

Changes in the algorithm for the calculation of TAI

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6th meeting of laboratories
contributing to TAI
31 March 2004, BIPM

ALGOS

- **Calculation of time links.**
 - **GPS common views**
 - **TWSTFT links**
- **Clock weighting.**
- **Free atomic scale, Echelle Atomique Libre (EAL).**
- **Duration of the scale unit of TAI; steering.**
- **BIPM Circular T.**



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ALGOS (algorithm for the calculation of TAI/UTC)

- **Step-by-step algorithm.**
 - **Designed to build a time scale**
 - stable on the medium / long term
 - accurate in frequency
 - **Blocks of one month clock and clock comparison data**
 - [UTC - UTC(k)]
 - [TAI - TA(k)]
- every 5 days at the standard dates**
- BIPM estimation of the relative duration of the scale unit of TAI by using PFS measurements over 1 year.



**GPS and TWSTFT
data**



$[UTC(k) - UTC(i)]$

+

clocks



$UTC - UTC(k)$

weighting

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TAI accuracy improvement

- External to the main algorithm
- Frequency steering of EAL

$$f(\text{TAI}) = f(\text{EAL}) + \text{frequency steering correction}$$

- Frequency corrections of 1×10^{-15} (smaller than the frequency fluctuations)



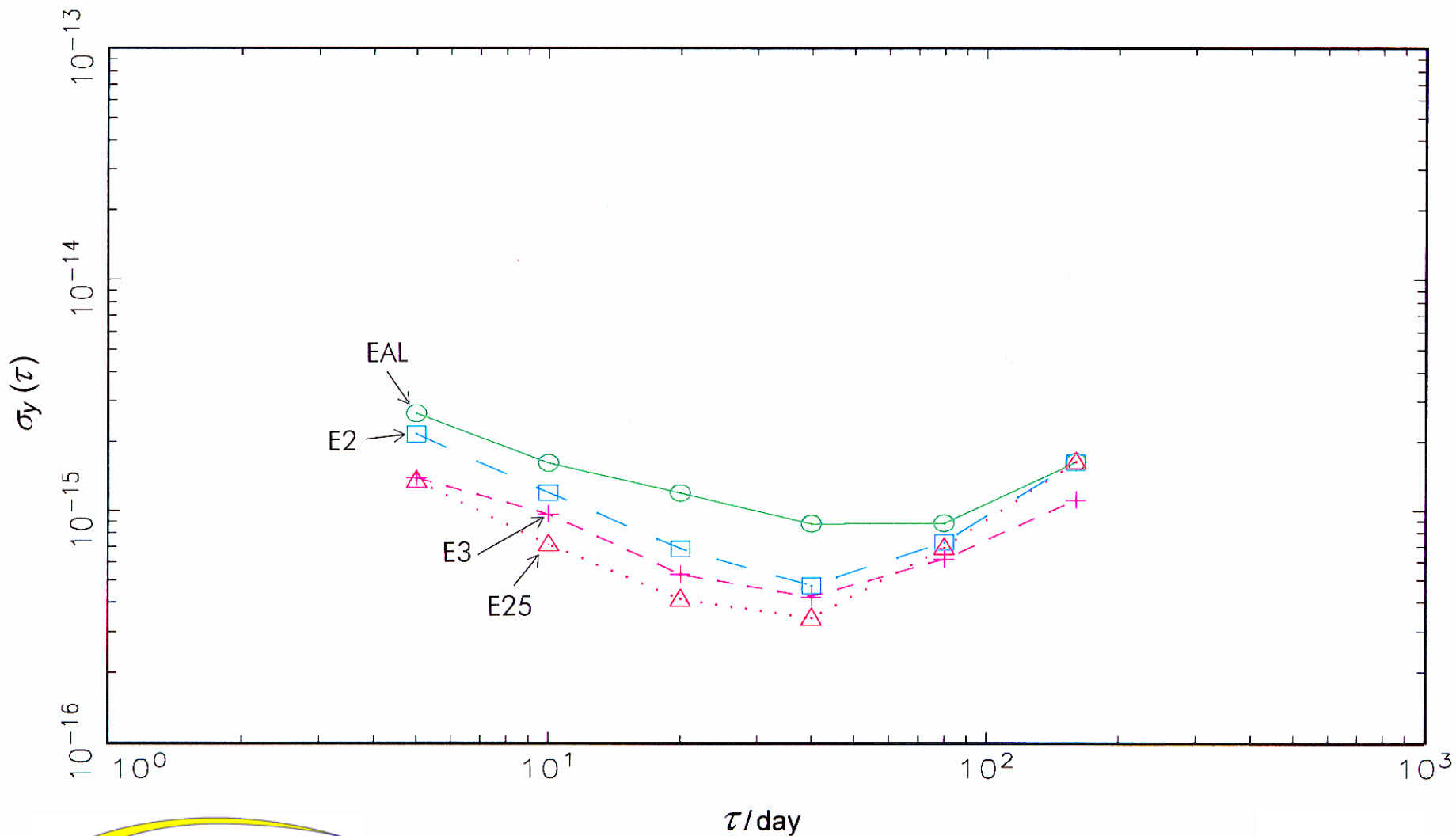
- Weighting procedure

- 1998: relative $\omega_{\max} = 0.007$

- January 2001: relative $\omega_{\max} = 2.0 / N$

- July 2002 : relative $\omega_{\max} = 2.5 / N$

Relative frequency stability of EAL, E2, E25 and E3



Clock weights (mean %)

Year 2000

55% of clocks at ω_{\max}
14% are H-m
74% are HP5071A

Over the H-masers
42% are at ω_{\max}

Over the HP5071A
65% are at ω_{\max}

$$\omega_{\max} = 0.700\%$$



Year 2001

23% of clocks at ω_{\max}
17% are H-m
76% are HP5071A

Over the H-masers
25% are at ω_{\max}

Over the HP5071A
25% are at ω_{\max}

$$\omega_{\max} = 2/N$$

July-Dec 2002

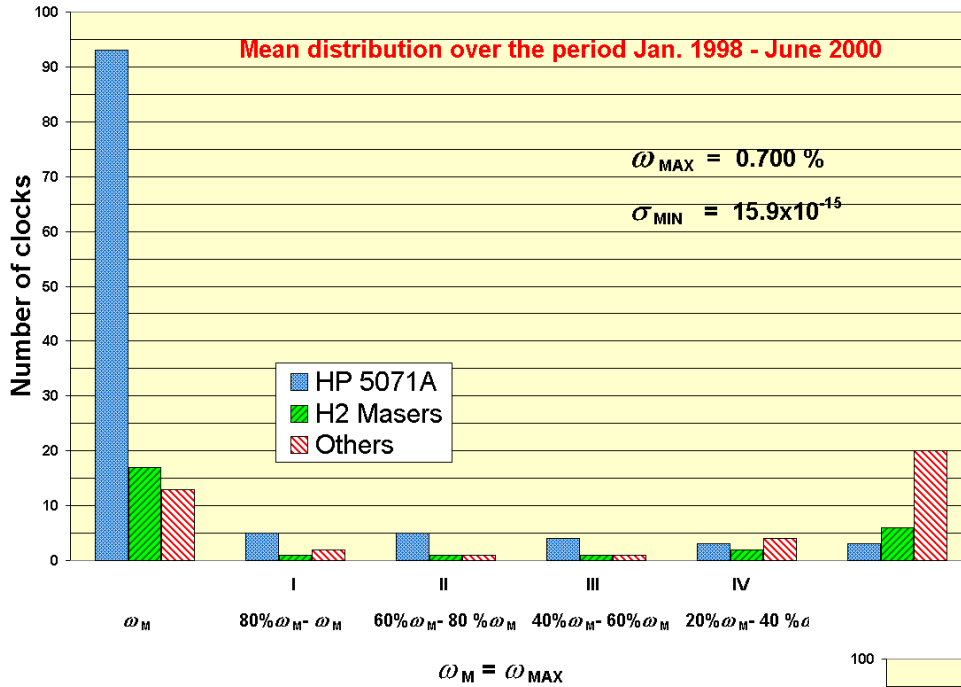
11% of clocks at ω_{\max}
14% are H-m
79% are HP5071A

Over the H-masers
10% are at ω_{\max}

Over the HP5071A
13% are at ω_{\max}

$$\omega_{\max} = 2.5/N$$

Weights distribution for various types of clocks (scale TAI)



Weights distribution for various types of clocks (scale TAI)

