

# “Simeiz-Katsively” Geodynamic Area: Results of the Geodetic VLBI Observing Program and Variability of the Black Sea Level

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## Abstract

This report gives an overview about the geodetic VLBI activities at the Simeiz station. It also summarizes the seasonal and long-term variability of the Black Sea level near Yalta and Katsively.

## 1. Measurements of Motion of Simeiz Station Using VLBI

The different analysis groups use different VLBI software for their investigations. Estimates of the horizontal velocity of the radioastronomical station Simeiz were obtained using VLBI observations carried out under geodynamics programs during the years 1994-2000 using CALC/SOLVE for data analysis (Petrov et al., 2001).

We continue it and the estimations of the horizontal and the vertical velocity of Simeiz station were obtained during the years 1994-2002. To analyse the time series of positions of the Simeiz VLBI site 3 million measurements of group delay from 1983 to 2003 have been processed using the Occam5.1 software at Saint-Petersburg IVS Analysis Center. The station rates have been estimated by weighted least squares (LSQ) method using a linear model. Figures 1, 2, 3 show the time series of topocentric coordinates of Simeiz.

## 2. The Black Sea Level

The 22-m radiotelescope RT-22 is located 80 m from the edge of the Black Sea. The geodynamics areas “Simeiz-Katsively” consists of two satellite laser ranging stations, a permanent GPS receiver, a sea level gauge and the radiotelescope RT-22 (Nesterov & Volvach, 2002). All these components are located within 3 km. Yalta level gauge is located near Yalta 20 km east of RT-22. Measurement of Yalta and Katsively level of Black Sea are plotted in Figure 4.

Height of a level is given in centimeters concerning uniform zero for posts of the Black Sea, which is located 500 cm below the zero Kronshtadt tide-gauge. High factor of correlation 0.964 testifies to synchronous change of levels. The level varies insignificantly from January till March. Then it begins prompt growth till May. Then the growth is slowed down and in June there comes a maximum. After July there is a fast fall up to the minimal size observable in October. From October till November the seasonal level varies little. In the period from November till December there is fast growth which is slowed down in the period December - January. The long-term variability of average annual value of sea level for Yalta and Katsively is shown in Figure 5.

Until 1999 the growth in change of sea level was observed. Then in 2000 the growth was slowed down and the recession began.

## 3. Future Plans

The VLBI activities in 2004 at “Simeiz-Katsively” area will consist of: (1) carrying out modernization of sites VLBI (Mark5B system), SLR-1 and SLR-2 with the purpose to increase their

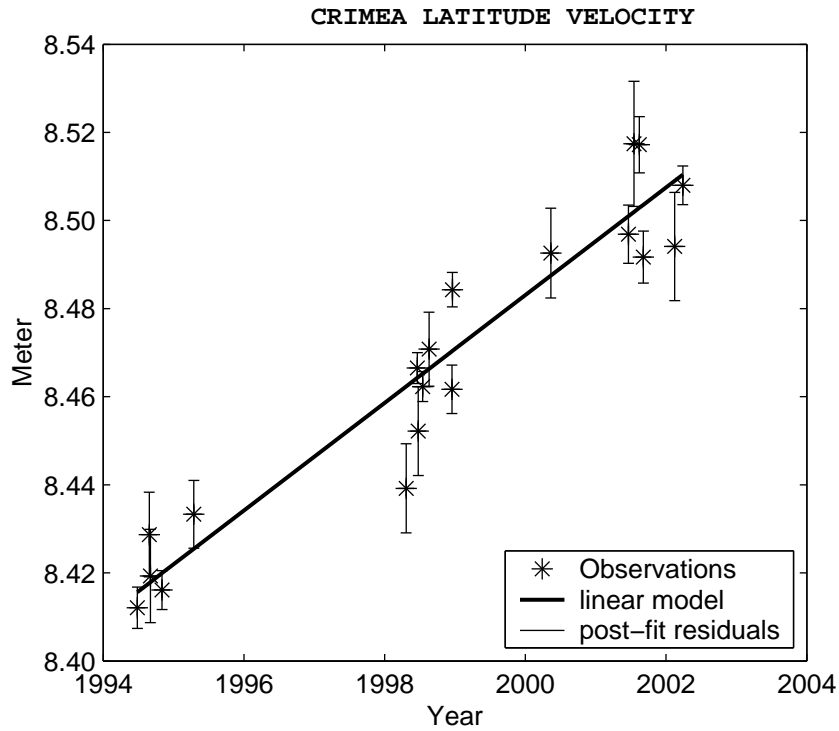


Figure 1. Crimea latitude velocity.

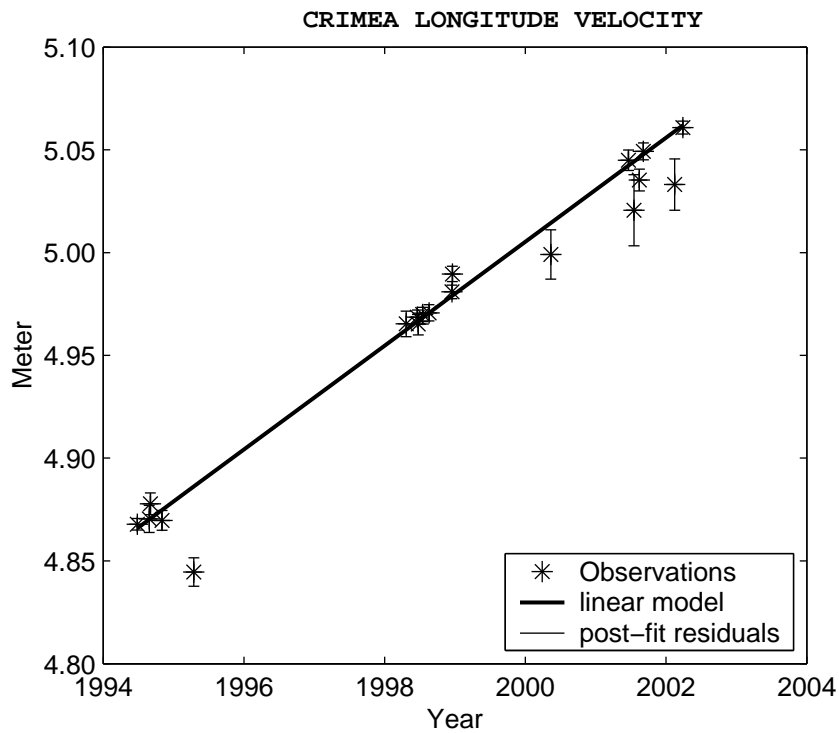


Figure 2. Crimea longitude velocity.

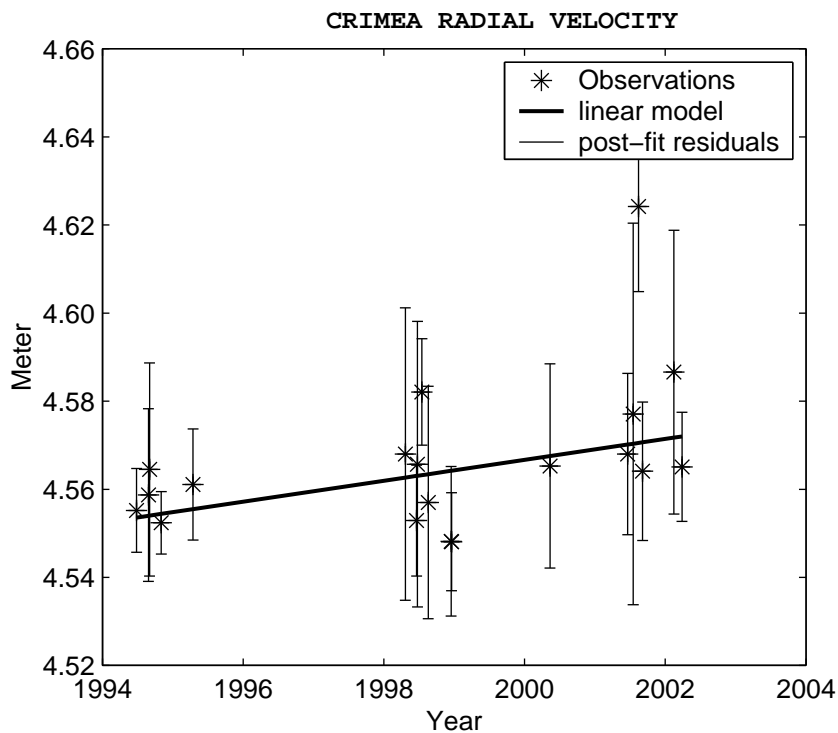


Figure 3. Crimea radial velocity.

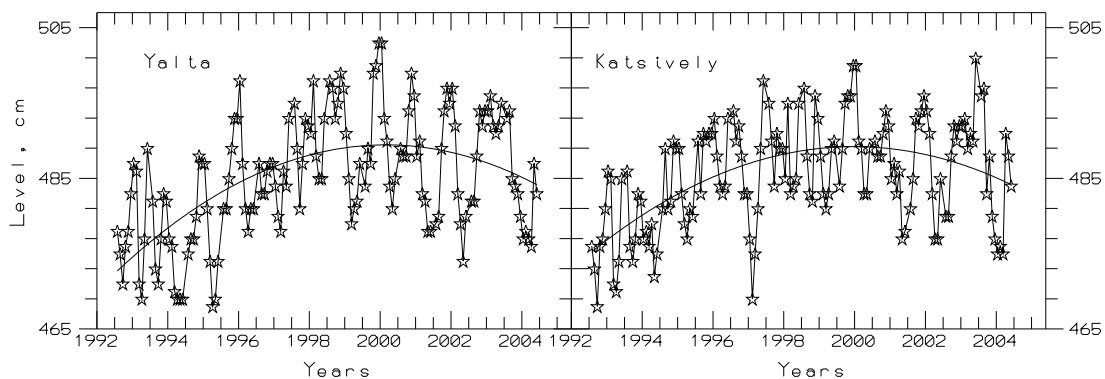


Figure 4. The Black Sea level near Yalta and Katsively.

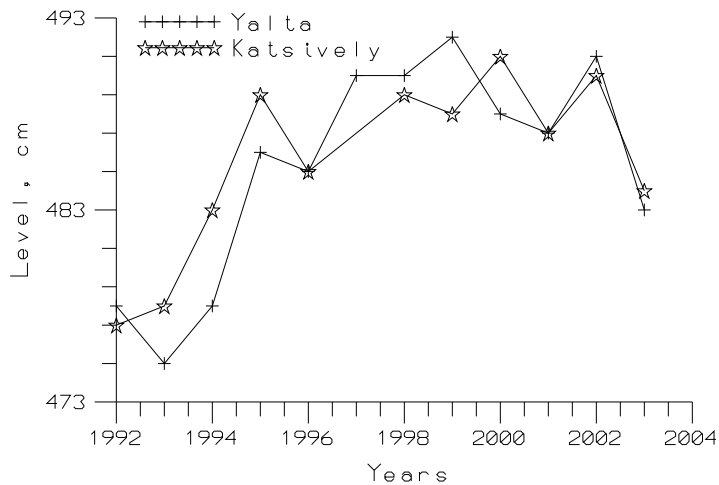


Figure 5. The long-term variability of Black Sea near Yalta and Katsively.

level of equipment according to the international standards; (2) realization of observations on sites VLBI and SLR for maintenance in territory of Crimea the International Terrestrial Reference Frame (ITRF) and high-precision connection (at a level of several millimeters) permanent GPS stations of the network to ITRF; (3) creation of the prototype of a system of monitoring of geodynamic phenomena of mountain region of Crimea and geotectonics of the Black Sea basin.

#### 4. Acknowledgment

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