

The JCET/GSFC (SLR) TRF Solution 2004

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Outline

- SLR analyses for ILRS and IERS
- SLR targets used
- Supported products and studies:
 - “Geocenter” Variations
 - *Moment of Inertia Variations*
 - EOP (PM & LOD)
 - Gravitational modeling (static & TVG)
 - Refraction model validation
 - Comparison with geophysics
 - Other...
- Present status



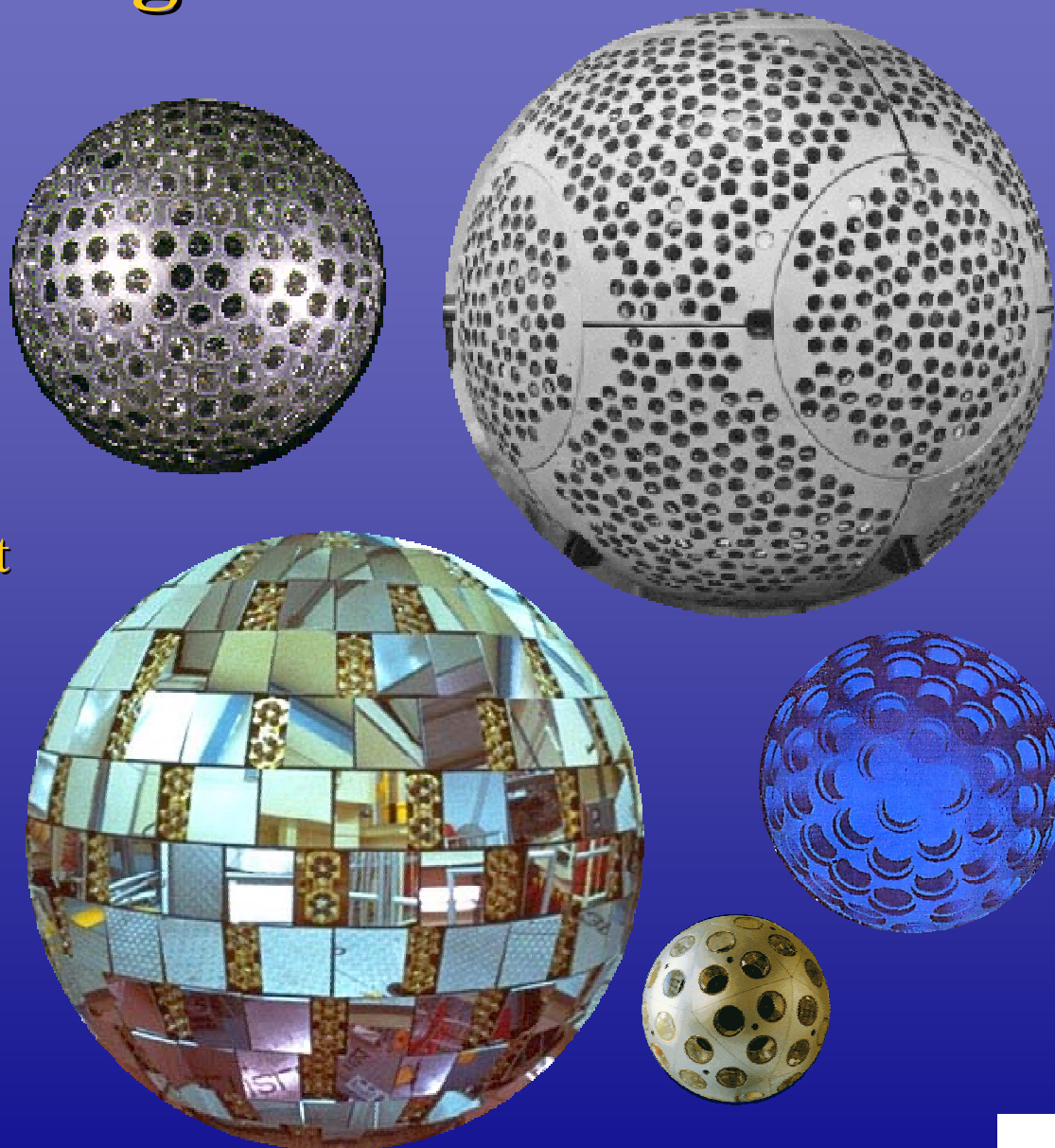
SLR for ILRS & IERS

- Contributing to ILRS weekly products:
 - SINEX for Positions and EOP
 - EOP wrt ITRF2000 for NEOS
 - ILRS GLTN QC of L-1, L-2, E-1 and E-2
- Contributing annually a multi-year solution
- Weekly products for IERS CPP (same as above)
- Annual multi-year solution (unconstrained) for IERS TRF development
- Long series of EOP from an ITRF2000-based multi-year solution



SLR Targets Used

- At present:
 - LAGEOS 1 & 2
 - 1993 - present
 - ETALON 1 & 2
 - April 2001 - present
- Considering to add:
 - Starlette
 - Ajisai
 - ???



Supported Products & Studies - 1

GM Estimate and Uncertainty

$$GM_{\text{IERS}} = 398600.441500 \times 10^9 \text{ [m}^3/\text{s}^2\text{]}$$

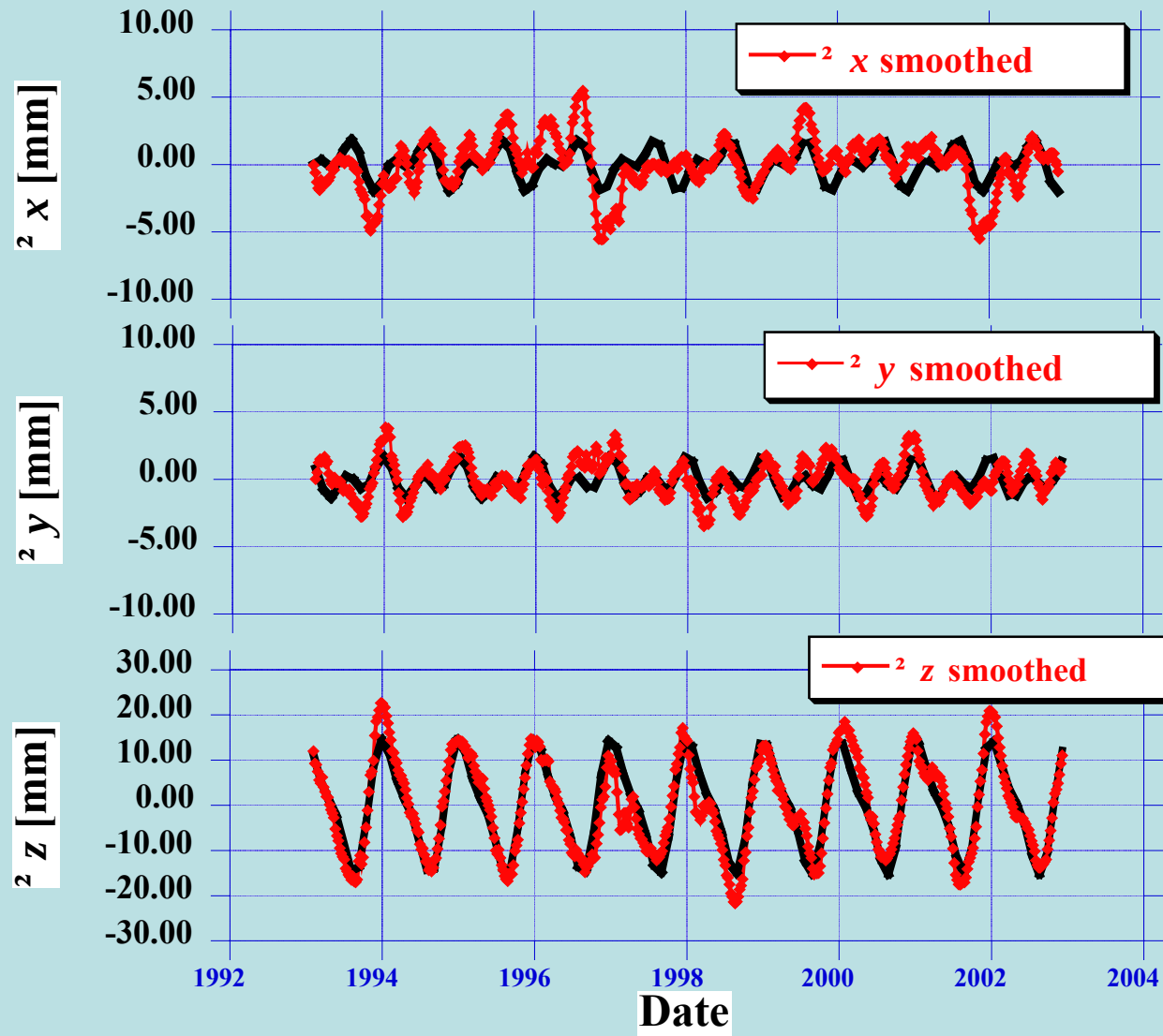
$$GM_{\text{SLR}} = 398600.441644 \times 10^9 \text{ [m}^3/\text{s}^2\text{]}$$

$$1-\sigma_{GM_{\text{SLR}}} = 0.0000006 \times 10^9 \text{ [m}^3/\text{s}^2\text{]}$$

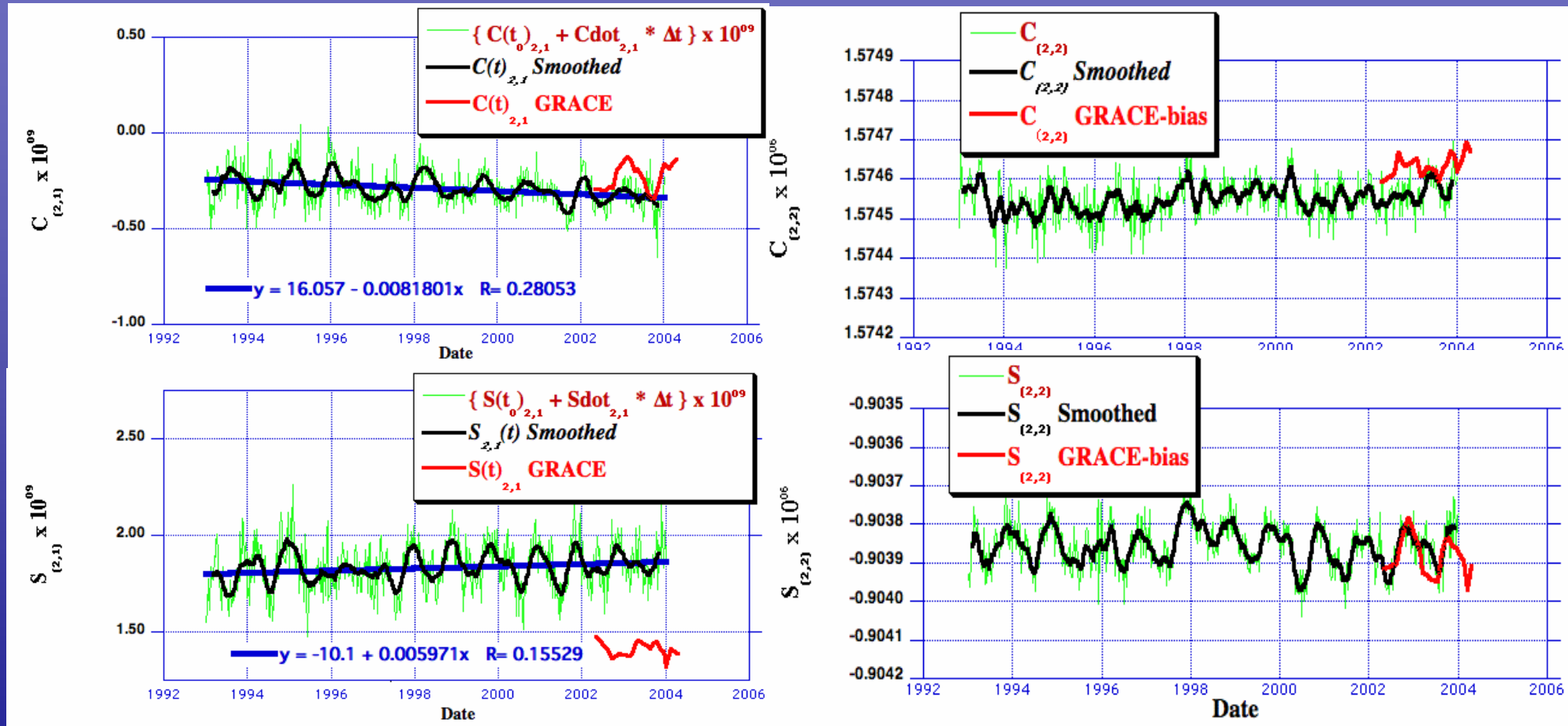
TRF scale at ≈ 0.02 parts in 10^9



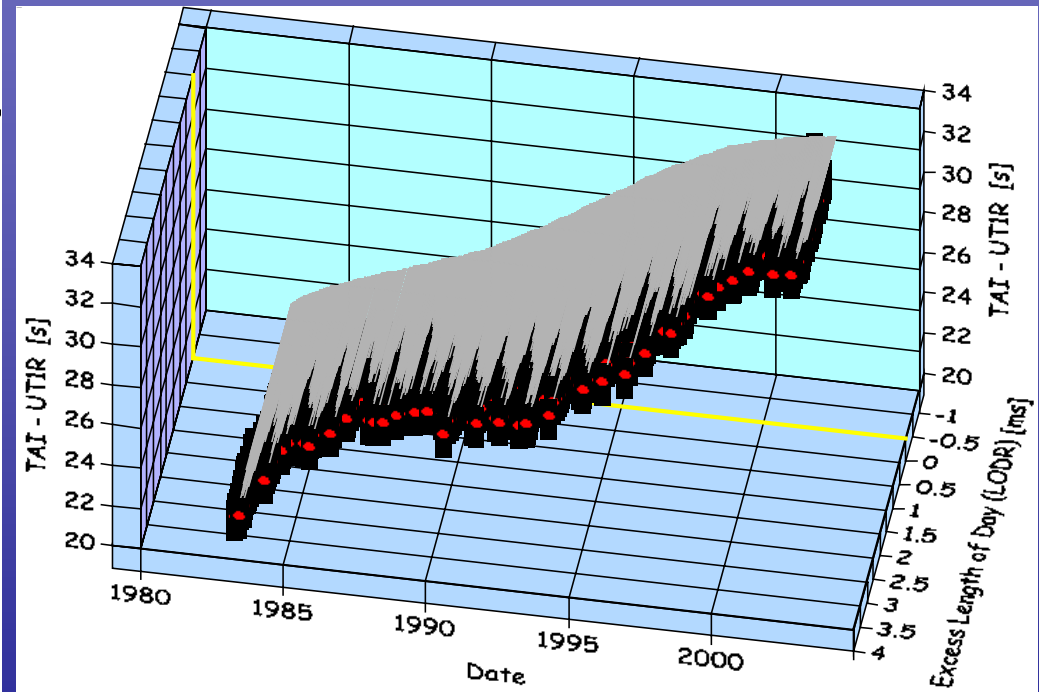
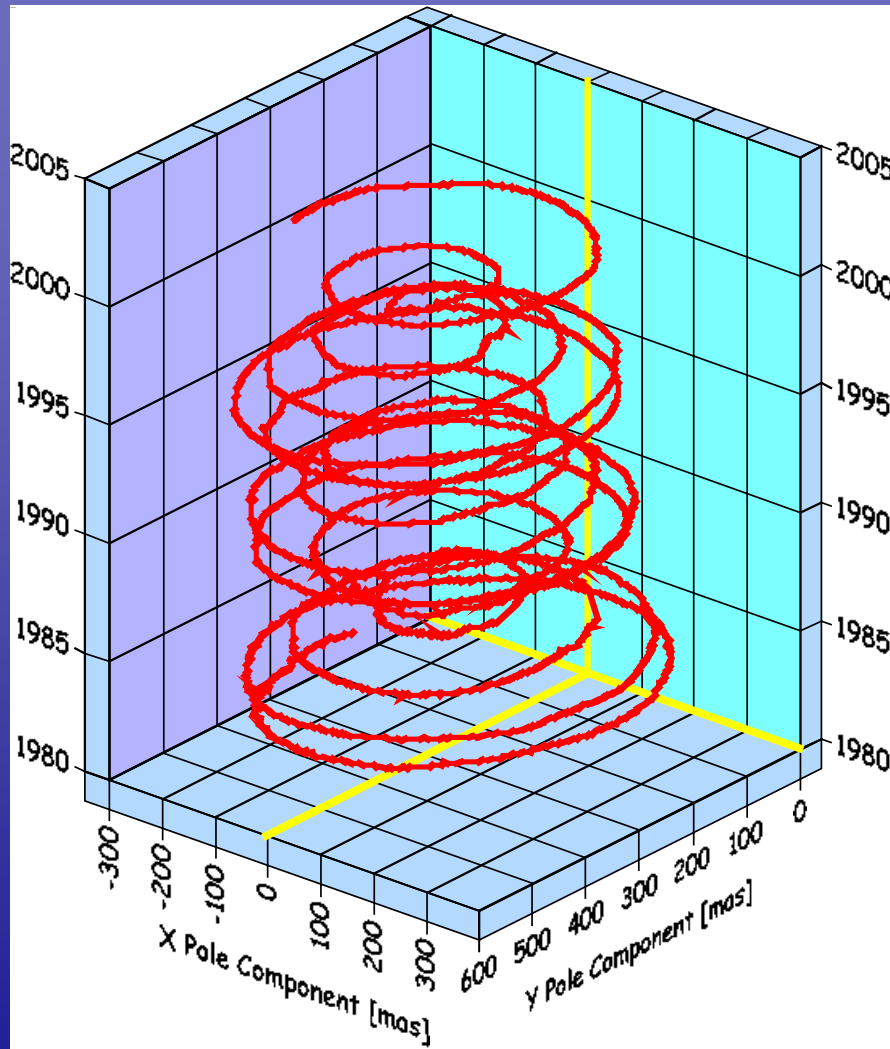
Supported Products & Studies - 2



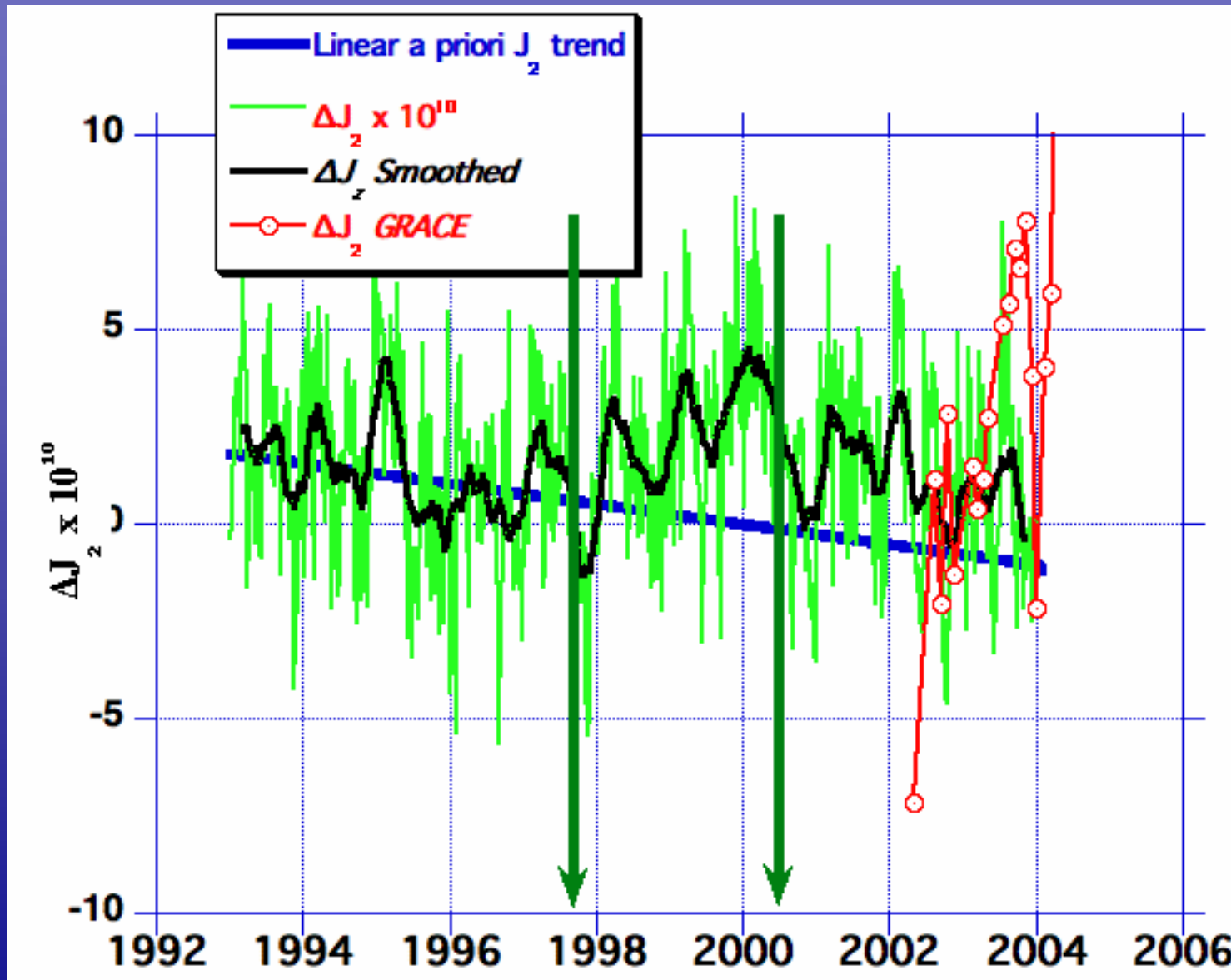
Supported Products & Studies - 3



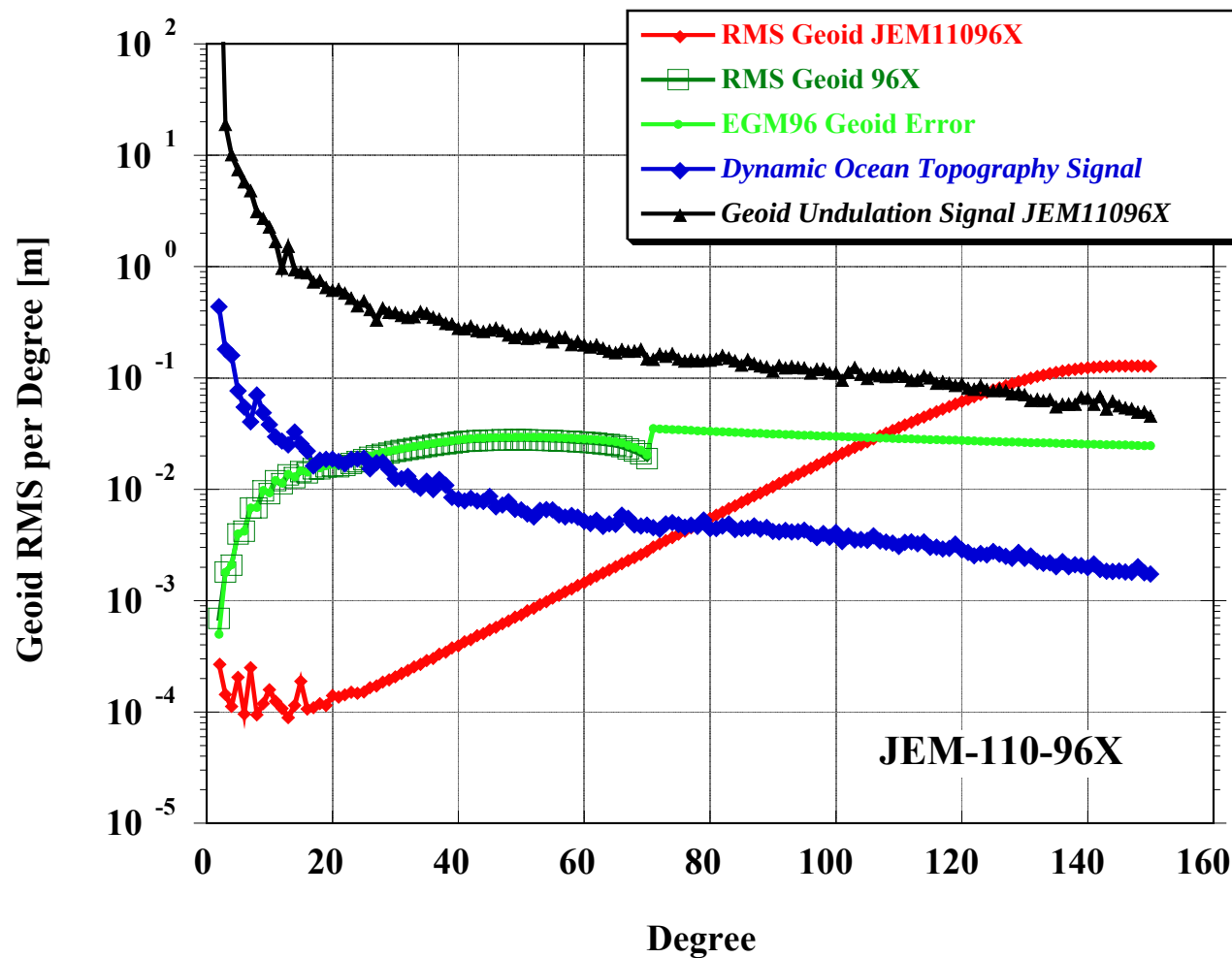
Supported Products & Studies - 4



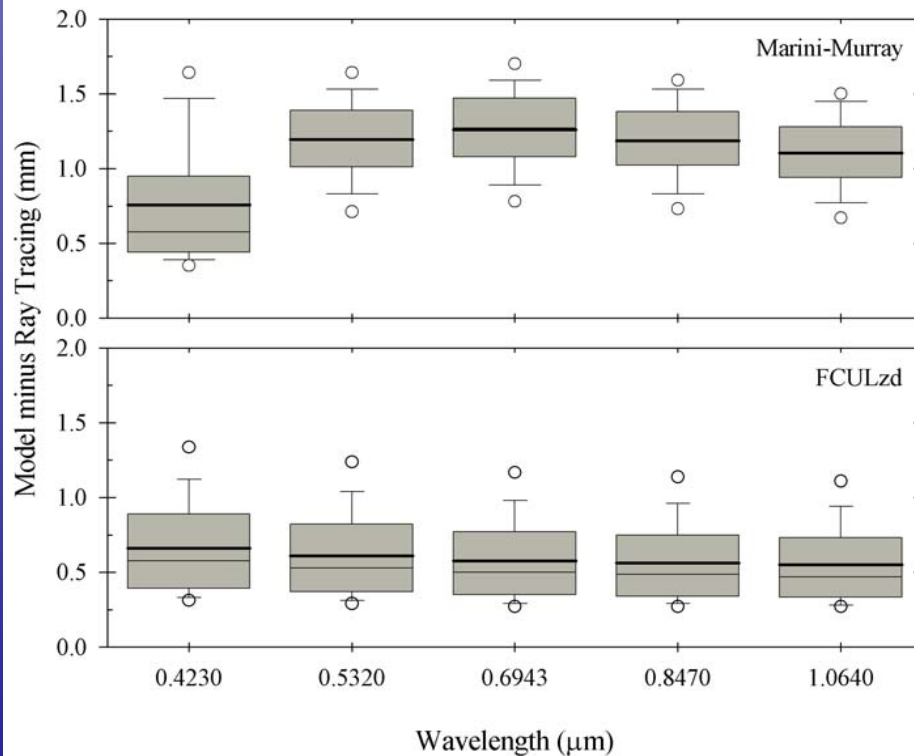
Supported Products & Studies - 5



Supported Products & Studies - 6



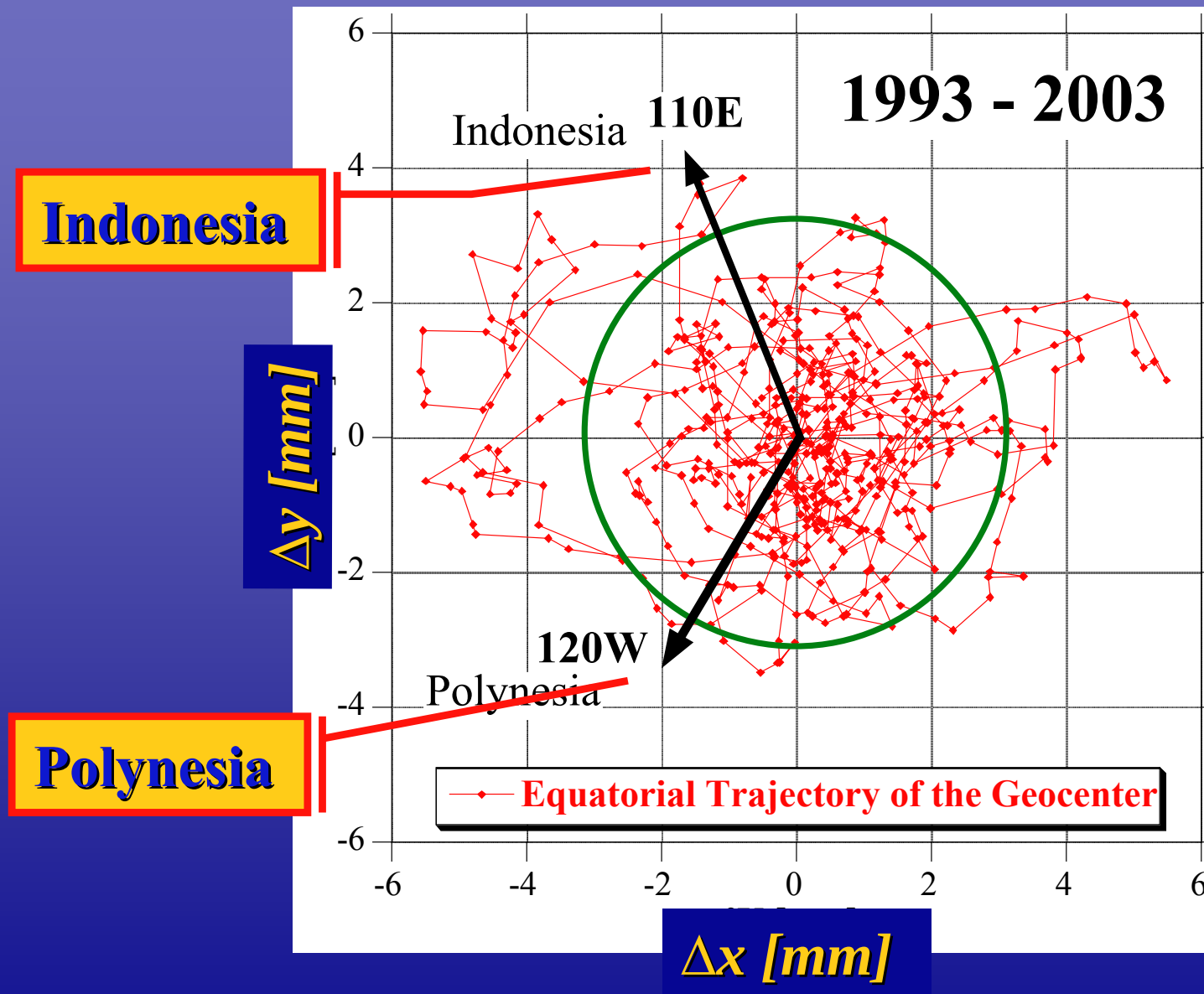
Supported Products & Studies - 7



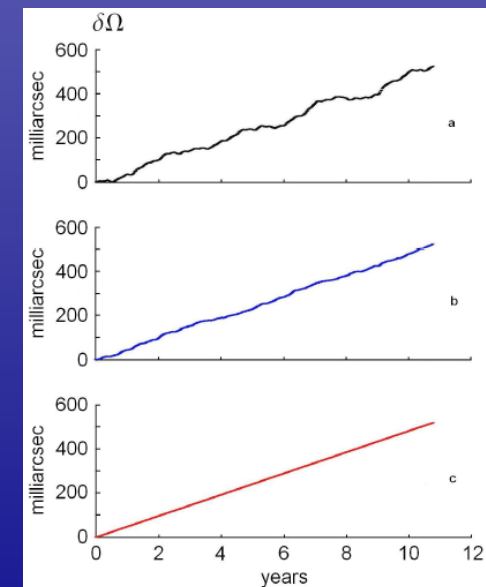
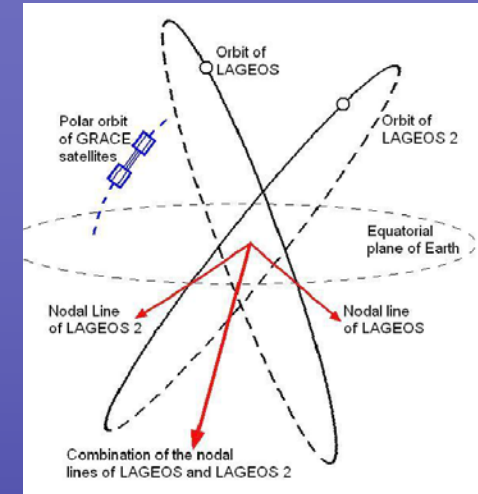
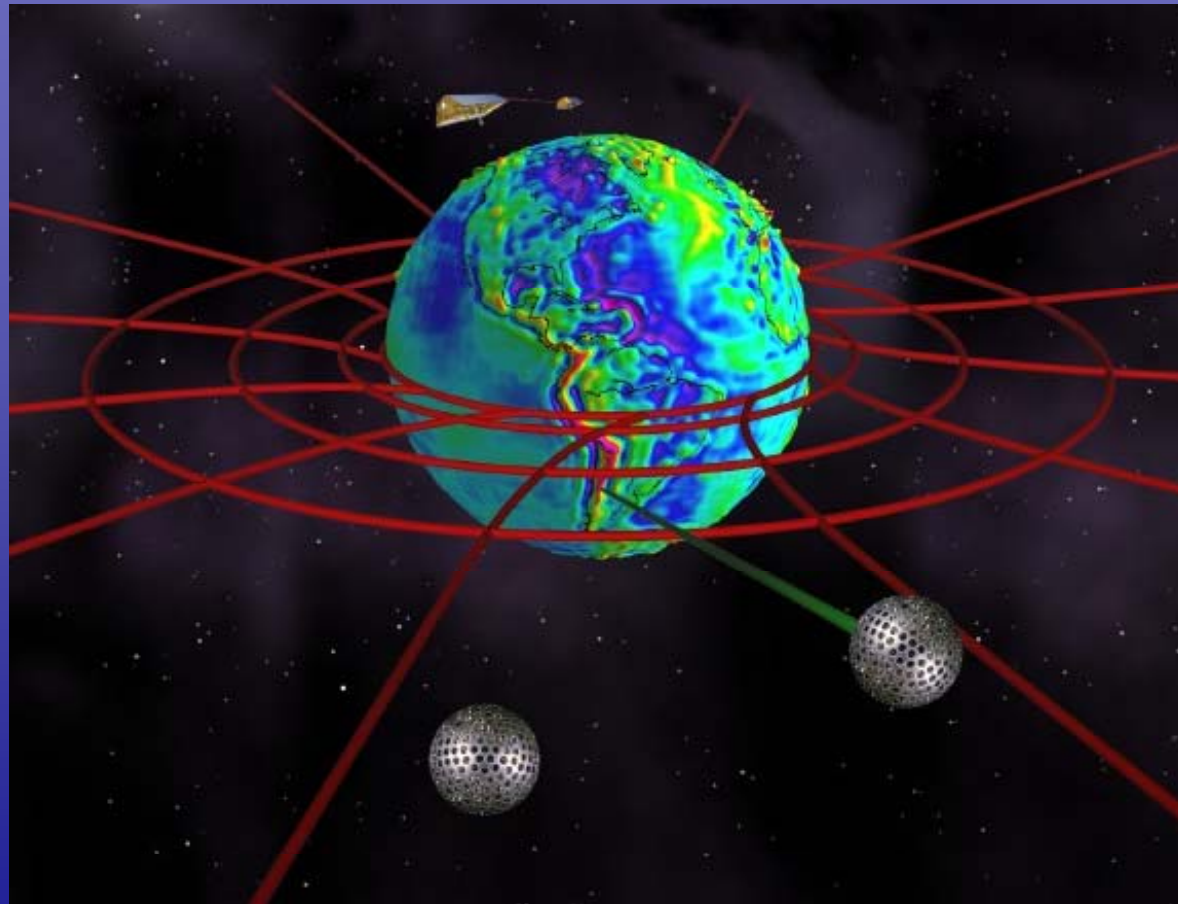
QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



Supported Products & Studies - 8



Supported Products & Studies - 9



JCET Analysis Schedule

Weekly Analysis of L-1, L-2, E-1 and E-2
to produce normal equations for:

- SINEX of weekly ILRS AWG contribution
- Annual solution (after end-of-year)
- Incremental solution of multi-year solution
- NEOS solution for EOP and network QC



JCET Incremental Solution

The JCET multi-year solution is updated sequentially on a weekly basis, delivering a new “multi-year” TRF realization weekly, along with a new weekly estimate of the change in the “geocenter”, and an extension of the long EOP series that is delivered annually:

$$\begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} A_{11} & \emptyset \\ A_{12} & A_{22} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} L_1 \\ L_2 \end{bmatrix}$$

The sequential solution allows for new “parameters” (e.g. new sites), and for a modification of the existing parameters due to the inclusion of new data.



2004 Solution Modifications I

DATA:

- Analysis of LAGEOS 1 SLR data will be extended “backwards” in time to include data as early as 1983, and possibly since 1976.
- Since weekly-resolution normal equations prior to 1990 will be developed, we are processing Starlette and Ajisai data at the same period to strengthen the solution and to allow daily resolution of EOP.



2004 Solution Modifications II

MODELS:

- **GEODYN is upgraded to conform fully with IERS Conventions 2003.**
- **New analysis will be based on new gravitational (GGM02S) and tidal (Earth, oceans, and loading) models.**
- **Atmospheric loading will be included for all sites using NCEP fields, (temporal gravitational effects included).**
- **New refraction model (zenith delay and mapping function).**
- **LAGEOS 1 & 2 spin axes modeled with LOSSAM.**



Summary

- The JCET/GSFC ILRS AC will contribute to the CPP with a set of weekly SINEX files starting in 1990 and possibly, as early as 1976.
- The standard analysis routine is under modification to allow the re-analysis of the current as well as the expanded data set with new, improved models and procedures, adhering to the IERS 2003 conventions.
- The new products will be delivered in January 2005, at the same time that we will deliver the standard annual contribution to IERS.



SLR Analysis @ JCET

The End

... a re-analysis to be released in January 2005!

