

# Modified primary time and frequency standard of VNIIFTRI - new results and activities

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The National time scale of the Russian Federation is reproduced and maintained based on the use the primary State standard of time and frequency (GET1-2022) operated at a facility located in Mendeleevo, Moscow Region, Russia. The main purpose of the VNIIFTRI system of primary frequency standards, comprising two caesium fountains, is to perform regular calibrations of the international time-scale TAI/UTC at the highest accuracy and to provide a stable reference for the construction and steering of UTC(SU), as well as the local representation of UTC in Russia. In the present time, the system of primary frequency standard can be use for absolute frequency measurements of optical frequency standards using femto-second Comb techniques developed at VNIIFTRI.

In the present paper, a brief overview of the composition of GET 1-2022 is given, a comparative analysis of the contribution of time standards to the formation of the TAI time scale is carried out, as well as an analysis of the shifts of the time scales of the standards relative to TAI and the instability of the frequency standards (Fig.1)

It was shown, in particular, that from September 2022 to December 2023, the contribution of GET 1-2022 to the formation of the TAI increased significantly and exceeded that of the US Naval Observatory standard, and currently the contributions of these standards are comparable. In terms of frequency instability and average contribution to the formation of UTC, the atomic standards of GET 1-2022 are significantly superior to similar standard instruments from other countries.

The UTC(SU) time scale is currently transmitted to the GLONASS Ground Control Segment using signal receivers. The UTC(SU) time scale is a representation of UTC in accordance with the BIPM requirements.

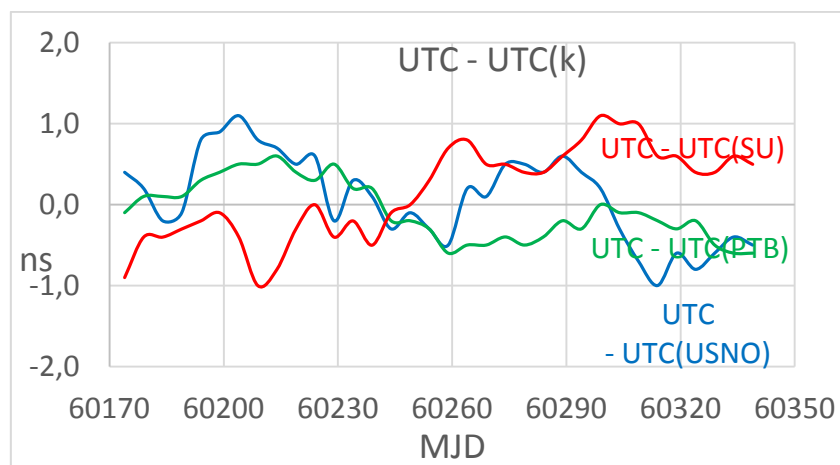


Figure 1. National local representations of UTC (k).

As follows from the BIPM Circular T, the UTC(SU) time offset from UTC has not exceeded 1.5 ns in the last year (see, for example, Fig.1)