Sea Level Difference between the Mediterranean and the Red Sea

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Key words : precise leveling, mean sea level.

ABSTRACT

The classic geodesy recommends controlling a large network of precise leveling by connection to tide gauges along the seashore. This is reasonable in the case that the accuracy of the height difference obtained by the tide gauges is better than that of the precise leveling. The latter is correlated mainly with the length of the leveling, while the first is influenced mainly by the maritime distance (and therefore a different regime of the marine system) between the tide gauges. The northern part of Israel is situated along the Mediterranean, which can be considered as a wide gulf of the Atlantic Ocean, having a narrow gate at the Strait of Gibraltar. The southern part of Israel reaches a sea shore at the northern edge of the Gulf of Eilat (or Aqaba), which is some 20 km wide and 170 km long band of the Red Sea, which for itself can be considered a wide gulf of the Indian Ocean, having a narrow gate at Bad el Mandeb. The whole maritime distance between Tel-Aviv and Eilat is some 24000 km, while the distance along the road is about 360 km. It is obvious in these circumstances that we can not trust the height difference obtained by the tide gauges at the two different seas, for controlling the precise leveling (except for gross error). On the other hand it is very interesting to find the sea level difference between the two. Also, if we can be sure that the sea level difference is stable, we can learn about the actual accuracy of the precise leveling.

The first precise leveling to Eilat was carried out during the early sixties. At that time a tide gauge was established there. The mean sea level of 1963 at Eilat was found to be about 24cm higher than that of Tel-Aviv. The geometry of the leveling network was poor, and gravimetric measurements were not used (only the theoretic orthometric correction was applied). New leveling was carried out in the recent years, with improved geometry of the network. Orthometric correction was not applied yet. The first results indicate no real change in the leveling, as well as in the difference of the mean sea level of 2001 between Tel-Aviv and Eilat. The last gravimetric measurements will be completed and applied soon.

The paper will describe the comparison between the two sets of leveling, as well as a picture of the bench marks stability, the accuracy of the leveling and tide gauges measurements and so on.

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1. INTRODUCTION

The classic geodesy recommends controlling a large network of precise leveling by connection to tide gauges along the seashore. This is reasonable in the case that the accuracy of the height difference obtained by the tide gauges is better than that of the precise leveling. The latter is correlated mainly with the length of the leveling, while the first is influenced mainly by the maritime distance (and therefore a different regime of the marine system) between the tide gauges. The northern part of Israel is situated along the Mediterranean, which can be considered as a wide gulf of the Atlantic Ocean, having a narrow gate at the Strait of Gibraltar. The southern part of Israel reaches a sea shore at the northern edge of the Gulf of Eilat (or Aqaba), which is some 20 km wide and 170 km long band of the Red Sea, which for itself can be considered a wide gulf of the Indian Ocean, having a narrow gate at Bad el Mandeb. The whole maritime distance between Tel-Aviv and Eilat is some 24000 km, while the distance along the road is about 360 km. It is obvious in these circumstances that we can not trust the height difference obtained by the tide gauges at the two different seas, for controlling the precise leveling (except for gross error). On the other hand it is very interesting to find the sea level difference between the two. Also, if we can be sure that the sea level difference is stable, we can learn about the actual accuracy of the precise leveling.

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BIOGRAPHICAL NOTES

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Since 1995 Deputy director general for Geodesy and Cadastral Surveys.
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Societies

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