Impact of Weak Gravitational Force in Sri Lanka

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Abstract

Gravity studies explain about the sub surface features and shape of the earth, and show gravitational force is weak in the Sri Lanka region, which has positive and negative impacts. This poster argues further studies on gravity are needed to revise the global gravitational model of the region.

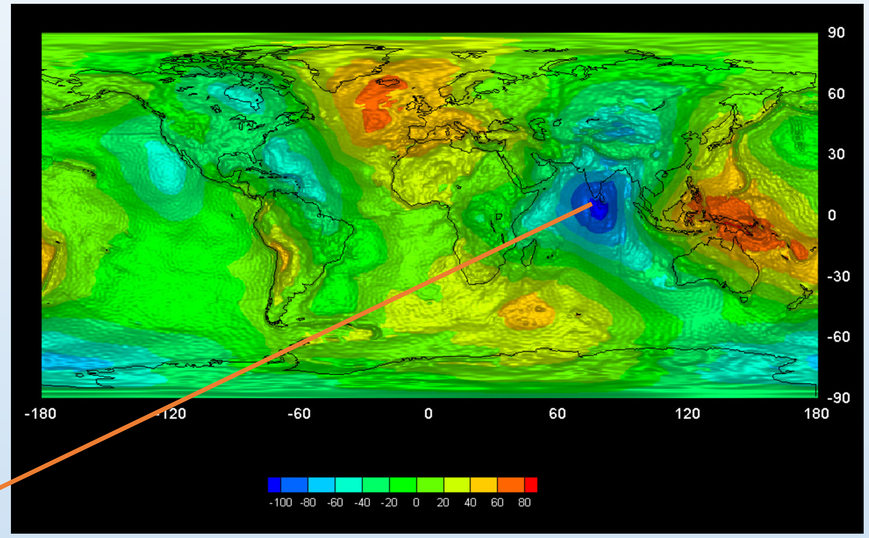

Fig 1 : Global Gravity Model (ESA – GOCE High Level Processing Facility, 2010)

Introduction

The gravitational pull of the earth is fundamental and the weakest universal force in Nature. According to the **density** of the subsurface materials and the shape of the earth, gravitational pull varies. Satellite based gravity observations show significant variations in the southern part of the Indian ocean that influence the Sri Lanka region. Research studies on this data reveal gravitational attraction is weak. **This weak gravitational attraction has both positive and negative effects in the Sri Lanka region.**

Results

GRACE (Gravity Recovery and Climate Experiment) Stellite Gravity Data (http://icgem.gfz-potsdam.de/home)

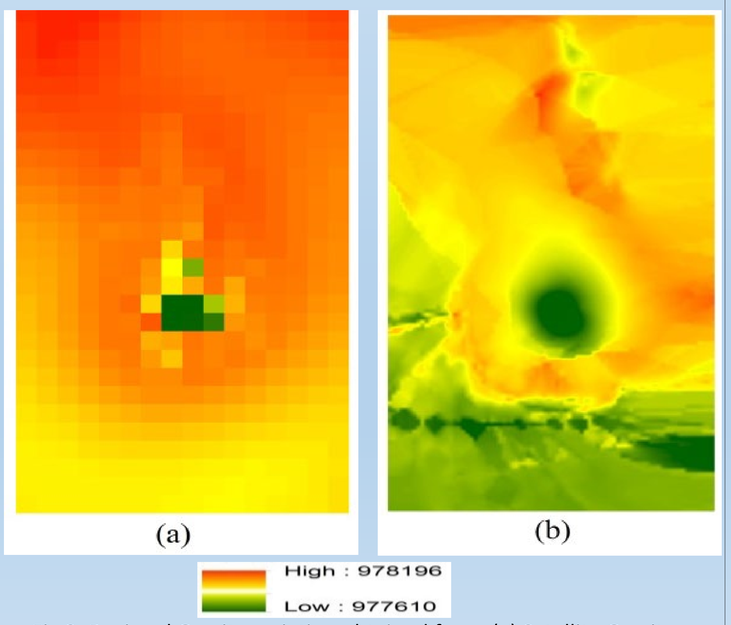

Fig 2: Regional Gravity variation obtained from (a) Satellite Gravity (b) Observed land gravity data (P. Thunendran)

Research Studies

- **Space elevator** based on Sri Kanda (Adam's Peak): Dr. Arthur. Clarke (Raitt, D, 2017)
- **GRACE** first gravity model EIGEN-GRACE01S (Reigber, 2005)
- The earth **gravity anomaly** provides the earth structure (Hinderer, J., & Crossley, D. , 2000)

Conclusion

- All this evidence provides reasonable justification that Sri Lanka is a special sample for Gravitational studies, because it has the weakest gravitational pull in the world.
- Density variation of the earth reflects its prominent subsurface features (Nabighian, M. N, 2005)
- This weakest gravitational pull has the following effects:
  - Positive: Economic developments such as mining for new minerals
  - Negative: GPS inaccuracy due to Gravity variations influencing vertical height measurements (Romagnoli, 2003)
- The global gravitational model should be revised for the Sri Lanka region.

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Reigber, C., Schmidt, R., Flechtner, F., König, R., Meyer, U., Neumayer, K. H., ... & Zhu, S. Y. (2005). An Earth gravity field model complete to degree and order 150 from GRACE: EIGEN-GRACE02S. Journal of Geodynamics, 39(1), 1-10.

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