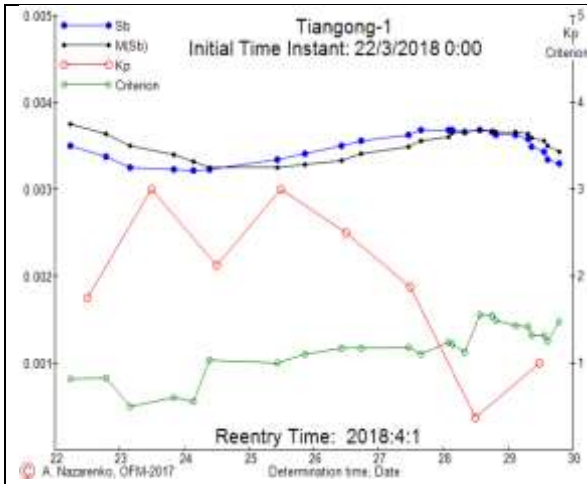


XVII. Decay Epoch of the "Tiangong-1" Spacecraft. March 30, 2018

Andrey I. Nazarenko, Professor, retired

1. The results for March 30, 2018

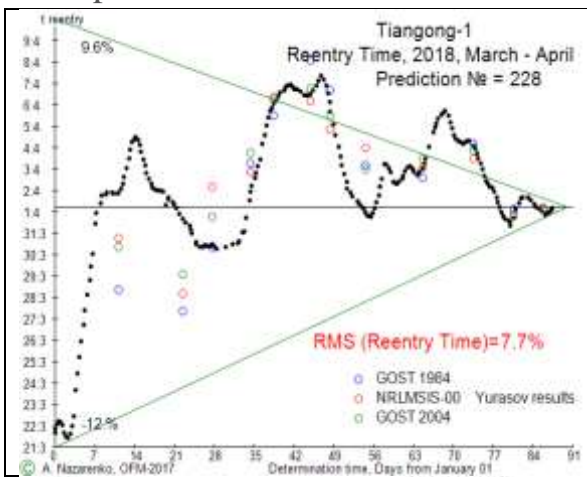
The materials presented below represent a continuation of the text under the same name, posted on the “satmotion.ru” site from November 2017 to March 28 2018.



This figure presents the ballistic coefficient estimates, the values of the geomagnetic disturbance index (Kp) and the minimized criterion for all preceding time instants of orbital parameters updating in interval from March 22 to March 29. The estimates of ballistic coefficient (Sb) have changed within the range from 0.00322 to 0.00369 m²/kg, i.e. 1.15 times. The highest drag variations have been observed after March 25, which is the consequence of strong and prolonged geomagnetic storms of March 23-26.

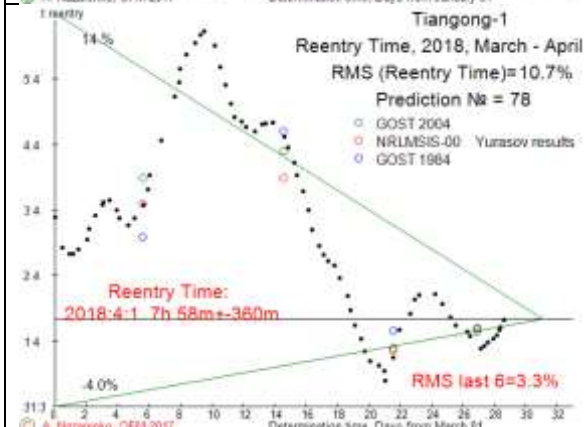
Reduction of geomagnetic activity March 28 led to a reduction in Sb values on 12%. The black line marks the Sb estimates averaged over some preceding time interval (the sliding average).

The last smoothed ballistic coefficient value (0.00344 m²/kg) was used as a constant value in the prediction of SC motion until its entering the dense layers of the atmosphere.



For SC Tiangong-1, the results of all 228 reentry time determinations after January 1, 2018 are presented here.

According to this results, RMS from the last value (April 1, 08^h) equals 7.7% of the remaining lifetime.

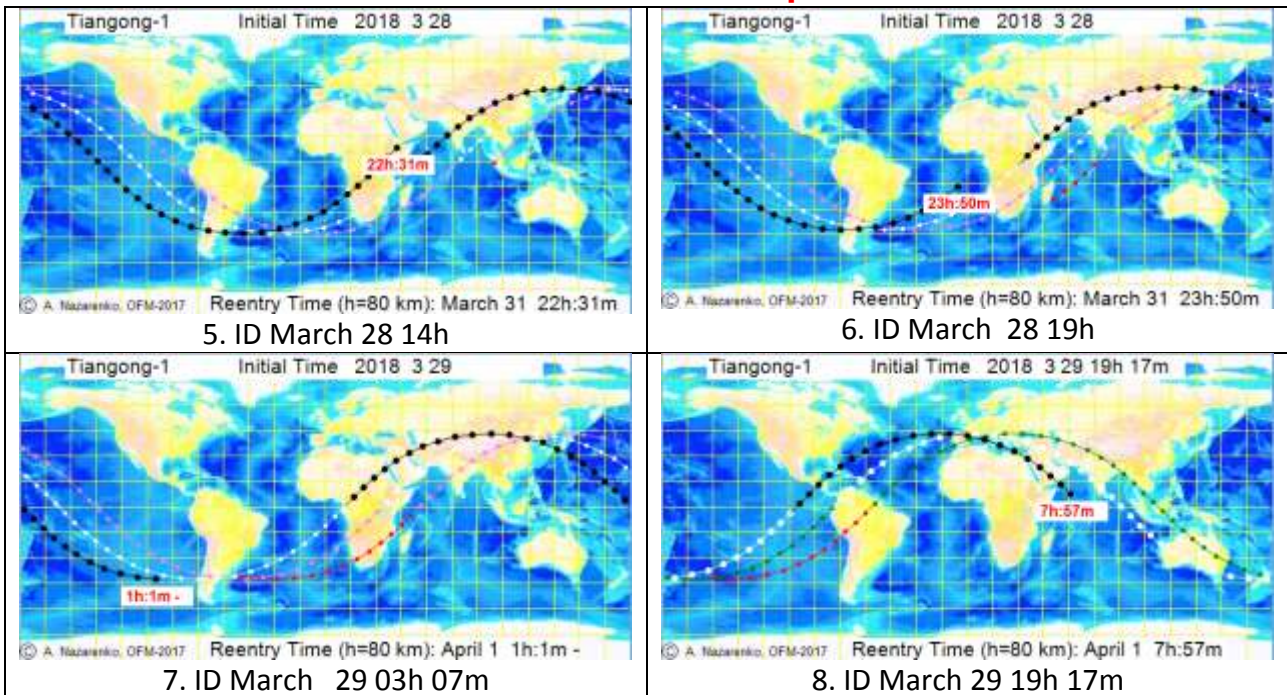


The results of all 78 reentry time determinations after March 1, 2018 are presented here.

According to the results of the last 6 determinations, RMS from the average value equals 3.3% of lifetime.

Reentry time:
April 1 2018 07^h 58^m ± 360^m

Initial data for March 28 and 29, 2018
Reentry prediction. Spread in reentry time (UTC):
from March 31 22^h 31^m to April 1 07^h 57^m



2. Recent publication of other authors

a) NORD TIP_msg

MSG_EPOCH	INSERT_EPOCH	DECAY_EPOCH	WINDOW	LAT	LON
2018-03-29 01:42:00	2018-03-29 01:49:44	2018-04-01 00:52:00	900	-25.7	209.8
2018-03-28 04:43:00	2018-03-28 04:50:52	2018-04-01 01:57:00	1140	33.8	115.8

b) Aerospace Corporation

Tiangong-1 is currently predicted to reenter the Earth's atmosphere around **April 1st, 2018 14:00 UTC ± 16 hours.**

This prediction was performed by The Aerospace Corporation on 2018 March 29.

c) ESA data:

Latest reentry forecast provided by ESA's Space Debris Office, ESOC, Darmstadt. Update 29 March 2018. The current estimated reentry window runs from **midday on 31 March to the early afternoon of 1 April** (in UTC time); this is highly variable.

References

1. A.I. Nazarenko, V.S. Yurasov, S.V. Tikhomirova. Determination of the satellite reentry time with allowance for random variations of atmospheric drag. ESOC, Reentry Workshop 2018, Darmstadt.
2. A.I. Nazarenko. Stochastic astrodynamics tasks. Mathematical methods and algorithms for solving. Moscow, URSS, 2017, 352 (p).