



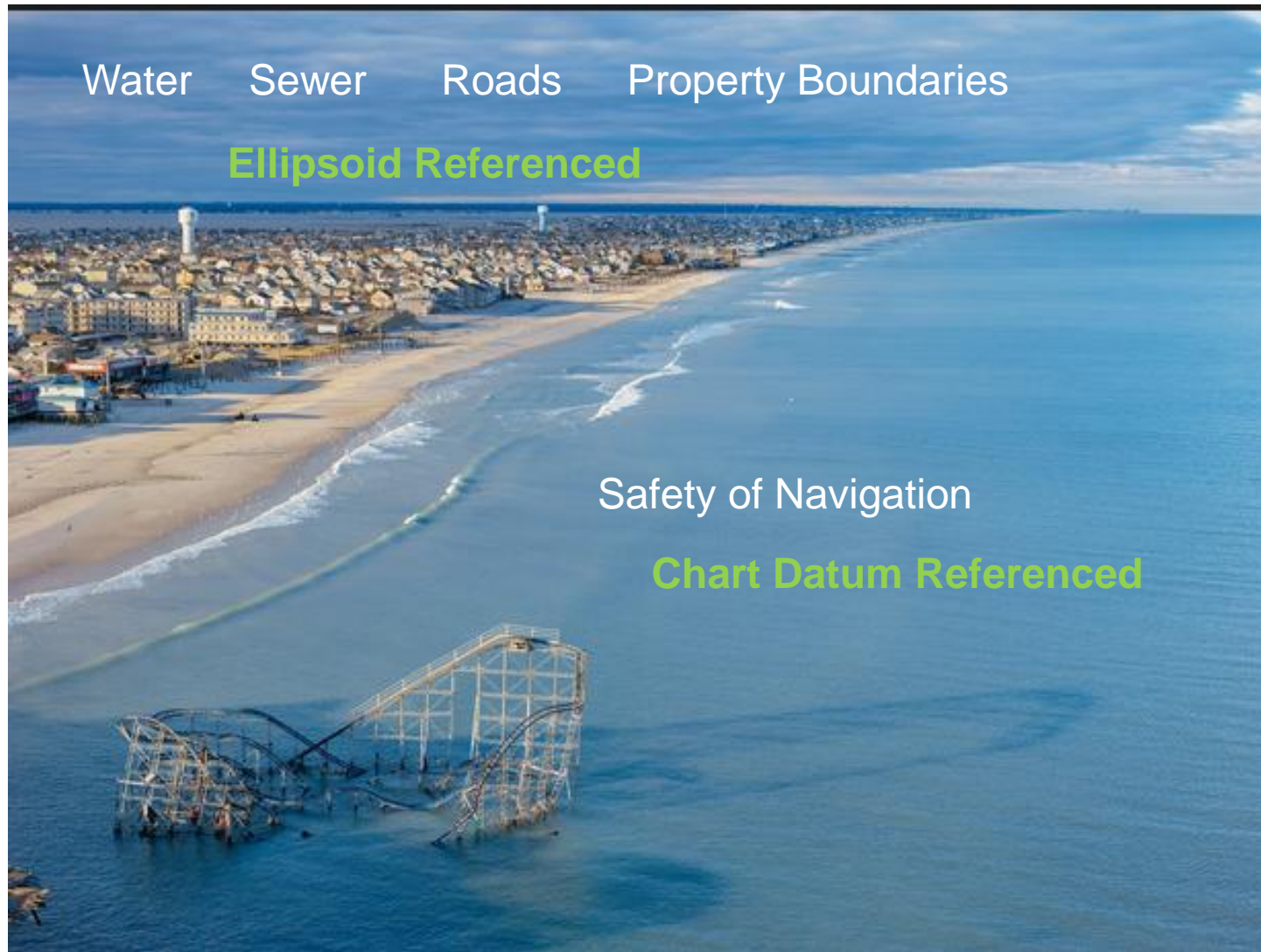
**Oman Geoid Project  
Supporting  
Ellipsoidal Referenced  
Surveying**

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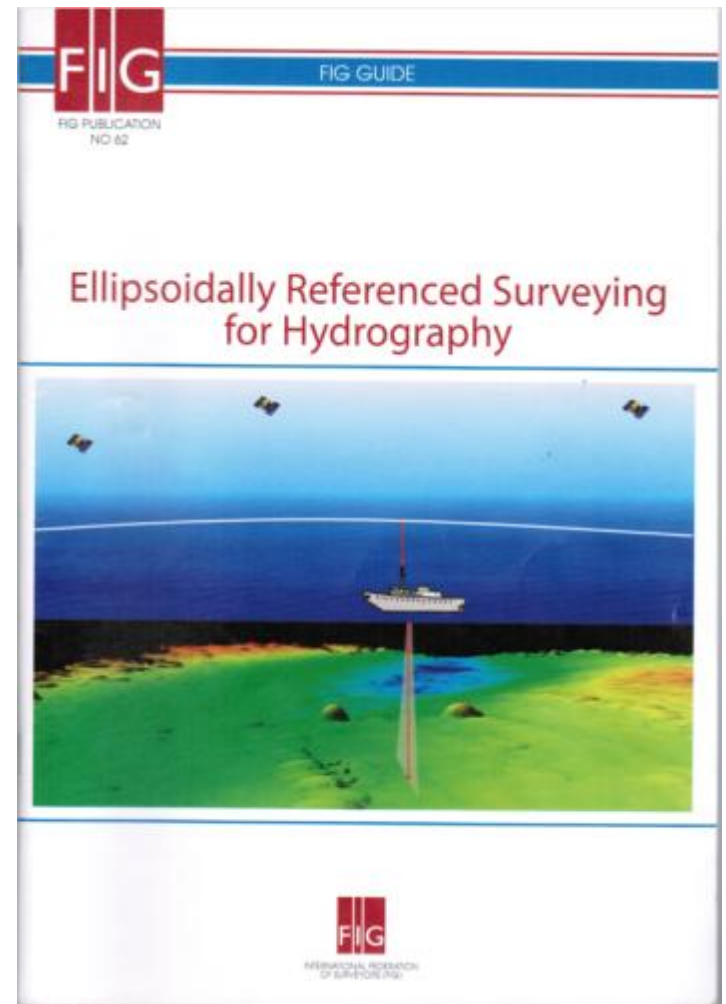
- Problem Definition and Motivation
- Description of Ellipsoidally Referenced Surveying
- Determining the Relationship Amongst Vertical Datums
- Description of the Oman Geoid Project

# Problem Definition and Motivation



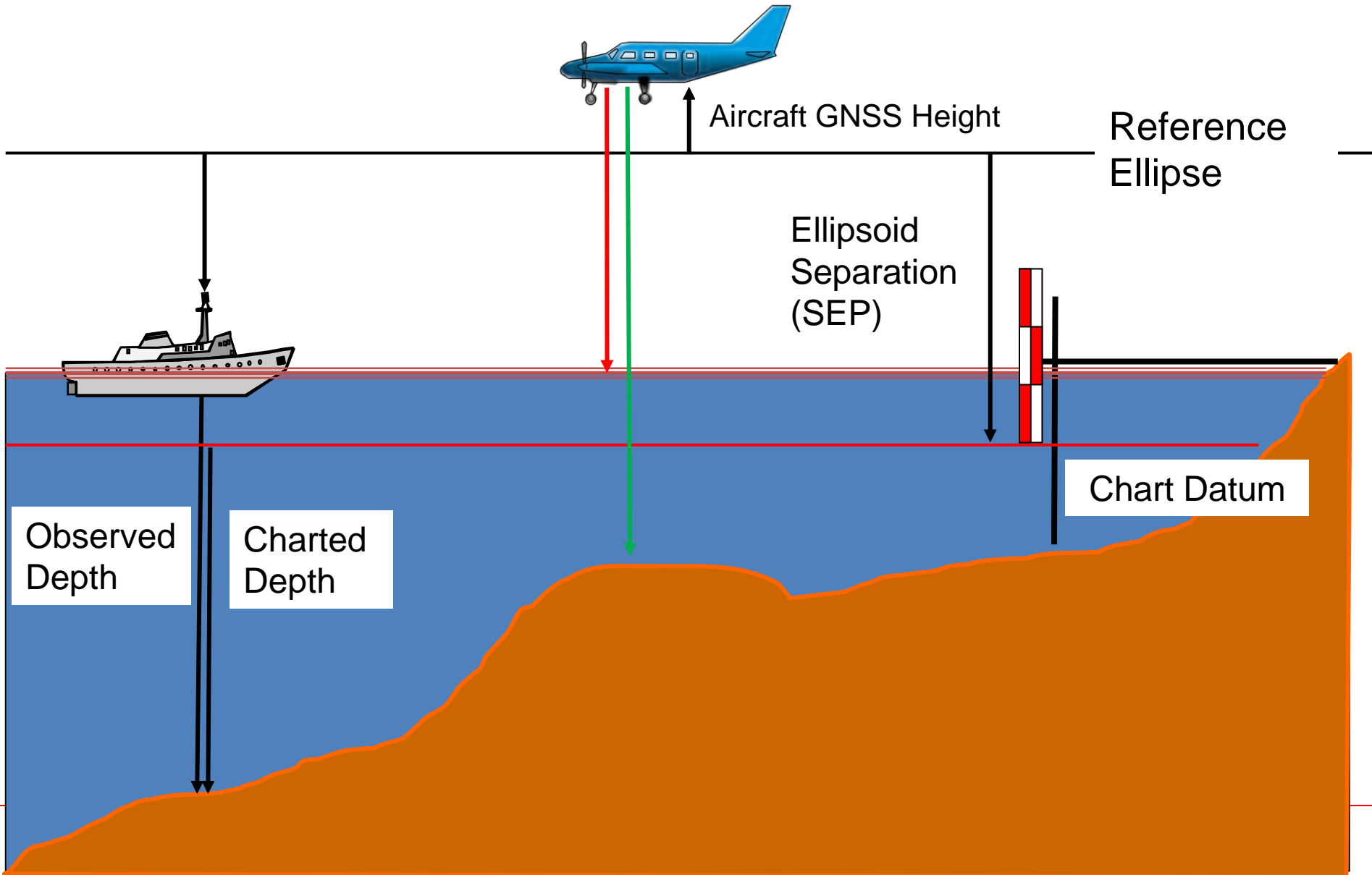
**FIG Commission 4 has published a document showing best practices for hydrographic surveying**

**“Surveying on the Ellipsoid”**



<http://www.fig.net/pub/figpub/pub62/Figpub62.pdf>

# Ellipsoidally Referenced Surveying



The objective is not to establish a relationship amongst the various vertical datums:

**Determine the Geoid** (explained in this paper)

**Determine MSL** (established by HO using tide gauges over 19+ years)

**Determine the relationship between MSL and the Geoid** (complex hydrodynamic modelling)

**Determine Chart Datum** (established by the HO as , MLLW, LAT, MHHW, HAT ....)

NATIONAL SURVEY AUTHORITY  
MINISTRY OF DEFENCE  
SULTANATE OF OMAN

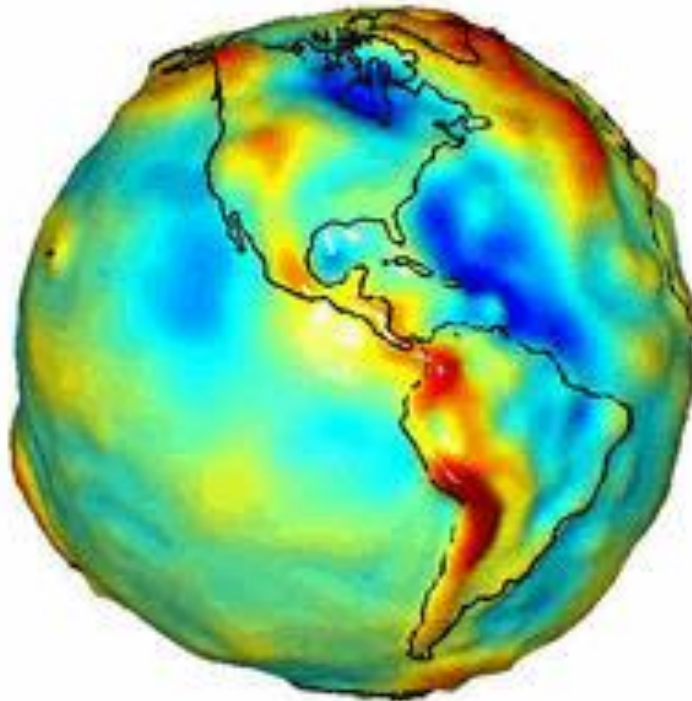


ESTABLISHMENT OF OMAN NATIONAL GEOID MODEL  
(ONGM) FOR THE SULTANATE OF OMAN

To develop a national geoid model for the Sultanate of Oman (ONGM) for establishing a modern height reference system.

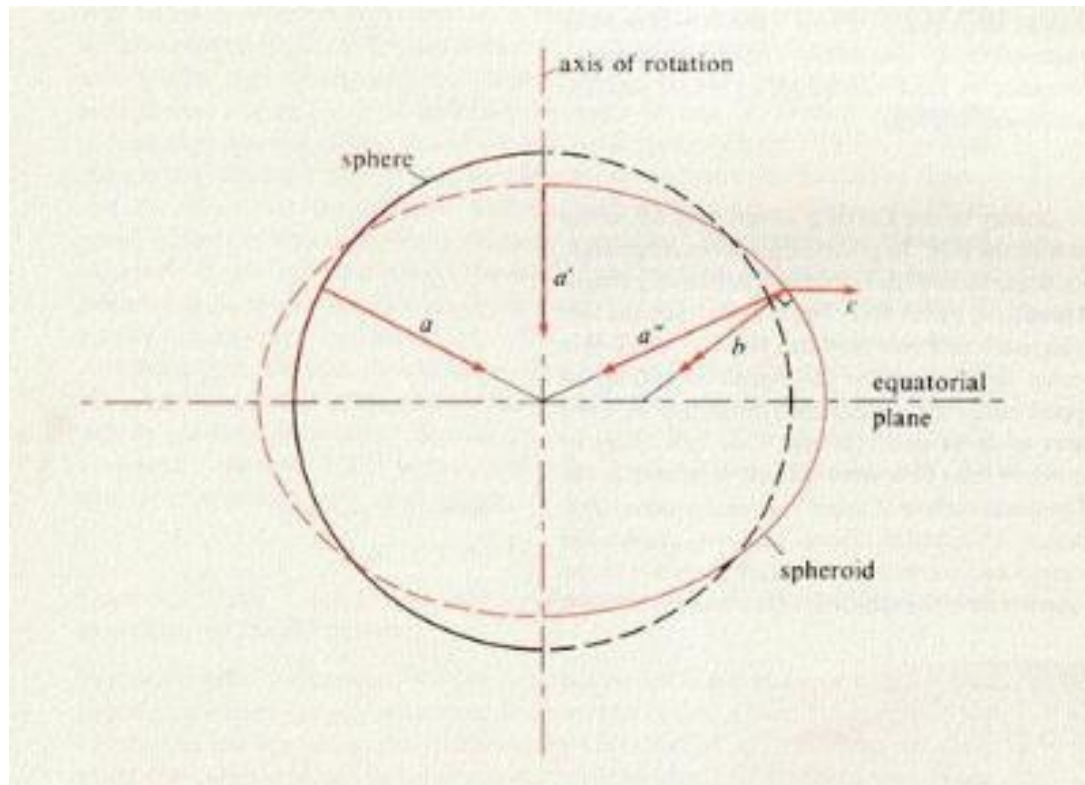
By definition the geoid is a 3D surface of the earth gravity field equipotential and relates to Mean Sea Level.

Determination of the geoid therefore requires to measure the earth gravity field.



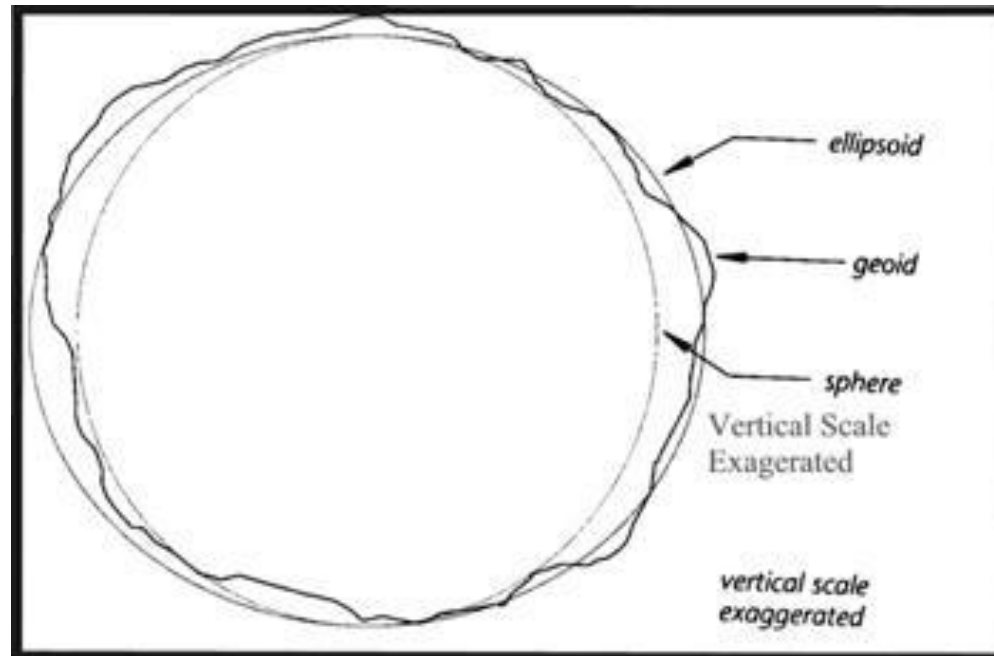
# The Geodetic Approach

Height system from GPS satellite refers to ellipsoid height. The ellipsoid being a mathematical figure that best represent the Geoid



Establishing a national modern height system consists in computing the difference between the ellipsoid and the geoid on a regular grid across the entire country.

That regular grid is the output model of this study.



## The Geophysical Tasks:

### **Ground Gravity**

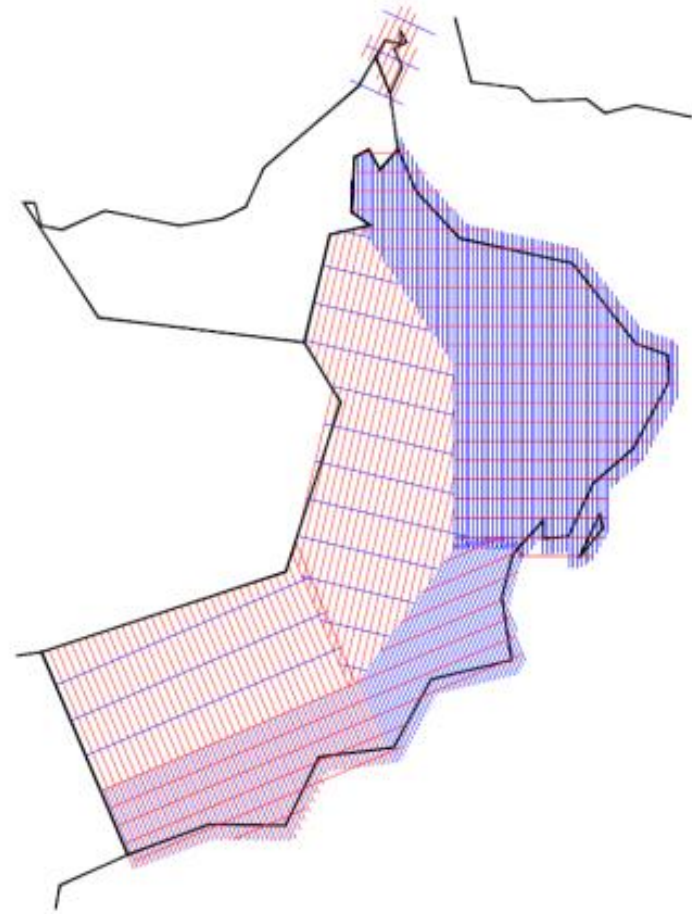
Analysis of existing gravity data and acquisition of 6000 new gravity points in urban (and mountainous) areas



## The Geophysical Tasks:

### **Airborne Gravity**

Acquisition of over 66,000 line-km of data over the entire country



## The Geodetic Tasks:

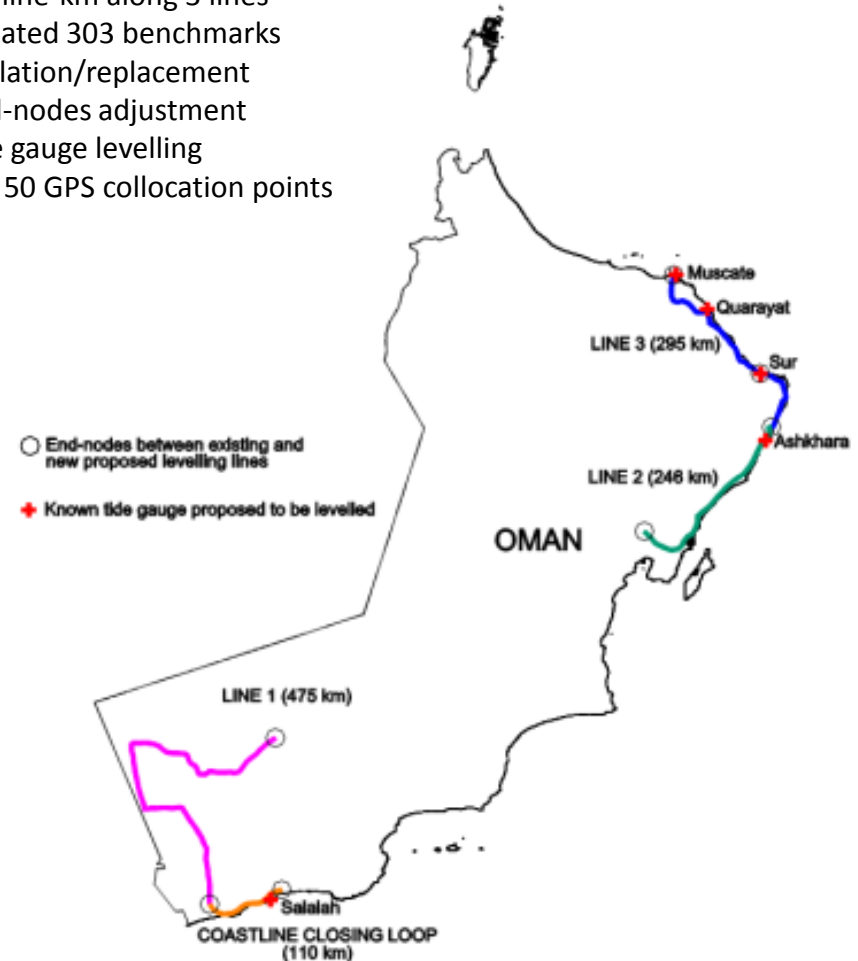
### Benchmarks

Inspection of existing BM and installation of new BM along new Levelling routes.

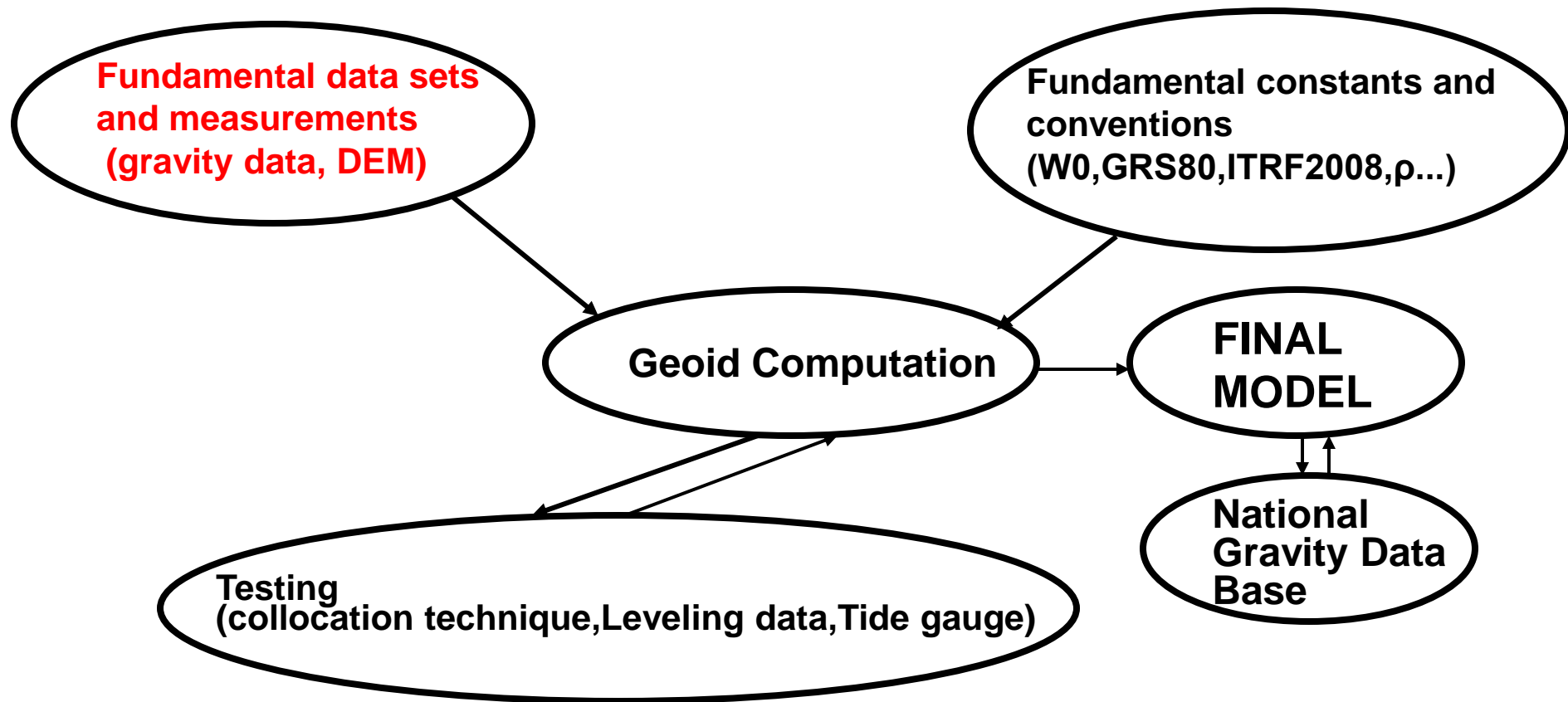
### Levelling

Analysis of the existing precise levelling network and to carry out additional levelling surveys to complete loops and hanging lines.

- 1126 line-km along 3 lines
- Estimated 303 benchmarks installation/replacement
- 6 end-nodes adjustment
- 5 tide gauge levelling
- 40 to 50 GPS collocation points



## From Geophysics to Geodetic Modelling Tasks:



Modern day challenges ask that hydrographic and topographic projects be linked.

The approach to link topographic and hydrographic surveys is by collection and referencing all data to the ellipsoid.

Oman has undertaken a national strategy for the modernization of its geoid to integrate land and sea.

Thank you for listening