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Gravity Field Modelling

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For the construction and maintenance of large-scale infrastructure such as the Gotthard Base Tunnel or the CERN-FCC, it is vital to take into account the influence of the varying gravity field, because most geodetic measurements are referring to the local plumb lines and equipotential surfaces, deviating from purely geometrical positioning by e.g. GNSS.

The so-called Geoid, an equipotential surface of the gravity potential field, describes the idealized continuation of the mean surface of the oceans beneath the continents and is in general used as reference surface for the definition of physical heights. Different approaches exist to compute a local or regional model of the gravity potential field and the Geoid. Due to uncertainties, gaps in the measurements and simplifications in the modeling, existing geoid models differ by up to several centimeters in the FCC region. In this talk, the deviation between different geoid models available nowadays is shown and an overview to gravity field modelling using a selection of measuring instruments is given. Furthermore, the preliminary analysis of geodetic data (leveling, gravimetric measurements, deflection of the vertical and GNSS positions) collected along a profile, which was specifically selected to validate the calculated Geoid models, is presented.

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