DECELERATION CONTINUES

Clifford E Carnicom

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A detailed statistical analysis of time over a period of four months continues to support the hypothesis of an earth in a state of deceleration. The magnitude of the deceleration, if confirmed, is sufficient to anticipate unusual geophysical activity in the foreseeable future.

The magnitude of the deceleration is currently best estimated at approximately 0.3 milliseconds per day. Any deceleration component of rotation of the earth is to be regarded with the greatest of interest, as an apparent small acceleration (deceleration) will result in significant velocity differentials and accumulated time differentials over a relatively short period of time if sustained. A deceleration component of 0.3 milliseconds per day will result in a velocity change of approximately 0.1 seconds per day at the end of a one year period. This same deceleration component would lead to an accumulated difference of approximately 20 seconds of time after a one year period. These are phenomenal magnitudes relative to any historical basis that is available.

Small changes in time will translate to large changes in the kinetic energy of the earth. One second of time change per year corresponds roughly to the energy contained within all of the fossil fuels of the earth. Data under collection and analysis indicates that a significant multiple of the historical level of approximately one second per year may now be occurring. This indicates the prospect of significant energy and subsequent geophysical changes occurring in future times.

Further data that is accumulated with additional timepieces over a greater interval of time will continue to clarify the findings that are under examination. The independent time system now consists of 14 quartz clocks with measurements on a regular basis. The deceleration bias that is under detection remains thus far regardless of the subset of timepieces examined or of the interval over which a constant rate of rotation is assumed.

Readers may also wish to be aware of the anomalous time measurements over this same period as recorded in the earlier articles, Time, Time To Start Watching Time ,Time, Energy and Earth Changes, The Waistline of Rotation, and Time and Rotation Changes Sustained.

Additional notes related to the computation of time differences are presented below.

The following table presents an example spreadsheet statistical analysis of an independent timekeeping system using 8-14 quartz clocks over a four month period. The column descriptions and weighting functions will be described in more detail below.

	n	rirms^2	racc^2	di	do	ai	bi	delta d	Weights					Unweighted Errors		%
SET 1	4	0.92	0.87	122.4	74.5	0.000286	-0.022	365	5.0E+09	27.6	-9.67	0.79	-1.6	18.8	9.4E+10	75.97
SET 6	4	0.77	0.54	64.9	61.9	0.000258	-0.016	365	3.7E+06	23.5	-6.83	0.49	-1.0	17.1	6.4E+07	0.06
SET 3	4	0.98	0.96	122.4	105.4	0.000512	-0.054	365	1.5E+09	56.7	-25.40	2.84	-5.7	34.1	5.1E+10	22.57
SET 4	4	0.82	0.7	64.9	48.8	0.000300	-0.014	365	9.2E+07	25.7	-5.79	0.36	-0.7	20.3	1.9E+09	1.40

SET 5	4	0.81	0.47	64.9	55.3	0.000232	-0.012	365	2.8E+07	20.5	-5.04	0.36	-0.7	15.8	4.4E+08	1.84
t11	1	0.12	0.21	59.8	50.2	0.000203	-0.008	365	3.5E+05	17.5	-3.32	0.26	-0.4	14.3	5.0E+06	0.02
														Wgt. Total Error	22.2 Seconds	
									6							
									4.2E+01							
									0.833							
									1.0E+00							
													var		7.1	
													sigma		2.7	
													E90		4.4	
													Lower		17.8	
													Upper		26.6	

Additional notes on columns and weighting factors:

Column 1 :

The set number.

Column 2 : n

The number of clocks in the set.

Column 3 : r_{irms}^2

The root mean square (RMS) of the r^2 correlation coefficients of the clocks within a set. The linear regressions within the set model the drift rate of the individual clocks. No variation in the rate of the rotation of the earth is assumed over the interval of the regression.

The model for each clock is of the form: Drift rate per day in seconds (DR^o) = $a_1 d + b_1$ where d is the number of days since the point of synchronization with UTC for each clock. The coefficients of the regression are a_1 and b_1. At d = d_o, no variation in the rotational rate of the earth is assumed, and the coefficients of the regression and the correlation coefficients are computed for each clock at that point in time.

Column 4 : r_{acc}^2

The RMS of the r^2 correlation coefficients of the linear regressions of the non-linear components of the clocks within a set. The determination of this value is as follows:

DR^o is applied to a measured drift rate at d >= d_o by subtraction. In other words, the effect from assuming a constant rotation rate of the earth is applied to a measured drift rate at all times exceeding d_o. Therefore, the non-linear component of the drift rate is modeled by DR^1_i = $DR_{measured}$ - DR^o at d >= d_o. A linear regression is then solved for the mean of the non-linear components of the drift rates for each clock, after the mean of the non-linear components is subtracted at d = d . An attempt is therefore made to remove any bias of the set resulting from a

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non-linear component of the drift rate. The model for each clock is therefore $DR^1 = a_2 d + b_2$ where DR^1 represents the mean of the non-linear components minus the mean of the non-linear components at $d = d_o$, to be computed at $d >= d_o$. The coefficients of regression are a_2 and b_2.

Column 5 : d_i

The day number at which the complete error analysis is computed. A condition of computation is that $d_i >= d_o$. This day number is the number of days that has elapsed since the point of synchronization with UTC for each clock, or subset of clocks that have been synchronized on the same day within a relatively short interval of time.

Column 6 : d_o

The day number at which it is assumed that the rotation rate of the earth is constant, that the drift rate for each clock can be adequately modeled by linear regression, that the correlation coefficients measure the success of the modeling process, and at which the reference drift rate function for each clock is therefore determined.

Columns 7 and 8: a_i, b_i

The coefficients of regression for the non-linear terms for each set of clocks as described for column 4. The a_i term can be interpreted as a bias in the change of the difference between a measured drift rate and a modeled drift rate at any point where $d >= d_o$. It can therefore be interpreted as an acceleration component of time, measured in units of seconds per day. If the congregation of timepieces demonstrated random non-linear variations, no aggregate bias (statistical signing) in these coefficients would be evident.

Column 9 : delta d

The number of days after $d = d_o$ in which the projected and accumulated time differences are determined. A value of 365 corresponds to the projected time differences at the end of a one year period past the point of $d = d_o$. Assuming a constant acceleration rate, both velocity and accumulated time differentials can be derived.

Column 10 : Weights

The weighting factor applied to the determination of the total time differential accumulated at d >= do. This factor is currently computed as:

$$w_i = n * {r_{irms}}^2 * {r_{acc}}^2 * d_i * {d_o}^2 * (d_i - d_o)^2$$

Column 11 : First term of accumulated time difference function:

The first term of the accumulated time difference function determined as:

$$t_1 =(a_i*((\text{delta d}) + d_o)^2) / 2$$

Column 12 : Second term of accumulated time difference function:

The second term of the accumulated time difference function determined as:

$t_2 = b_i * ((\text{delta } d) + d_o)$

Column 13 : Third term of accumulated time difference function:

The third term of the accumulated time difference function determined as:

$t_3 = (a_i * (d_o)^2) / 2$

Column 14 : Fourth term of accumulated time difference function:

The fourth term of the accumulated time difference function determined as:

$t_4 = b_i * d_o$

Column 15: The accumulated time difference over the interval of delta d, determined as:

$TE = t_1 + t_2 - t_3 - t_4$

Column 16 : The contributions to the numerator of the weighted average of the accumulated time difference, determined as:

Weighted Average (contribution to numerator) = $w_i * TE_i$

Column 17 : The contribution of the weight factors expressed as a percentage of the sum total of the weights.

Individual Entries to the spreadsheet are described as follows:

1. Wgt. Total Error : The weighted average of the accumulated time difference over the interval of delta d, determined as:

Wgt. Total Error = (sum (w_i * TE_i)) / sum (w_i)

2. var: The weighted variance of the weighted average of the accumulated time difference over the interval of delta d, determined as:

var = (sum ((w_i %) * (TE_i - Weighted Average))) / (((n -1) / n) * sum (w_i%))

where w_i% are the weights expressed as a percentage / 100.

3. sigma : the weighted standard error of the weighted average of the accumulated time difference over the interval of delta d, determined as:

sigma = sqrt (var)

4. E90 : the 90th percentile error estimate of the weighted standard error of the weighted average of the accumulated time difference over the interval of delta d, determined as:

E90 = 1.6449 * sigma

5. Lower : the lower E90 confidence limit of the weighted average of the accumulated time difference over the interval of delta d, determined as:

Lower = weighted average - E90

6. Upper : the upper E90 confidence limit of the weighted average of the accumulated time difference over the interval of delta d, determined as:

Upper = weighted average + E90

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