



# **ODYSSEY NAVIGATION PERFORMANCE AND LOCAL MEAN SOLAR TIME ANALYSIS**

**NAVIGATION TEAM  
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05/22/06**



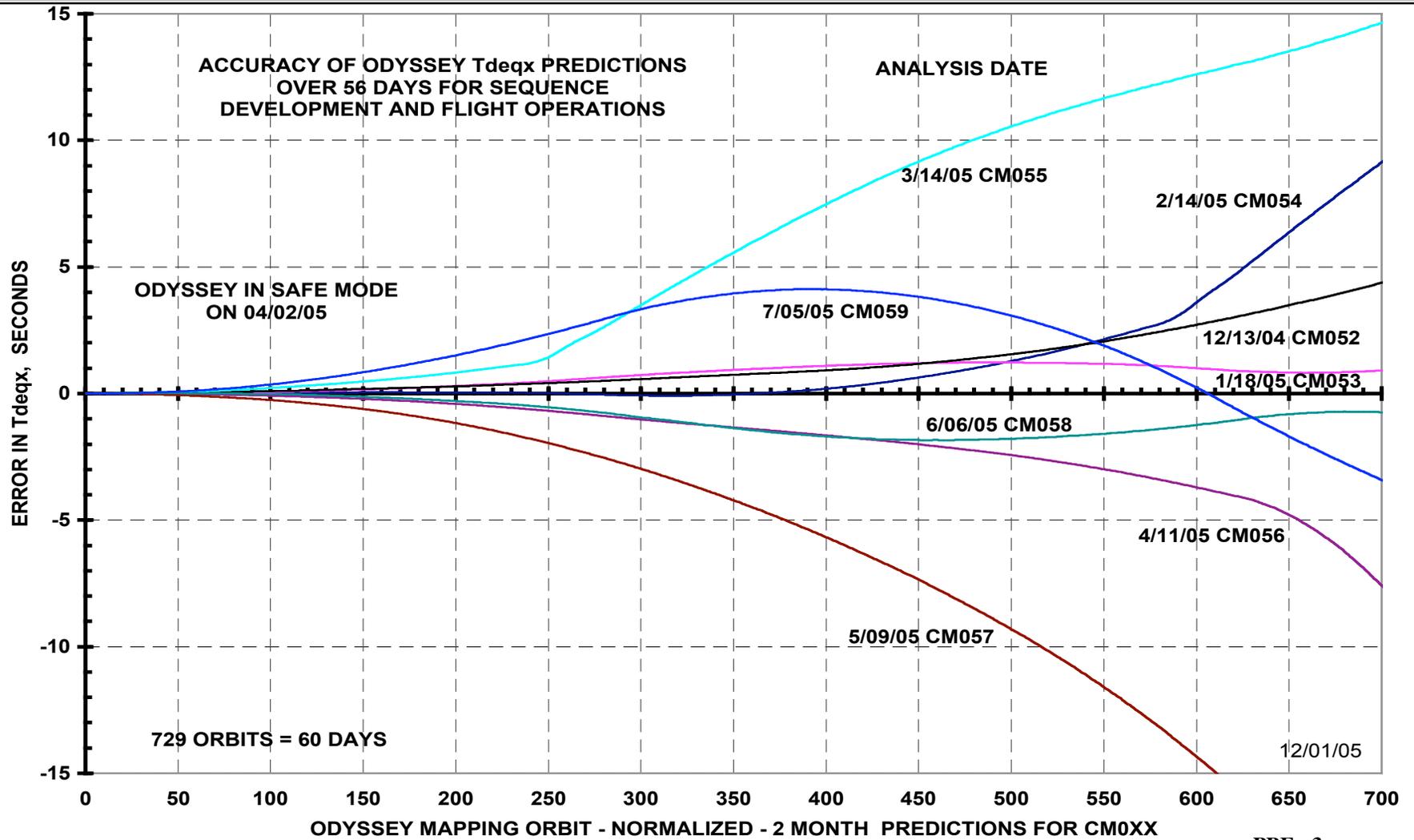
## NAVIGATION OVERVIEW



- **PREDICTED TRAJECTORY ACCURACY IN DESCENDING EQUATOR CROSSING (DEQX) TIME**
  - Short term(over 7 days): generally less than 0.1 seconds
  - Long term(over 56 days): generally within 10 seconds
- **RECONSTRUCTED TRAJECTORY POSITION ACCURACY**
  - Generally, 10 to 20 meters in down-track, 20 to 30 meters in cross-track and 1 to 2 meters in radial position components. These are representative estimates and are based on navigation consistency checks based on subsets of independent Doppler data analyses.
- **SUCCESSFUL USAGE OF PERIAPSIS AND APOAPSIS DESATURATIONS TO CONTROL AND MODERATE THE GROUND TRACK WALK(GTW).**
  - Maintain the mapping orbit repeat cycle over 312 orbits: between -15 to -18 km
  - Odyssey safe mode entry will disrupt the GTW trend as has occurred on 04/02/05 and on 03/22/06.
- **LOCAL MEAN SOLAR TIME (LMST) ANALYSIS STATUS**
  - Execute propulsive maneuvers to cause a small orbit inclination change. This allows the LMST to drift from 5:00 pm (estimate) to 3:00 pm and then return to 5:00 pm (at the DEQX).

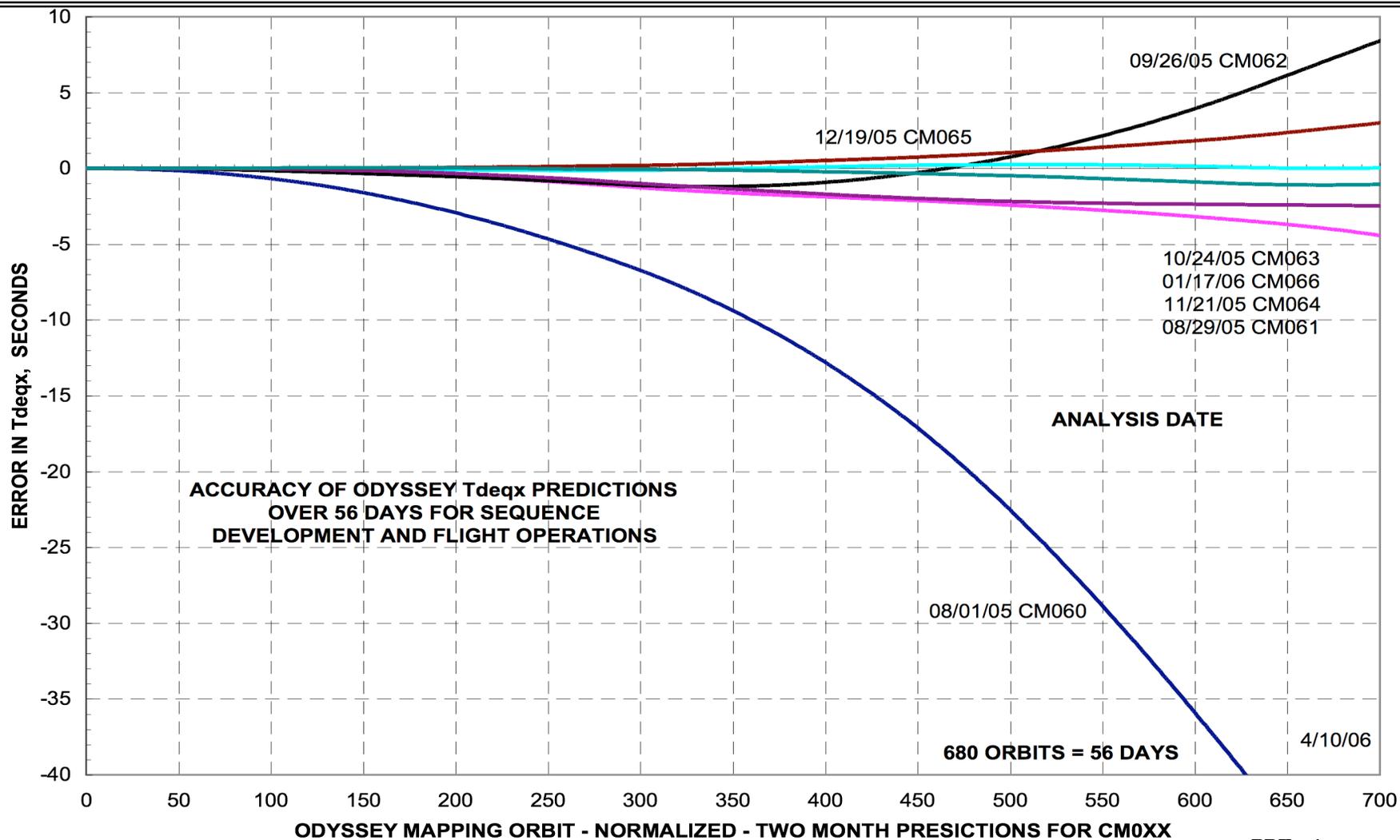


# ACCURACY OF NAVIGATION LONG-TERM PREDICTIONS



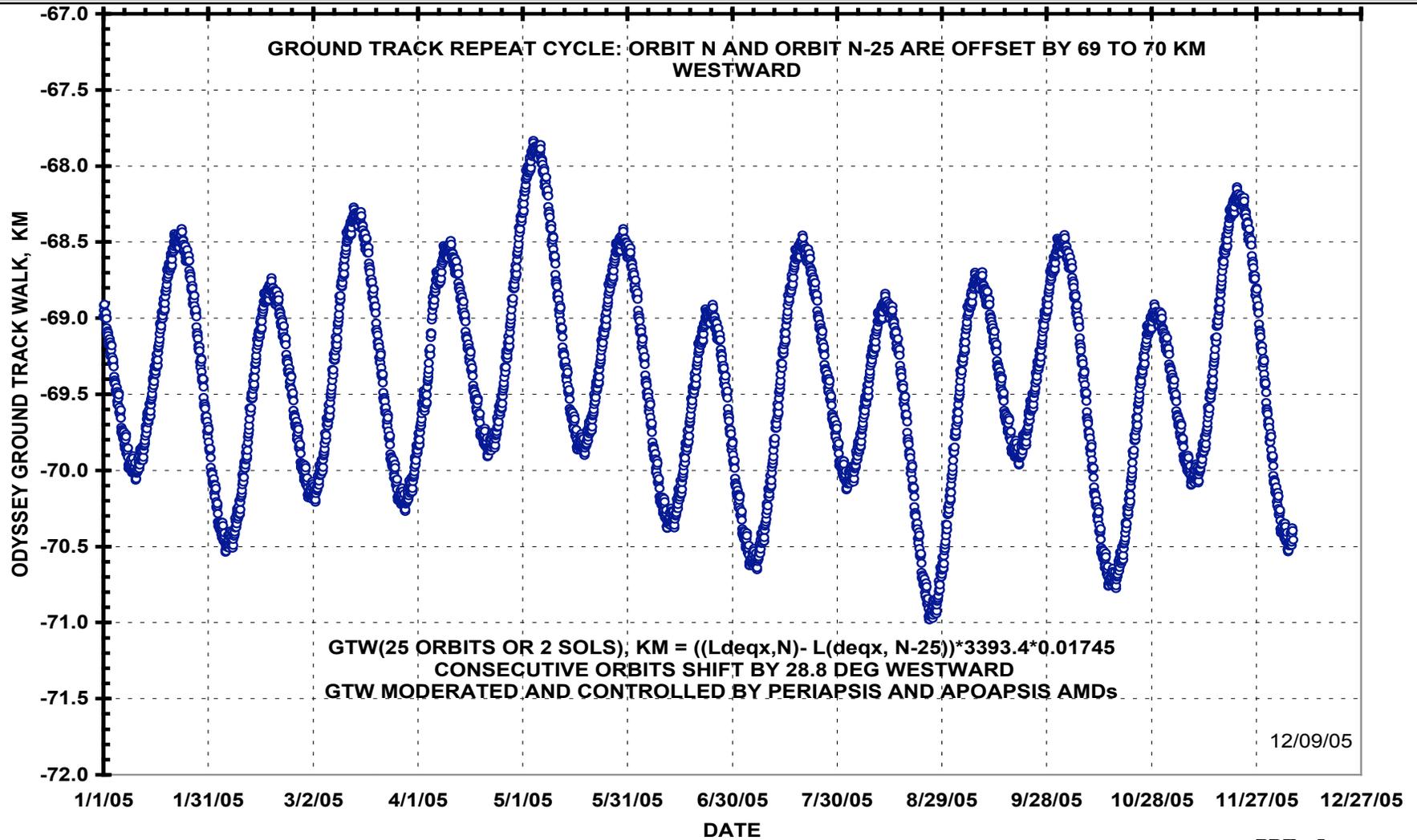


# ACCURACY OF NAVIGATION LONG-TERM PREDICTIONS



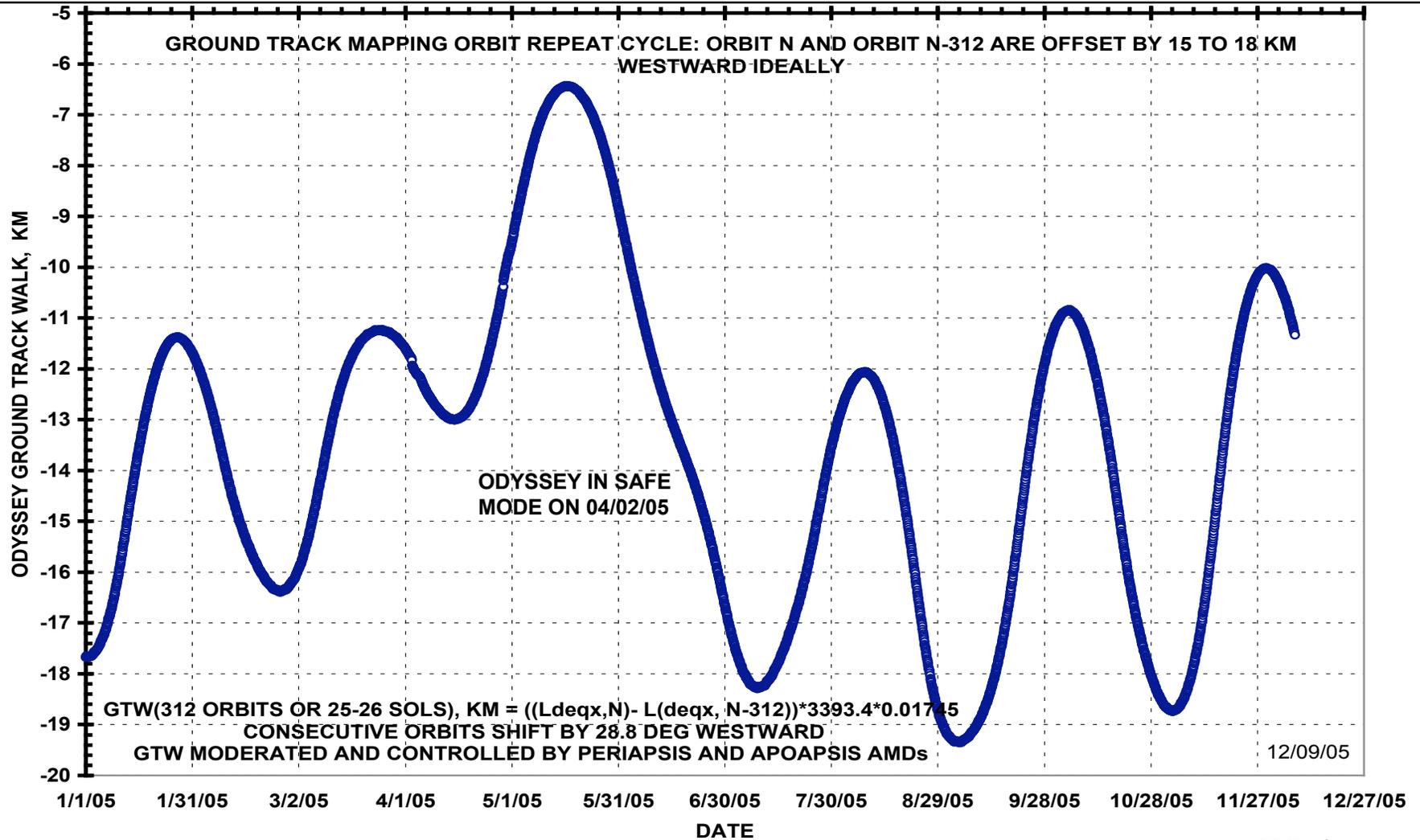


# GTW REPEAT CYCLE





# GTW MAPPING REPEAT CYCLE





## Preliminary Analysis - Establish 3PM LMST Orbit



• LMST Before OTM; LMST Trend(min/yr)	OTM date, $\Delta I$ (deg), $\Delta V$ (m/s)	LMST Trend(min/yr) After OTM	Duration (months)
5:09 pm(10/01/07), +3.85	10/01/07, -0.37, 21.5	-88.0	19
2:59 pm(03/25/09), -88.0	03/25/09, +0.334, 20.	+0.7	7
2:59 pm(10/15/09), +0.7	10/15/09, +0.37, 20.	+97.1	15
5:00 pm(01/15/11), +97.1	01/15/11	constant	---

### Notes

LMST-rates are linearized estimates.

An inclination change has a significant impact on the GTW.

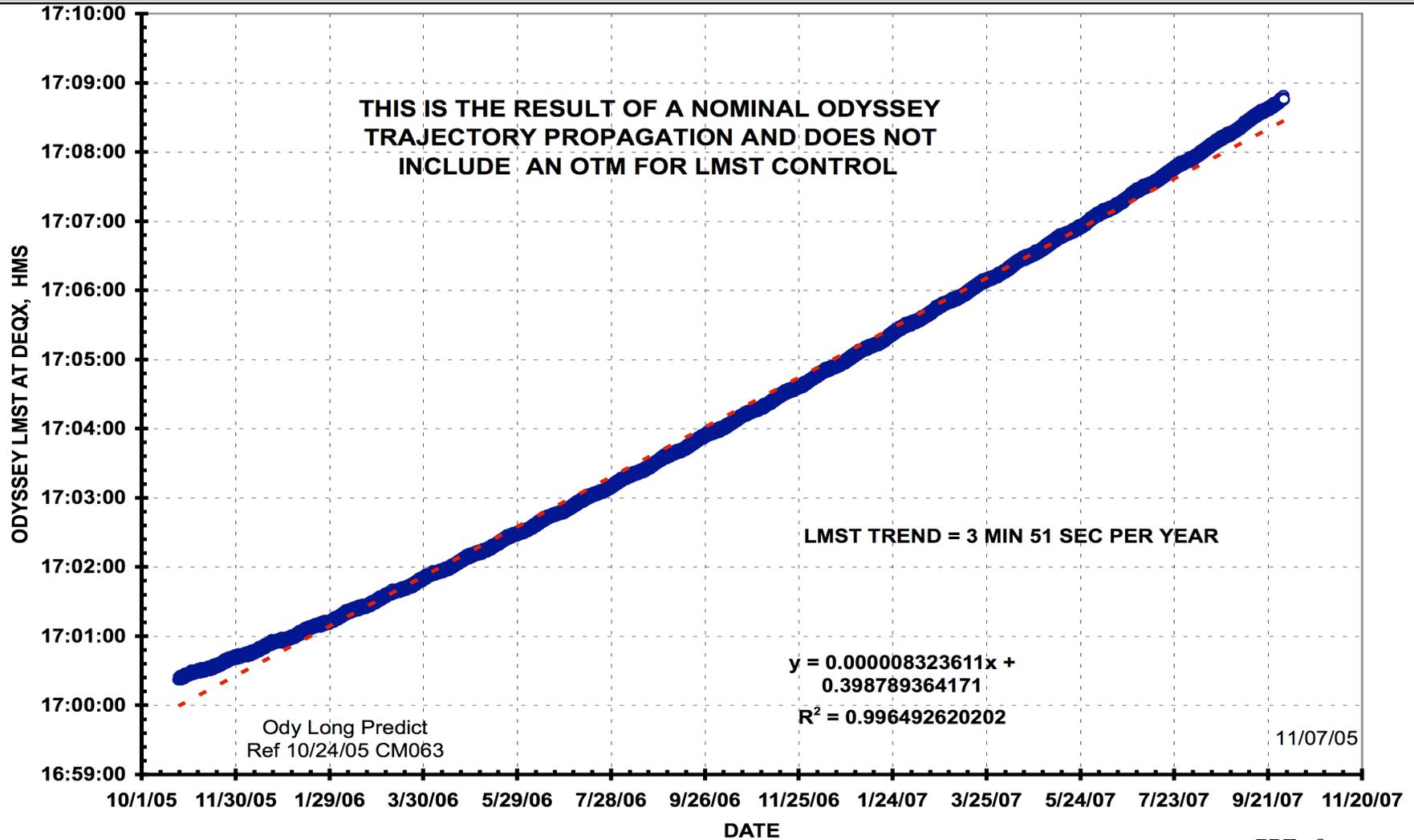
$\Delta V$  estimates are scaled from OTM-1(09/24/03):  $\Delta I = -0.16$  deg,  $\Delta V = 9.3$  m/s,  $\Delta m = 1.76$  kg and  $\Delta T = 99.2$  sec. Prior to OTM-1, the LMST-rate was +39.05 min/year.

Phoenix EDL occurs on 05/25/08.

Current project information (R. Mase email dated 04/13/06): start LMST trend to 3:00 pm (DEQX) on approximately 10/01/08.



# LOCAL MEAN SOLAR TIME TREND





# LOCAL MEAN SOLAR TIME TREND

