REFAG 2022 THESSALONIKI - GREECE 17-20 October 2022

Saudi Arabia - National Spatial Reference System (SANSRS)

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Abstract. SANSRS is an accurate framework that unifies all geospatial activities within the Kingdom, it allows users to precisely determine and express locations in the Kingdom of Saudi Arabia. SANSRS consist of the following components:

• National Geodetic Reference Frame (KSA-GRF) is based on ITRF2014, coincides with it at epoch of 2017.0 (KSA-GRF17) and is co-moving with the stable part of the Arabian tectonic plate.

• National Vertical Reference Frame (KSA-VRF) is using the Helmert-Orthometric above Mean Sea Level height system at the Jeddah Tide Gauge. It was determined using satellite data (altimetry & gravity) and terrestrial observations from national tide gauge, gravity and leveling networks. KSA-VRF14 is the current realization fixed to MSL epoch 2014.75.

• National geoid model (KSA-GEOID) – hybrid geoid model determined by using satellite data (altimetry & gravity), more than 500000 offshore and onshore pointwise gravity observations, airborne gravity measurements, and 3522 GPS-leveling points. The most recent realization is KSA-GEOID21.

The following geodetic networks beside SANSRS forms SA National Geodetic Infrastructure (NGI)

• KSA-CORS: a network of over 200 active CORS installed according to the international standards and providing GNSS services in KSA-GRF17.

• National Vertical Network (KSA-NVN): a network of 3893 geodetic BMs grouped into 88 lines and observed by precise spirit leveling, providing orthometric height in KSA-VRF14.

• National Gravity Network (KSA-NGN) – consists of 41 absolute gravity stations with the accuracy of 10 μGal and 3836 relative gravity stations with the accuracy of 20 μGal. In addition, a gravity calibration baseline of 14 stations is established.

In order to follow the technical development in geodesy and to improve the accuracy and reliability of SANSRS, Currently GASGI is working on developing the concept for transition from static to a dynamic/time varying SANSRS.