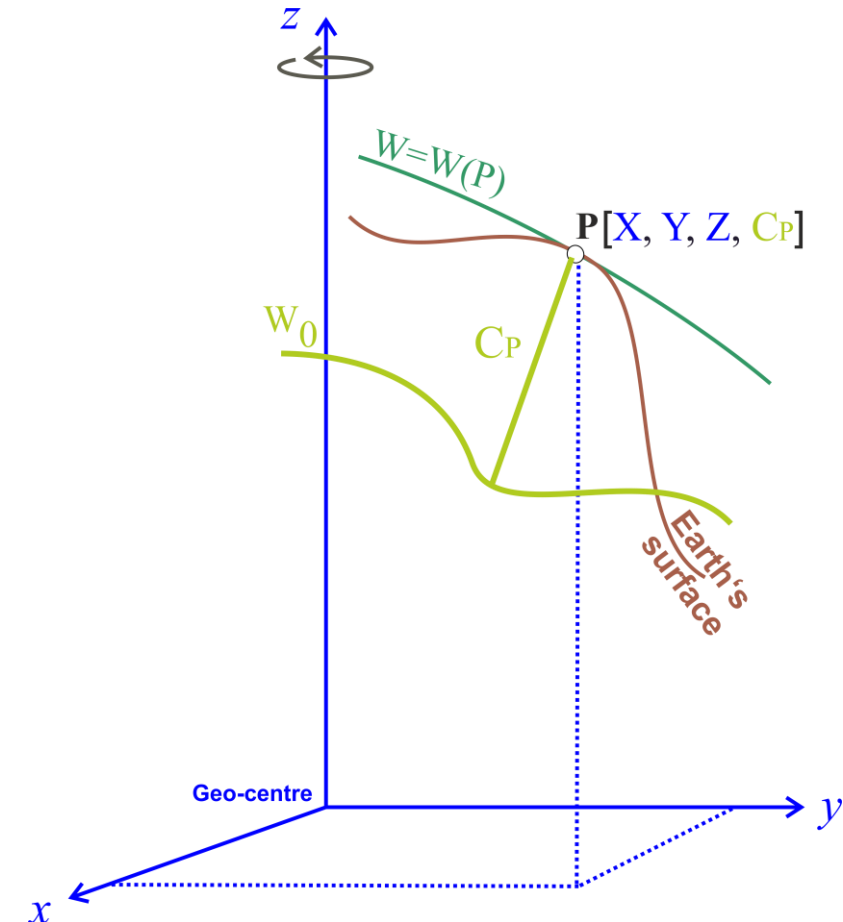


The International Height Reference System (IHRIS)

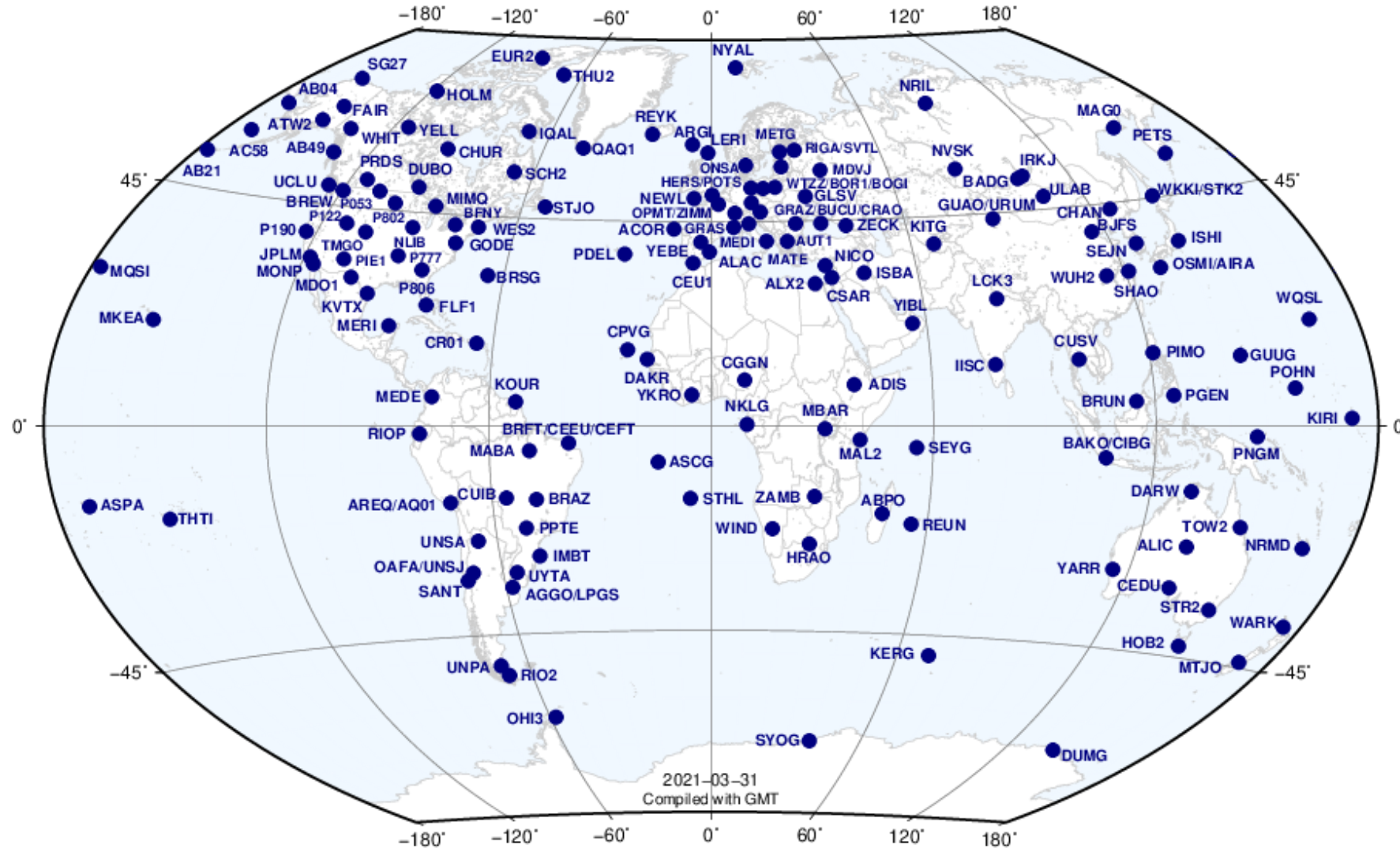
- **Convention:** geopotential-based height system
- **Principle:** Precise determination of gravity potential values (W) at positions $[X, Y, Z]$ defined by ITRF coordinates.
- **Primary vertical coordinate:** Geopotential numbers referring to a conventional reference W_0 value

$$C_P = W_0 - W_P \rightarrow H = \frac{C_P}{\gamma}$$

including time variations of W_P and $[X, Y, Z]_P$.



The International Height Reference Frame (IHRF)

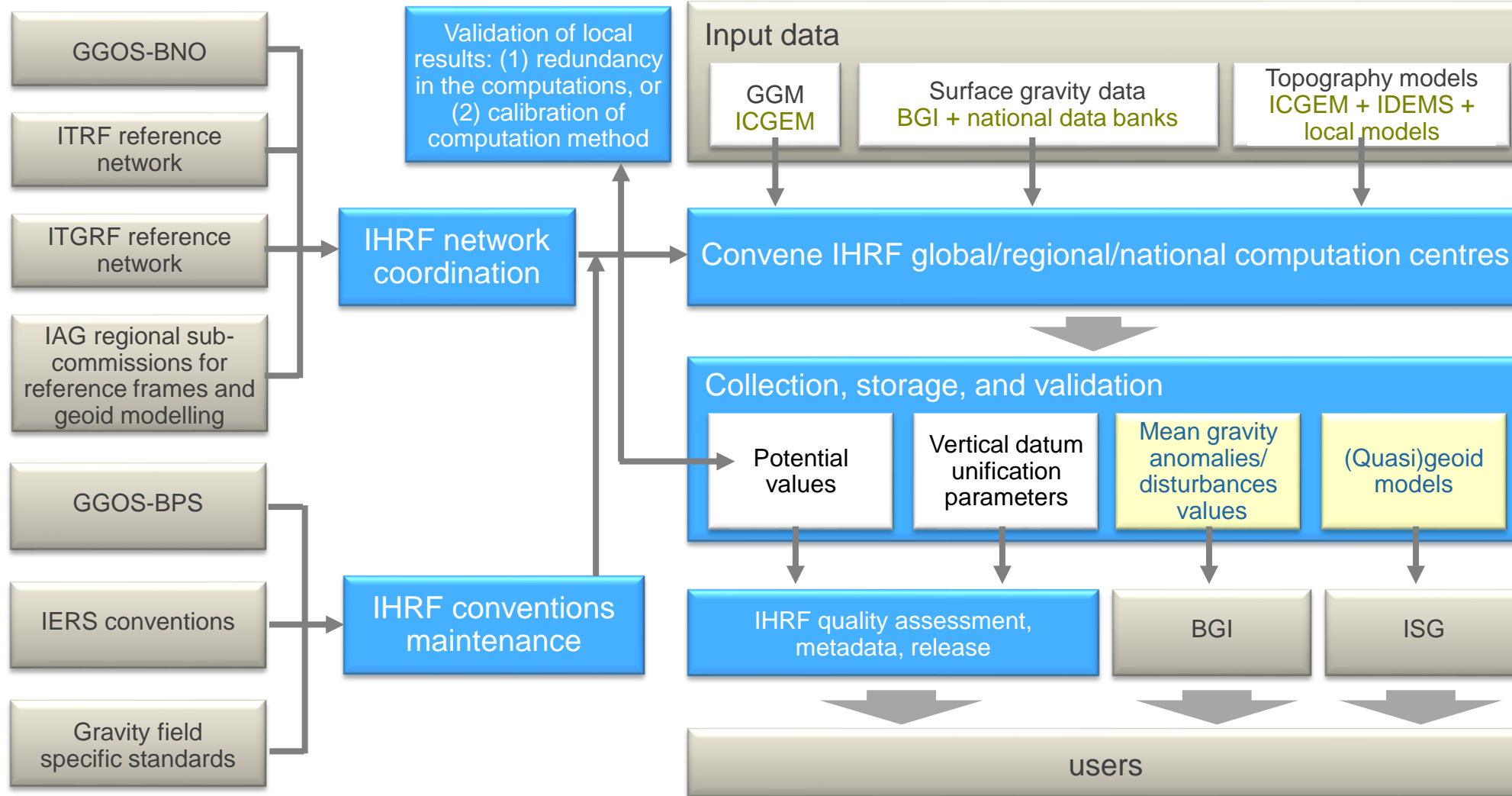


Ensuring a reliable and long-term sustainable realisation of the IHRF



Responsibilities of the IHRF Coordination Centre

Networking with other IAG Services



IHRF Coordination Centre of the International Gravity Field Service (IGFS)

