

Astronomical alignments as the cause of ~M6+ seismicity

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I here demonstrate empirically my georesonator concept in which tidally induced magnification of Earth masses' resonance causes seismicity. To that end, I show that all strong (~M6+) earthquakes of 2010 occurred during the Earth's long ($t > 3$ day) astronomical alignments within our solar system. I then show that the same holds true for all very strong (~M8+) earthquakes of the decade of 2000's. Finally, the strongest (M8.6+) earthquakes of the past century are shown to have occurred during the Earth's multiple long alignments, whereas half of the high-strongest (M9+) ones occurred during Full Moon. I used the comet C/2010 X1 (Elenin), as it has been adding to robustness in terms of very strong seismicity since 2007 (in terms of strongest seismicity: since 1965). The Elenin will continue intensifying the Earth's very strong seismicity until August-October, 2011. Approximate forecast of earthquakes based on my discoveries is feasible. This demonstration proves my hyperresonator concept, arrived at earlier as a mathematical-physical solution to the most general extension of the georesonator concept possible.

Introduction

Geophysics can not explain the mechanism that supplies most of the energy that is required for tectonogenesis and overall seismicity [1]. The Earth's ~M7+ seismicity can arise as a natural response of our planet to its alignments with other celestial objects, Sun/Moon in particular [2]. Such seismicity exhibits up to 3-day phase and maximum displacement up to ~10 m that corresponds to M9.5 quakes – the strongest allowed in luni-solar *georesonator* (the Earth thought of as a mechanical oscillator forced by celestial bodies), *ibid.* That is the extreme case-scenario for our solar system.

I verified the georesonator theoretically, by extending it to the most general realm – that of the *hyperresonator* (the Universe thought of as a mechanical oscillator forced by yet outer Universes). As the result, a remarkable mathematical solution was arrived at: the first analytical expression for gravitational constant, G , was derived, for various scales [3]. Here,

instead of regarding just the Moon-Sun forcing, I expand the georesonator so to consider the forcing of the Earth by other celestial objects presently found in our solar system as well.

Units of time are given to within ± 1 day, as differential orbital inclinations in the nearly coplanar solar system can be safely ignored. The alignments were estimated to ± 1 arc $^{\circ}$. The '~' means $\pm 5\%$, except for the M6 threshold that was set when creating the sample so as to make the sample large enough for depicting a pattern of resonance magnification as proposed by [2]. So the M6- earthquakes used in this study were those flagged by USGS as significant for deaths. They are few, so they should not alter the result. Note that the M6 threshold was proper also because the M6+ earthquakes emit ~70%+ of energy released by all earthquakes. This makes the M6.5 a safe choice for threshold in search for an unknown mechanism responsible for most of Earth's seismicity and tectonogenesis.

Verification

The georesonator concept is herein verified by comparing the epochs of the last year's strong (~M6+), the last decade's very strong (~M8+), as well as the last century's strongest (M8.6+) seismicity, against the Earth's alignments with significant bodies of mass in our solar system. Here 'significant' are all objects between the Sun and the Neptune's orbit, which can cause gravitational shadowing on the Earth, akin to that caused by the Sun/Moon [2] [3]. So I include the following celestial objects in this verification: the Sun, the Mercury, the Venus, the Mars, the Jupiter, the Saturn, the Uranus, the Neptune, and the comet C/2010X1 (Elenin). The Elenin is included for two reasons: first, it drags gravitationally locked particles around 30,000+ km across, at the $\sim 1^{\circ}$ inclination, making its gravitational shadowing significant for proving the georesonator. Secondly, it passed the Uranus orbit (on the Elenin's own sling-orbit about the Sun) within the previous decade, adding to the verification's robustness in terms of very strong seismicity. The Elenin

has started affecting the Earth's strongest seismicity around mid 1960-ies.

The use of the previous decade gives ten years of seismic data which are same in kind but entirely independent from the (1990's) data that I had used to prove the georesonator mathematically-physically [2][3]. The JPL Orbit Solutions for C/2010X1 (16 and 23 March 2011) were used for resolving the alignments [4]. The earthquake data are from USGS [5], and lunar phases are from NASA [6].

Then this verification is methodological. No statistical testing was done due to: relatively small sample sizes, diverse distributions [2] and mathematical-physical verification having been achieved (via independent reasoning) [3].

Then in order to empirically verify the georesonator concept, it suffices to show that, first, all strong earthquakes of 2010 have occurred during the astronomical alignments, and in a self-evident fashion. I select year 2010 as it contained the most robust data, most likely due to the proximity of the approaching Elenin.

Secondly, one has to show that the very strong decadal earthquakes occurred during the alignments as well. Lastly, the past century's strongest earthquakes must be demonstrated also to have occurred during the alignments.

Note that the total number of the alignments and very strong earthquakes is nearly the same over the selected test periods. Here 'nearly' depicts the difference ascribable solely to earthquakes of lower magnitude class.

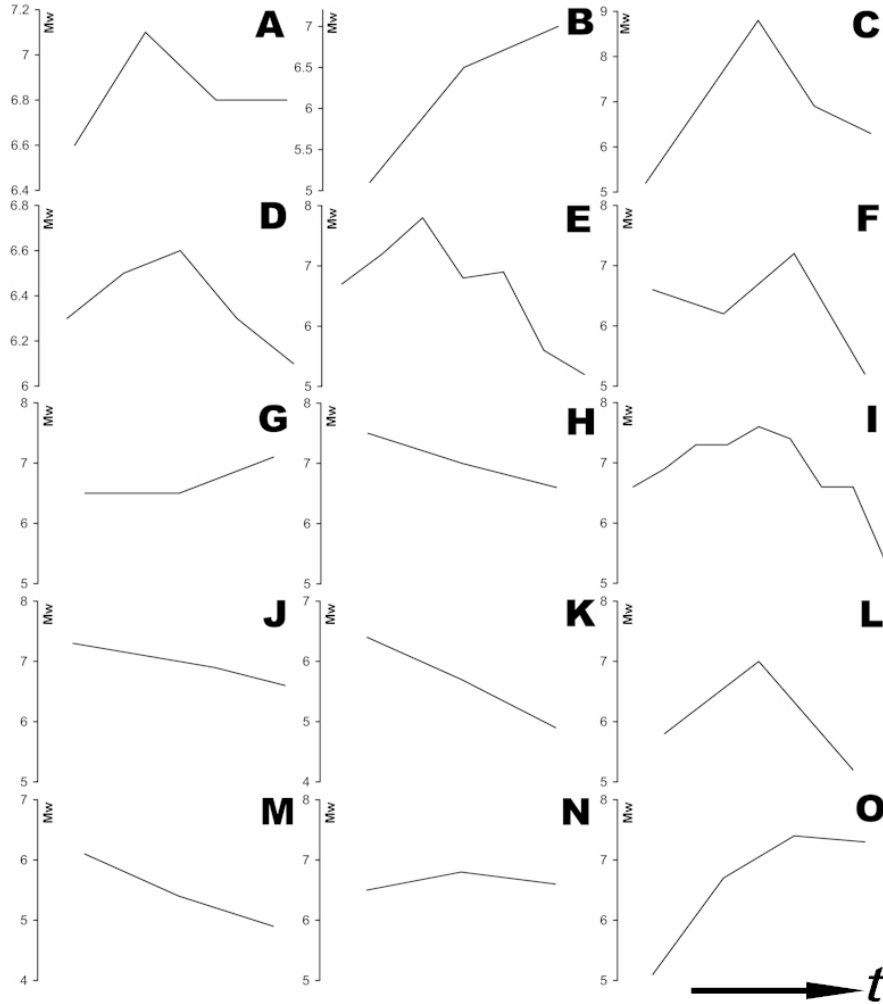


Figure 1. The resonance magnification pattern, as a gravitational shadow traverses the Earth thus disturbing the Earth's masses; cases A-O, Table 1. The resolution increases with the Earth's response as measured by the number of (strong) earthquakes where the total resolvedness is attained past the minimum resolution of 3 (successive strong) earthquakes.

	ALIGNMENTS	DATE	MOON	LOCATION	MAGNITUDE	DEPTH	LABEL
A	Earth-Mercury-Sun-Venus	Jan 03 2010		Solomon Isles	Mw=6.6	d=26.0 km	PS
	Earth-Mercury-Sun-Venus	Jan 03 2010		Solomon Isles	Mw=7.1	d=25.0 km	PS
	Earth-Mercury-Sun-Venus	Jan 05 2010		Sandwich Isles	Mw=6.8	d=10.0 km	PS
	Earth-Mercury-Sun-Venus	Jan 05 2010		Solomon Isles	Mw=6.8	d=15.0 km	PS
	Earth-Sun-Venus	Jan 10 2010		Indonesia	Mw=5.1	d=65.0 km	PS
	Earth-Sun-Venus	Jan 10 2010		California US	Mw=6.5	d=29.0 km	PS
	Earth-Sun-Venus	Jan 12 2010		Haiti	Mw=7.0	d=13.0 km	PS
	Earth proximal to: Mars-Sun-Venus	Jan 17-25 10		Yellowstone US	(swarm w/1000s of events)		PS
	Mars-Earth-Venus	Jan 28 2010					
	Mars-Earth-Sun; Moon-Earth-Sun	Jan 30 2010		F	China	Mw=5.1	d=10.0 km
B	Mars-Earth-Mercury; Earth-Moon-Sun	Feb 14 2010	N				
	Elenin-Earth-Venus	Feb 18 2010		China/RU/N.Korea	Mw=6.9	d=578 km	CP
	Elenin-Earth-Jupiter	Feb 22 2010					
	Elenin-Earth-Sun	Feb 25 2010		China	Mw=5.2	d=10.0 km	CS
	Elenin-Earth-Sun	Feb 26 2010		Japan	Mw=7.0	d=25.0 km	CS

C	Elenin-Earth-Sun; Earth-Sun-Jupiter; Sun	Feb 27 2010	F	Chile	Mw=8.8	d=23.0 km	CMPS
	Elenin-Earth-Sun	Feb 27 2010		Chile	Mw=6.9	d=35.0 km	CS
	Elenin-Earth-Sun	Feb 27 2010		Argentina	Mw=6.3	d=10.0 km	CS
	Elenin-Earth-Mercury	Mar 04 2010		Taiwan	Mw=6.3	d=21.0 km	CP
D	Elenin-Earth-Mercury	Mar 04 2010		Vanuatu	Mw=6.5	d=176 km	CP
	Elenin-Earth-Mercury	Mar 05 2010		Chile	Mw=6.6	d=18.0 km	CP
	Elenin-Earth-Mercury	Mar 05 2010		Indonesia	Mw=6.3	d=21.0 km	CP
	Elenin-Earth-Mercury; Earth-Sun-Mercury	Mar 08 2010		Turkey	Mw=6.1	d=12.0 km	CPS
	Earth-Sun-Mercury; Saturn-Earth-Venus	Mar 11 2010		Chile	Mw=6.9	d=11.0 km	PS
	Earth-Sun-Mercury; Saturn-Earth-Venus	Mar 11 2010		Chile	Mw=6.7	d=18.0 km	PS
	Earth-Sun-Mercury-Uranus	Mar 14 2010		Japan	Mw=6.5	d=32.0 km	PS
	Earth-Sun-Mercury-Uranus; Sun	Mar 16 2010	N	Chile	Mw=6.7	d=18.0 km	MPS
	Saturn-Earth-Sun	Mar 20 2010		Papua NG	Mw=6.6	d=415 km	PS
	Earth-Mercury-Venus; Moon-Earth-Sun	Mar 30 2010	F	India	Mw=6.7	d=34.0 km	MPS
	Earth-Mercury-Venus	Apr 04 2010		Mexico	Mw=7.2	d= 4.0 km	P
E	Earth-Mercury-Venus	Apr 06 2010		Indonesia	Mw=7.8	d=31.0 km	P
	Earth-Mercury-Venus	Apr 11 2010		Solomon Isles	Mw=6.8	d=21.0 km	P
	Earth-Mercury-Venus; Earth-Moon-Sun	Apr 13 2010	N	China	Mw=6.9	d=17.0 km	MPS
	Earth-Mercury-Venus	Apr 18 2010		Afghanistan	Mw=5.6	d=13.0 km	P
	Earth-Mercury-Venus	Apr 20 2010		Australia	Mw=5.2	d= 0.0 km	P
	Saturn-Earth-Uranus	Apr 26 2010		Taiwan	Mw=6.5	d=15.0 km	P
	Earth-Mercury-Sun	Apr 30 2010		Bering Sea	Mw=6.5	d=14.0 km	PS
	Elenin-Earth-Neptune(Earth-Mercury-Sun)	May 05 2010		Indonesia	Mw=6.6	d=27.0 km	P(S)
	Elenin-Earth-Neptune(Earth-Mercury-Sun)	May 06 2010		Chile	Mw=6.2	d=37.0 km	P(S)
	Elenin-Earth-Neptune(Earth-Mercury-Sun)	May 09 2010		Indonesia	Mw=7.2	d=38.0 km	P(S)
	Elenin-Earth-Neptune(Earth-Mercury-Sun)	May 14 2010	N	Algeria	Mw=5.2	d= 2.0 km	MP(S)
	Saturn-Earth-Jupiter	May 24 2010		Brazil	Mw=6.5	d=581 km	P
	G	Saturn-Earth-Jupiter	May 26 2010		Japan	Mw=6.5	d=10.0 km
Saturn-Earth-Jupiter; Moon-Earth-Sun		May 27 2010	F	Vanuatu	Mw=7.1	d=31.0 km	MPS
Mars-Earth-Neptune		May 31 2010		Andaman, India	Mw=6.5	d=112 km	P
H	Earth-Jupiter Uranus; Earth-Moon-Sun	Jun 12 2010	N	Nicobar, India	Mw=7.5	d=35.0 km	MPS
	Earth-Jupiter Uranus	Jun 16 2010		Indonesia	Mw=7.0	d=18.0 km	P
	Earth-Jupiter Uranus	Jun 16 2010		Indonesia	Mw=6.6	d=11.0 km	P
	Earth-Sun-Mercury; Moon-Earth-Sun	Jun 26 2010	F	Solomon Isles	Mw=6.7	d=35.0 km	MPS
	Earth-Sun-Mercury	Jun 30 2010		Mexico	Mw=6.3	d=20.0 km	PS
	Earth-Venus-Elenin	Jul 14 2010		Chile	Mw=6.6	d=22.0 km	CP
	Saturn-Earth-Uranus	Jul 18 2010		Alaska USA	Mw=6.6	d=14.0 km	P
	Saturn-Earth-Uranus	Jul 18 2010		Papua NG	Mw=6.9	d=28.0 km	P
	Saturn-Earth-Uranus	Jul 18 2010		Papua NG	Mw=7.3	d=35.0 km	P
	Saturn-Earth-Uranus	Jul 23 2010		Philippines	Mw=7.3	d=607 km	P
	Saturn-Earth-Uranus	Jul 23 2010		Philippines	Mw=7.6	d=586 km	P
	Saturn-Earth-Uranus	Jul 23 2010		Philippines	Mw=7.4	d=641 km	P
	Saturn-Earth-Uranus	Jul 24 2010		Philippines	Mw=6.6	d=553 km	P
	Saturn-Earth-Uranus; Moon-Earth-Sun	Jul 29 2010	F+3	Philippines	Mw=6.6	d=627 km	MPS
	Saturn-Earth-Uranus	Jul 30 2010		Iran	Mw=5.4	d=24 km	P
	Mars-Earth-Jupiter	Aug 04 2010		Papua NG	Mw=6.5	d=226 km	P
	Mars-Earth-Jupiter	Aug 04 2010		Papua NG	Mw=7.0	d=44.0 km	P
	Venus-Earth-Jupiter; Earth-Moon-Sun	Aug 10 2010	N	Vanuatu	Mw=7.3	d=25.0 km	MPS
J	Venus-Earth-Jupiter	Aug 12 2010	N+3	Ecuador	Mw=7.1	d=207 km	MPS
	Venus-Earth-Jupiter	Aug 13 2010		Mariana Isles	Mw=6.9	d=10.0 km	P
	Venus-Earth-Jupiter	Aug 14 2010		Mariana Isles	Mw=6.6	d=13.0 km	P
	Earth-Venus-Mars Saturn-Earth-Jupiter	Aug 20 2010		Papua NG	Mw=6.4	d=51.0 km	P
	Earth-Venus-Mars	Aug 27 2010		Iran	Mw=5.7	d= 7.0 km	P
K	Earth-Venus-Mars	Aug 29 2010		China	Mw=4.9	d=53.0 km	P
	Earth-Mercury-Sun-Elenin	Sep 03 2010		Alaska USA	Mw=6.5	d=24.0 km	CPS
	Earth-Mercury-Sun-Elenin	Sep 03 2010		New Zealand	Mw=7.0	d=12.0 km	CPS
	Earth-Venus-Mars	Sep 27 2010		Iran	Mw=5.8	d=27.0 km	P
	Earth-Venus-Mars	Sep 29 2010		Indonesia	Mw=7.0	d=26.0 km	P
	Earth-Venus-Mars; Earth-Sun-Saturn; Jupiter-Earth-Mercury	Oct 01 2010					
	Earth-Venus-Mars	Oct 10 2010		Pakistan	Mw=5.2	d=33.0 km	P
L	Earth-Sun-Mercury	Oct 21 2010		California Gulf	Mw=6.7	d=10.0 km	PS
	Earth-Venus-Mercury	Oct 25 2010		Indonesia	Mw=7.8	d=20.0 km	P
	Earth-Venus-Sun	Oct 29 2010					
	Jupiter-Earth-Elenin	Nov 03 2010		Indonesia	Mw=6.1	d=29.1 km	CP
	Jupiter-Earth-Elenin	Nov 03 2010		Serbia	Mw=5.4	d=10.0 km	CP
	Jupiter-Earth-Elenin; Earth-Moon-Sun	Nov 06 2010	N	Iran	Mw=4.9	d= 5.0 km	CMP
	Elenin-Earth-Uranus	Nov 10 2010		India	Mw=6.5	d=10.0 km	CP
	Earth-Mercury-Mars; Moon-Earth-Sun	Nov 21 2010	F				
	Elenin-Earth-Uranus	Nov 30 2010		Japan	Mw=6.8	d=487 km	CP
	Elenin-Earth-Uranus	Dec 02 2010		Papua NG	Mw=6.6	d=33.0 km	CP
M	Earth-Mercury-Mars	Dec 14 2010					
	Earth-Mercury-Sun	Dec 19 2010		Ethiopia	Mw=5.1	d=10.0 km	PS
	Earth-Mercury-Sun	Dec 20 2010		Iran	Mw=6.7	d=12.0 km	PS
	Earth-Mercury-Sun; Moon-Earth-Sun	Dec 21 2010	F	Japan	Mw=7.4	d=17.0 km	MPS
	Earth-Mercury-Sun	Dec 25 2010		Vanuatu	Mw=7.3	d=12.0 km	PS

Table 1. Comparison of the Earth's all long alignments v. all strong ($\sim M6+$) earthquakes, of 2010. Earthquake labels: C for Elenin-caused, M for Moon-caused, P for planetary-caused, S for Sun-caused alignment. Consecutive bold caps on the left hand-side mark the cases of the long ($\Delta t > 3$ days) alignments; see Figure 1. The Moon phase labels: 'N' for New Moon, 'F' for Full Moon; both to within ± 1 day. Underscored 'Sun' marks a solar eclipse, while underscored 'Moon' marks a lunar eclipse; both of any type and to within 2 lunar months, or within 1 lunar month when in bold.

Discussion

As seen from Table 1, all strong earthquakes of the year 2010 occurred during a long ($t > 3$ days) astronomical alignment. The alignments were occurring at the rate of some 20-30 times per year before the Elenin crossed into the Uranus orbit in 2006, and around 30-40 times per year afterwards.

Table 1 and Figure 1 reveal a regular pattern for dissipation of energy in all cases (labeled A-O). The pattern is better resolved for longer lasting alignments, i.e., those that can be related to more than a minimum of three of the strong earthquakes; see Figure 1. As expected for a georesonator (as oscillations add up, so that the Earth's order in her long alignments is of no great significance), magnification of Earth masses' oscillation intensifies as the alignment gets straighter; while it fades out as the alignment fades out. Then brief alignments, of up to three days in duration, can not generally be related to strong earthquakes. For example, the killer Haiti earthquake of 12 January came at a culmination of the Earth-Sun-Venus long alignment lasting for several days due to the Sun's size.

The focal depth is of no relevance here, except for some cases of the lunar forcing (namely: I, J) [2], indicating that all strong seismicity on Earth is rather due to a general external mechanism such as the georesonator as forced by all significant celestial objects.

Proximity of the Earth to the alignments of other celestial bodies, particularly of those involving the Sun, can result in intense seismic activity such as at the Yellowstone, US, which caused a swarm with thousands of quakes during the Earth's proximal pass by the Mars-Sun-Venus alignment of 17-25 January. (Similarly, proximity of the Sun to the many-planets alignment of 1 August 2010 caused the most massive eruptions swarm enveloping half of the Sun.) Even when coming in triplets such as of 21 October, the short alignments seem unable to cause strong earthquakes. Note that the alignments are relatively rare events that occur on average less than once a week, while the multiple ones occur on average less than once a month.

ALIGNMENTS	DATE	MOON	LOCATION	MAGNITUDE	DEPTH	LABEL
Saturn- Earth-Sun	Nov 16 2000		Papua NG	Mw=8.0	d=33.0 km	PS
Mars- Earth-Mercury ; Earth-Moon-Sun	Jun 23 2001	N+1	Peru	Mw=8.4	d=33.0 km	MPS
Earth-Venus-Mercury ; Earth-Moon-Sun	Nov 03 2002	N	Alaska US	Mw=7.9	d=5.0 km	MPS
Earth-Moon-Sun	Sep 25 2003	N	Japan	Mw=8.3	d=27.0 km	MS
Earth-Mercury-Venus	Dec 23 2004		Macquarie NZ	Mw=8.1	d=10.0 km	P
Earth-Mercury-Venus ; Moon-Earth-Sun	Dec 26 2004	F	Indonesia	Mw=9.1	d=30.0 km	MPS
Earth-Mercury-Sun ; Earth-Sun-Venus	Mar 28 2005		Indonesia	Mw=8.6	d=30.0 km	PS
Jupiter-Earth-Sun	May 03 2006		Tonga	Mw=8.0	d=55.0 km	PS
Earth-Sun-Venus-Jupiter	Nov 15 2006		Kuril Isles RU	Mw=8.3	d=30.3 km	PS
Earth-Sun-Mercury	Jan 13 2007		Kuril Isles RU	Mw=8.1	d=10.0 km	PS
Mars- Earth-Elenin ; Moon-Earth-Sun	Apr 01 2007	F	Solomon Isles	Mw=8.1	d=10.0 km	CMPS
Earth-Venus-Elenin	Aug 15 2007		Peru	Mw=8.0	d=39.0 km	CP
Earth-Moon-Sun	Sep 12 2007	N	Indonesia	Mw=8.5	d=30.0 km	MS
Earth-Moon-Sun	Sep 12 2007	N	Indonesia	Mw=7.9	d=30.0 km	MS
Earth-Moon-Sun	Dec 09 2007	N	Fiji	Mw=7.8	d=149.0 km	MS
Elenin- Earth-Neptune	May 12 2008		China	Mw=7.9	d=19.0 km	CP
Earth-Mercury-Jupiter	Jan 03 2009		Indonesia	Mw=7.7	d=17.0 km	P
Earth-Sun-Mercury	Jul 15 2009		New Zealand	Mw=7.8	d=12.0 km	PS
Earth-Venus-Elenin	Sep 29 2009		Samoa	Mw=8.1	d=18.0 km	CP
Venus-Earth-Uranus	Oct 07 2009		Vanuatu	Mw=7.8	d=35.0 km	P
Elenin- Earth-Sun ; Earth-Sun-Jupiter ; Moon	Feb 27 2010	F	Chile	Mw=8.8	d=23.0 km	CMPS
Elenin- Earth-Sun ; Earth-Mercury-Uranus	Mar 11 2011		Japan	Mw=9.0	d=32.0 km	CPS

Table 2. Comparison of the Earth's long alignments at the peak-times, v. very strong ($\sim M8+$) earthquakes of the decade of 2000's (expanded by the earthquakes from years 2000, and the available part of 2011). Labels as before.

Table 2 shows that the epochs of the very strong earthquakes from the decade of 2000's coincide in time with the astronomical alignments, at around their peak-times. Note that, in terms of very strong seismicity, the Elenin started playing a role in 2007, and continued doing so, contributing in 6 out of the

22 alignment-relating seisms. Similarly, the Sun participated in 19 such alignments, the Mercury in 9, the Venus in 8, the Moon in 9, the Mars in 2, the Jupiter in 4, the Saturn in 1, the Uranus in 2, and the Neptune in 1. The planetoid Pluto played no role.

The planets generally play lesser role in seismicity-relating alignments the farther they are from the Sun, not from the Earth. Besides being expected (since orbital periods generally become longer with an increase in orbital radius), this is also in agreement with the hyperresonator extension of the georesonator

concept: the here empirically demonstrated mechanism for the generation of seismicity lies outside the Earth. Note that the alignments with the Sun can last up to three or even more days, due to the Sun's size and consequently a greater gravitational shadow.

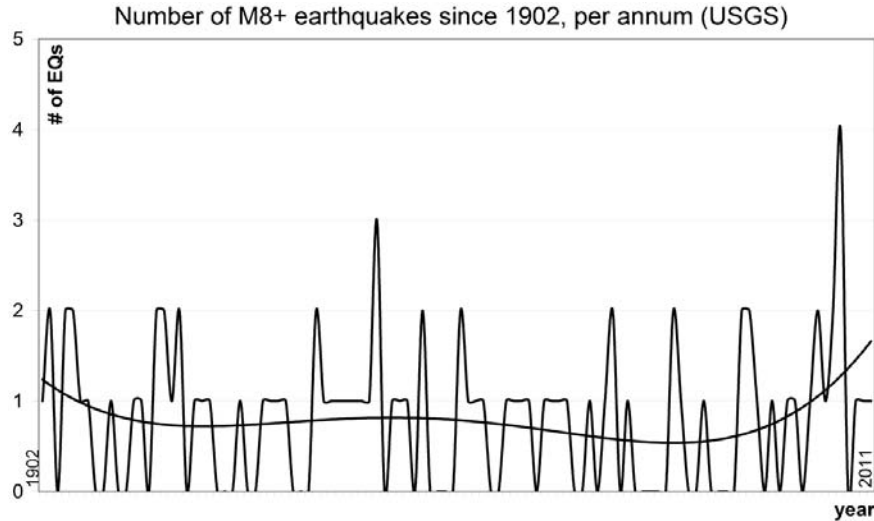


Figure 2. Occurrence of M8+ earthquakes 1902-2011 (so far), per annum. Note the largest increase in 2007, coinciding with the Elenin starting to play a role in the seismicity-related alignments, Table 2. Polynomial trend of 4th order.

ALIGNMENTS	DATE	(Δt)	MOON	LOCATION	MAG	DEPTH	LABEL
Earth-Sun-Mercury; Earth-Sun-Venus	May 22 1960	8,45		Chile	Mw=9.5	d=33.0 km	PS
Earth-Mercury-Jupiter; Earth-Sun-Mercury	Mar 28 1964	12,24	F	Alaska US	Mw=9.2	d=23.0 km	MP
Earth-Mercury-Venus; Saturn-Earth-Sun;M	Dec 26 2004	28,40	F	Indonesia	Mw=9.1	d=30.0 km	MPS
Elenin-Earth-Sun; Earth-Mercury-Uranus	Mar 11 2011	6, 8		Japan	Mw=9.0	d=32.0 km	CPS
Jupiter-Earth-Sun; Jupiter-Earth-Mercury	Nov 04 1952	12,15		KamchatkaRU	Mw=9.0	d=30.0 km	MPS
Elenin-Earth-Sun; Earth-Sun-Jupiter;Moon	Feb 27 2010	7, 4	F	Chile	Mw=8.8	d=23.0 km	CMPS
Earth-Sun-Venus; Neptune-Earth-Uranus	Jan 31 1906	30,20		Ecuador	Mw=8.8	d= unknown	PS
Elenin-Earth-Sun; Jupiter-Earth-Saturn;MS	Feb 04 1965	12,80	N+3	Alaska US	Mw=8.7	d=Buldir block	CMPS
Earth-Mercury-Sun; Earth-Sun-Venus	Mar 28 2005	4, 7		Indonesia	Mw=8.6	d=30.0 km	PS
Earth-Mercury-Saturn; Jupit-Earth-Sun;MS	Aug 15 1950	8,25	N+2	Assam, Tibet	Mw=8.6	d=unknown	MPS
Earth-Mercury-Venus; Jupiter-Earth-Sun	Mar 09 1957	4,12		Alaska US	Mw=8.6	d=33.0 km	P(S)

Table 3. Comparison of the top 11 greatest (all strongest, M8.6+) earthquakes recorded instrumentally (since 1902), and the matching long alignments. The dashed line separates the high-strongest (M9+) earthquakes. Δt denotes estimated duration (in days) of the alignments. The labeling and luni-solar phases/eclipses as in Table 1.

Table 3 shows eleven strongest (M8.6+) earthquakes recorded instrumentally (i.e., since 1902) v. the matching astronomical alignments. Multiple alignments can be noted on the day of the earthquake. Remarkably, three out of six (five expanded arbitrarily with one M8.8 event) high-strongest (M9+) earthquakes recorded to day occurred during the Full Moon. Four of strongest recorded earthquakes occurred in the last decade, and two in the last year due to the approaching Elenin.

The Sun participated in 18 alignments, the Mercury in 9, the Venus in 5, the Moon in 5, the Jupiter in 6, the Elenin in 3, the Saturn in 3, the Uranus in 2, and the Neptune in 1. The Mars and the Pluto played no role. Thus a

general trend as in Table 1 is largely preserved here too, and even more so for strongest earthquakes, therefore corroborating the georesonator in principle as well as empirically. Interestingly, the Mars played no role in strongest earthquake examined, so it is likely that Mars contributes mostly to increase in ~M8.6- seismicity only. The Pluto played no role in any of the earthquakes examined, so its demotion seems to have been justified. Its inclination of nearly 20° forbids it to partake in alignments, thereby corroborating the herein established alignments-seismicity causality as well. Importantly, all other planetoids from the Kuiper belt also have forbidding inclinations.

If luni-solar eclipses play a role, then it is only general (see Table 1) albeit not particular, e.g., they seem to play no role at all in the high-strongest (M9+) seismicity. This in turn would mean that their general role is not real either, and that it appears as such only because of a denser sample when more earthquakes are

considered; given that there is 4-6 eclipses of any kind per year.

A phase of up to 3 days can occur in lunar forcing which results in deep earthquakes [2]. This is evident here for the Alaska, 1965 event, and possibly, for the Tibet 1950 event, too.

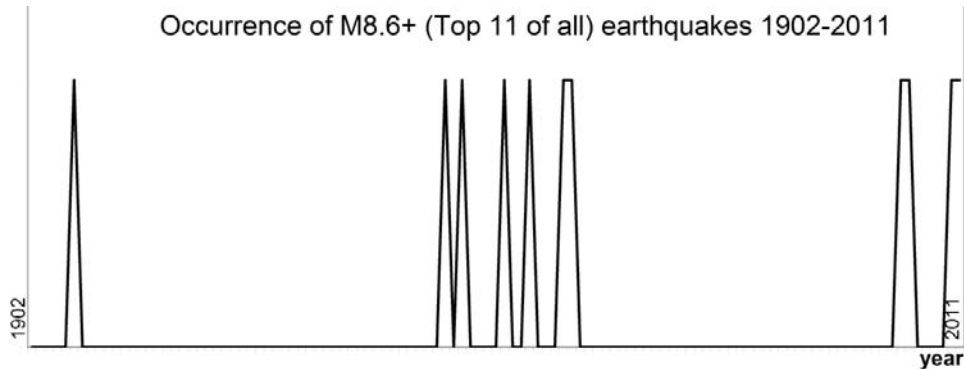


Figure 3. Occurrence of M8.6+ (the top 11) earthquakes between 1902–2011 (so far), per annum. Note that, for the last half a century, these events came in subsequent pairs, i.e., without a whole calendar year in between that can be called calm in the sense of strongest seismicity. This indicates intensity increase of georesonator's external forcing, coinciding with the Elenin starting (in 1965) to play a role in the seismicity-relating alignments of past century; Table 3.

In order to make the georesonator concept useful, a one-on-one relationship ought to be shown for a minimum of 67% earthquakes potentially dangerous to humans. Therefore, one has to examine how well all of the astronomical alignments over a test-period match the very strong seismicity. Expectedly, as it can be seen from Table 1, all of the long alignments do coincide in time with the occurrence of more than one strong earthquake. Comparison in Table 3, from the JPL data, against the USGS annual data as averaged over the Centennial Catalog, shows that there are on average 20-40 astronomical alignments of any duration, per annum, v. less than 100 strong earthquakes per annum. Thus Tables 1-3 essentially establish, at a well over 67% rate, a desired one-on-one relationship between the very strong seismicity and the astronomical alignments. The matching rate for the testing data was actually above 90%, which is then adopted hereby as the declared accuracy of approximate earthquake prediction by the georesonator concept, pending more detailed investigations into the tectonic plates' own characteristic frequencies. But what is the extent and the meaning of the approximation as inferred above?

In the classical view, successful earthquake prediction requires exact magnitude, time and location. However, given that the herein proved georesonator concept applies to the physics behind the Earth's strongest seismicity (of

potentially catastrophic outcome to humans), such a definition must be regarded impractical and too rigid. The definition is then amended and made more specific: *–Successful prediction is one that can predict a very strong or strongest earthquake to within a few-days interval and at a handful of locations globally.*

Obviously, the largest absence of land mass on the georesonator will necessarily act as a natural attenuator. This in turn explains a relative seismic tranquility of inland v. oceanic regions in terms of very strong earthquakes. It is thus evident why the Pacific Ocean, as the largest landmass discontinuity, makes the most suitable region for hosting one Ring of Fire. The Earth simply absorbs most of its magnified vibration by locking up the wave energy within the Pacific Rim, towards which most of the vibration arrives as moving from all directions to that largest landless area of all. By acting so, the circum-Pacific makes other similar regions relatively calm, such as the circum-Atlantic or the circum-Mediterranean, which together make the second largest body of mass and thus the second-most shaking region on Earth. As a long alignment nears, mechanical foreshocks occur normally in a matter of days or weeks prior to the main shock, followed by mechanical aftershocks as the alignments fade out. Besides, the only explanation for continuous periodicity in occurrence of strong earthquakes, as well as for their occurrence within tectonically inactive regions, is in long astronomical alignments as

the truly periodic event on the centennial scale. Then what we know as tectonic/seismic faults, subduction zones, trenches, etc. from the theory of plate tectonics, are merely material fractures in the georesonator, which resemble cracks on a bridge as soldiers step march across it thereby giving rise to bridge's resonance magnification.

Pinpointing strongest earthquakes' location is a matter of applying the existing structural engineering knowledge to future data gathered via globally gridded networks of sensors. Given that the demonstration of georesonator also proves the hyperresonator, it can be said that, generally, a larger gravitational shadow will result in a more energetic response by the georesonator, albeit not proportionately to either the body's mass or distance from the Earth (but from the Sun instead). I showed earlier that that the dependence is on the body's eigenfrequencies i.e. apparent size [3]. Also, the georesonator is the exact solution to a specific case of the previously unsolved three-body problem of the Newtonian mechanics.

The ongoing increase in seismic activity due to combined effects of the Elenin and other celestial objects is manifested in form of phases longer than 3 days, and displacements of more than 10 m. This will continue until the comet crosses into the Earth's orbit around 1 August 2011, when the seismicity will subside as the comet speeds up significantly. After that time it will not have enough time for participating in long astronomical alignments in order to pose imminent danger to the Earth as before, except for the alignments involving the Sun due to the Sun's size. The strongest seismicity will then again increase around 20 October 2011, i.e. upon the comet's crossing of the Earth's orbit on the way out, only to continue subsiding till year 2016. It will finally fade out in terms of very strong seismicity by year 2060.

The georesonator concept explains why atmospheric data behave as seismic precursors: the atmosphere is just a part of masses thrown into oscillation magnification, together with the mantle, rocks and oceans. The atmosphere along the vector of astronomical alignment thus reacts in "precursory fashion". Such a behavior is a byproduct of astronomical forcing of the georesonator, and as such arises from the same (external) sources as seismicity. Atmospheric precursors and earthquakes are not causally related, but belong simultaneously to a same process of outer forcing. Thus atmospheric precursors do not consist from gas radiation, which some allege extends upwardly from the Earth's depths to the atmosphere, but vice-versa and only as a part of the same process of astronomical forcing of the Earth as seismicity. For example, it has been well established that GPS soundings of the ionosphere show distinct changes days ahead of some earthquakes. Thus it is the mechanical shaking via magnification of mass resonance, and not the seismic stress

via rock compression, which is the prime cause for the release of gases days ahead of activation of the seismic fault itself. Here 'prime' is by extension: if mass-resonance magnification is the prime energy supplier and thus the cause of strong earthquakes, it is also the prime cause of their precursors. Similarly, the ionosphere disturbances are just a part of the same mechanism of resonance magnification.

The herein given empirical proof, together with its observational and theoretical proofs that preceded it, demonstrates beyond any doubt that the alignments do cause (via hyperresonator mechanism) strongest, very strong, and majority of the strong earthquakes as well. Examination into relations of long alignments and strong seismicity serves the purpose of demonstrating the georesonator's mechanical principle via finding the expected path (increasing-peaking-decreasing) of the magnified oscillation during a long alignment. On the other hand, examination into the relation of long alignments and very strong seismicity is the core of this paper. Note that herein empirically established causality is by exclusion: it stems from the fact that there are no alternative intermediaries in Space (relating earthquakes and alignments indirectly), other than the hyperresonator [3]. So the correlation is real.

Very long alignments (on the order of weeks-to-months) exhibit erratic magnitude trending: as one resonance magnification dies out under a very long alignment, another one begins, with or without a delay. This is fortunate because if mass resonance were not dying out naturally, the Earth would have been destroyed by resonance magnification a long time ago. Very long alignments show nicely that mass-resonance magnification outputs enough energy to stir things up, but insufficient to destroy an object, except in special cases like fragile construction – the 1940 example of the collapse of Tacoma bridge in the US.

Note finally that strong seismicity during long alignments has mostly to do with the object's orbital inclination (must be virtually coplanar to our solar system for any alignment to occur), relatively low speed, and its en-masse relatively large size. Such sizeable, non-periodic comets, and which have a hyperbolic trajectory virtually coplanar to our solar system, such as the Elenin, are very rare and come at a rate of about a few per century. That is what had made the Elenin so useful for this study. Obviously, since the georesonator concept is universal, it applies to other objects as well, for example the Sun's largest coronal mass ejection ever recorded, that of 7 June 2011, occurred during multiple long alignments Sun-Venus-Mars and Elenin-Sun-Uranus. This was a Sun equivalent of a M9+ earthquake due to the Elenin.

Conclusion

The Earth's strong seismicity is unrelated to tectonics, and they both arise due to the same external (astronomical) causes. So their mutual causality is not real either. ~M6- seismicity is primary due to tectonics and secondary due to the mantle's resonance magnification, since the mantle's permanent dynamics is caused at all times by resonance magnification from some alignments.

This discovery can have significant effects in preserving human life and habitat, mainly in quake-prone regions. Combined with careful studies of the structural characteristics of the lithosphere, knowledge unveiled via the georesonator concept now offers a real prospect for scientific earthquake forecast. Approximate forecast is feasible in time, location and magnitude. Time-wise, this can be done to within a few days, by monitoring the Earth's

response to a long alignment as it occurs. Location-wise, this can be done by narrowing the location down to geographical frontiers of the regions/plates whose oscillation frequencies are expected to reach the collapse mode considerably sooner than any other's, as the gravitational shadow traverses the Earth (the candidate-regions). Magnitude-wise, this can be done within a few degrees of magnitude, as earthquakes shown here to be caused by the alignments are of the ~M6+ strength.

This empirical demonstration, herein finalized by the conclusive empirical proof arrived at via near-real-time tracking and by lowering the threshold down to M6 (Figures 11 and 12), closes the three-step proof of the georesonator [2] and its generalization the hyperresonator [3], which concepts are thereby both proved.

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6. NASA – Moon Phases: 6000 Year Catalog (2011). <http://eclipse.gsfc.nasa.gov/phase/phasecat.html>

Examples of alignments related to strongest earthquakes of the decade of 2000's

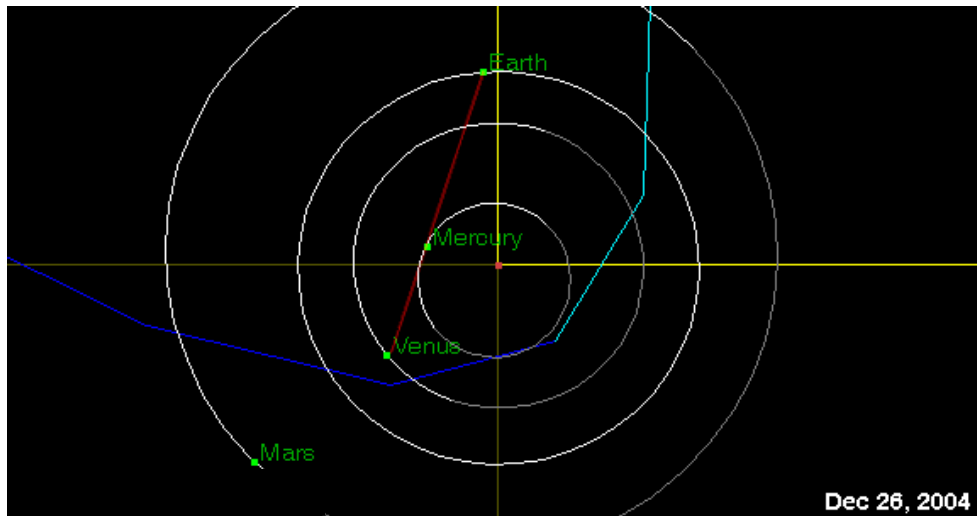


Figure 4. Long alignment (red) Earth-Mercury-Venus on day of M9.1 Indonesia quake of 26-Dec-2004, Table 2.

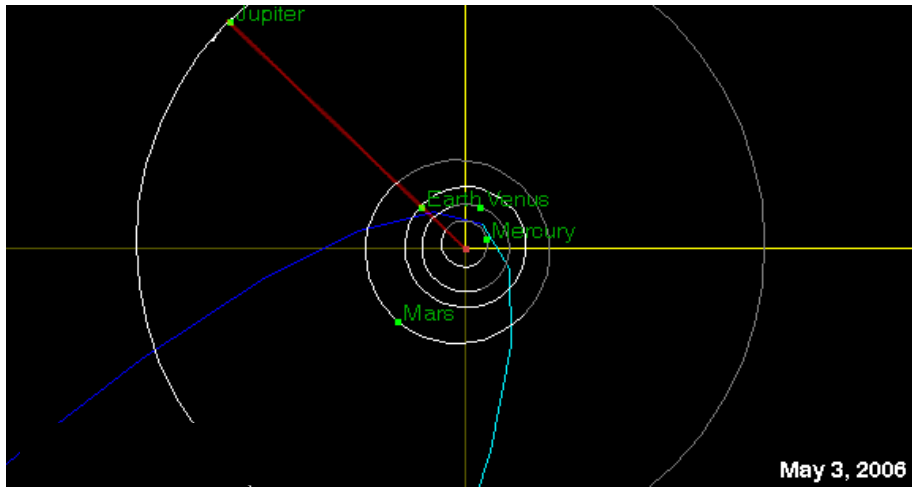


Figure 5. Long alignment (red) Jupiter-Earth-Sun on the day of M8 Tonga earthquake of 03-May-2006, Table 2.

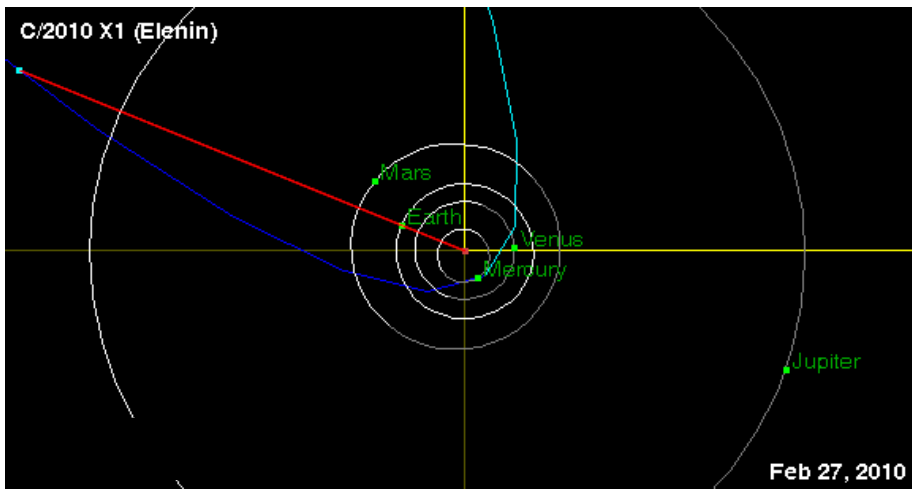


Figure 6. Long alignment (red) Elenin-Earth-Sun on the day of M8.8 Chile earthquake of 27-Feb-2010, Table 2.

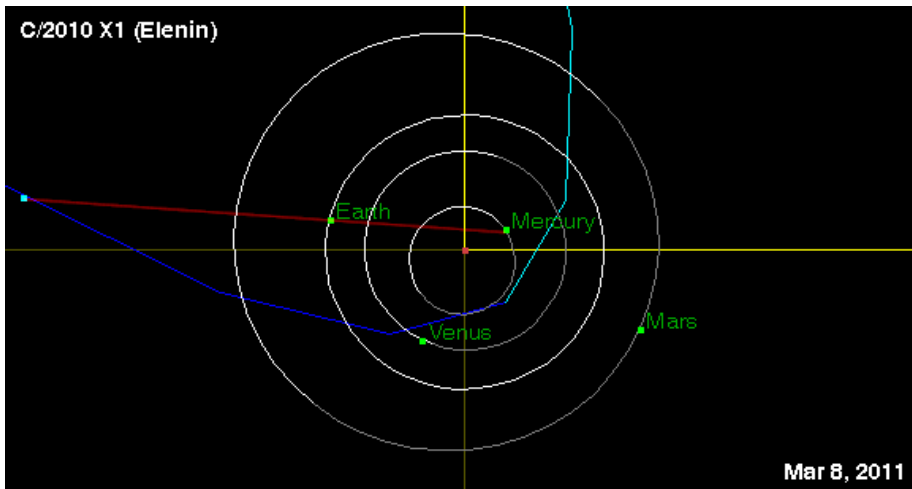


Figure 7. Long alignment (red) Elenin-Earth-Mercury, -3 day of M9 Japan earthquake of 11-Mar-2011, Table 2.

Example of continued mass resonance magnification (alignments-earthquakes relationship) tracked in near real time from May-July 2011

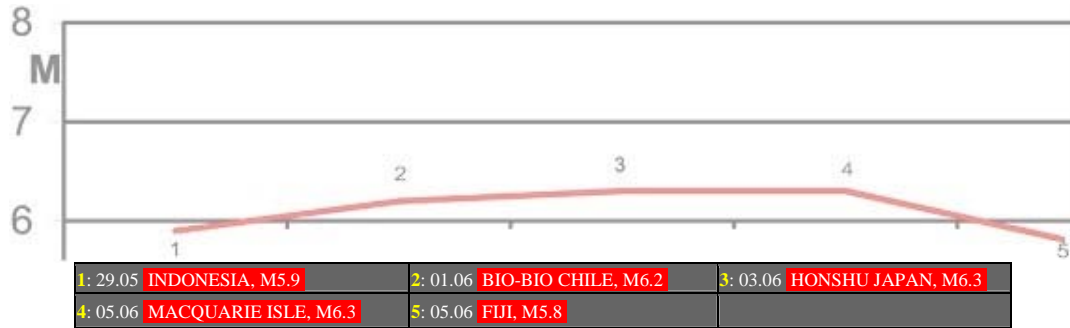


Figure 8. Long alignment Elenin-Earth-Neptune (26 May-05 June).
Pattern of strong seismicity intensification: as expected.

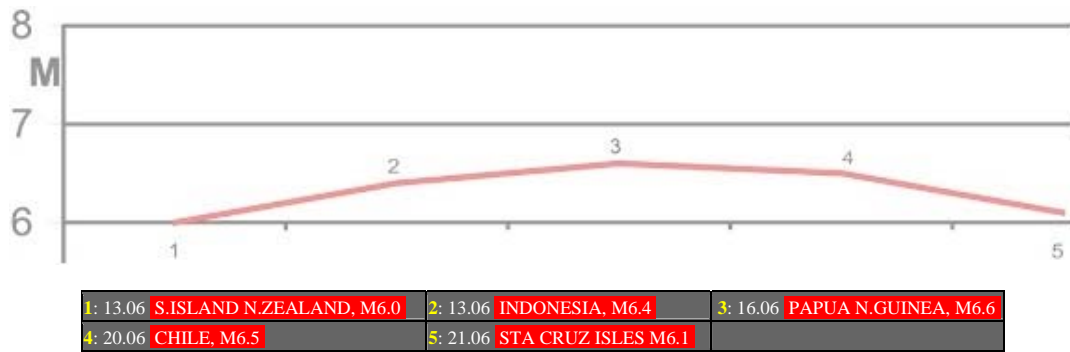


Figure 9. Long alignment Earth-Sun-Mercury (12-21 June).
Pattern of strong seismicity intensification: as expected.

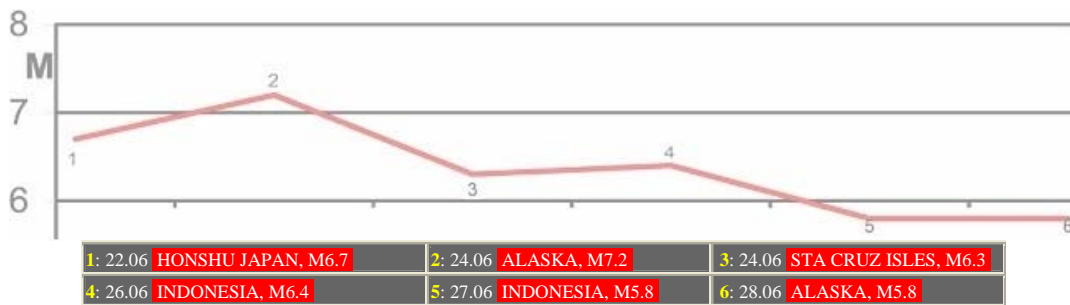


Figure 10. Long alignment Elenin-Earth-Neptune (22-30 June), as a continuation of the resonance magnification which was demonstrated for 26 May-05 June, so half of the ~M6+ earthquakes above were in the same regions as back then (top panel). Pattern of strong seismicity intensification: as expected.

Note that all time-intervals between those with the above-demonstrated patterns were quiescent in terms of strong seismicity: 20-25 May, 06-11 June, 01-04 July, as expected. Here quiescent means "within prescribed accuracy of up to one M6+ earthquake per interval of time spanning three or more days without Earth's long alignment".

The tracking was done on author's homepage: <http://sites.google.com/site/omerbashich>. Status accuracy can improve only once the Earth goes into its long alignment. For the pattern enhancement purposes the M(6-5%)+ (i.e. M5.7+) earthquakes were used in the above, at the beginning and ending of a mass resonance magnification.

Conclusive proof of long alignments-seismicity relationship as arising from mass resonance magnification, tracked in near real time from May-July 2011

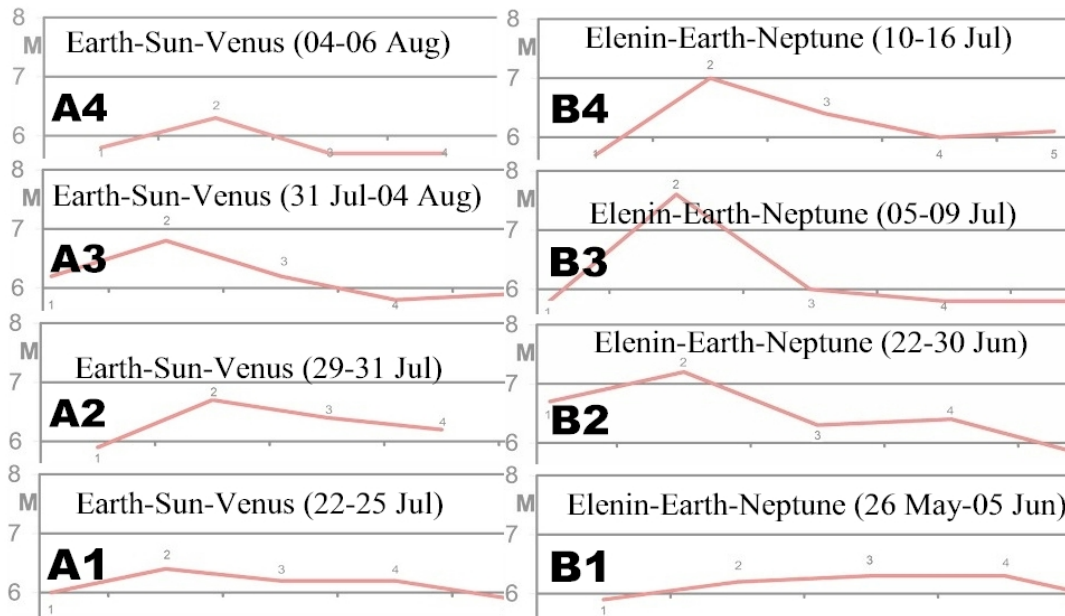


Figure 11: Demonstration of the long alignments- seismicity (Table 4) relationship: note a gradual change in peak-magnitudes, from episode to episode within each of the *very long alignments* ("on the order of weeks-to-months") tracked on author's homepage May-Aug 2011. This gradual increase-peaking-decrease pattern obviously represents the **georesonator at work** (jerkng the Earth, rather than destroying it). The above pattern corresponds to that seen more readily for *long alignments* ("on the order of days-to-weeks"), fig.9. In the above, the M5.7+ earthquakes enhance the pattern at the edges (beginning or/and end of mass-resonance magnification).

A1.1: 22.07 FIJI REGION, M6.0	B1.1: 29.05 INDONESIA, M5.9
A1.2: 23.07 HONSHU JAPAN, M6.4	B1.2: 01.06 BIO-BIO CHILE, M6.2
A1.3: 24.07 HONSHU JAPAN, M6.2	B1.3: 03.06 HONSHU JAPAN, M6.3
A1.4: 25.07 PAPUA N. GUINEA, M6.2	B1.4: 05.06 MACQUARIE ISLE, M6.3
A1.5: 25.07 PHILIPPINES, M5.9	B1.5: 05.06 FIJI, M5.8
A2.1: 27.07 MID-ATLANTIC, M5.9	B2.1: 22.06 HONSHU JAPAN, M6.7
A2.2: 29.07 FIJI ISLES, M6.7	B2.2: 24.06 ALASKA, M7.2
A2.3: 30.07 HONSHU JAPAN, M6.4	B2.3: 24.06 STA CRUZ ISLS, M6.3
A2.4: 31.07 VANUATU ISLES, M6.2	B2.4: 26.06 INDONESIA, M6.4
A3.1: 31.07 VANUATU ISLES, M6.2	B2.5: 27.06 INDONESIA, M5.8
A3.2: 31.07 PAPUA N.GUINEA, M6.8	B3.1: 06.07 HONSHU JAPAN, M5.7
A3.3: 01.08 HONSHU JAPAN, M6.2	B3.2: 06.07 NEW ZEALAND, M7.6
A3.4: 02.08 FIJI ISLES, M5.8	B3.3: 07.07 NEW ZEALAND, M6.0
A4.1: 04.08 INDONESIA M5.8	B3.4: 09.07 TONGA, M5.8
A4.2: 04.08 KURIL ISL.RUSSIA M6.3	B4.1: 09.07 NEW ZEALAND, M5.7
A4.3: 06.08 INDONESIA M5.7	B4.2: 10.07 HONSHU JAPAN M7.0
A4.4: 10.08 PAKISTAN M5.7	B4.3: 11.07 PHILIPPINES, M6.4
	B4.4: 16.07 CHILE. M6.0
	B4.5: 16.07 ALASKA, M6.1

Table 4. Data for Figure 11.

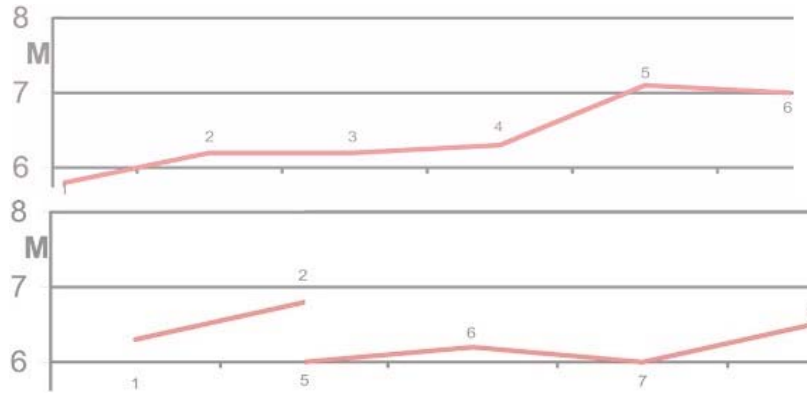


Figure 12: Fifth episode (top panel) of the very long alignment Earth-Sun-Venus (22 July and through mid-September), interposed by the Mercury during mid-two weeks of August. This interpose has introduced oscillatory-orbital interference which shut down the M6+ seismicity (Table 5) on the Earth during those two weeks. The mode of reactivation after the interpose (top) was then same as that after the previous interpose of the alignment Earth-Mercury-Venus of May 2011, by the Jupiter (bottom panel). Note that all time intervals in between the here demonstrated activity (in the sense of M6+ seismicity) ones, were quiescent in the same sense, meaning no M6 earthquakes occurred in those intervals, e.g., the Earth was indeed quiescent in the same sense during the two-weeks interpose, only to see its mass-resonance magnification rebound immediately after the interpose.

1: 16.08 INDONESIA M5.8
 2: 17.08 HONSHU JAPAN, M6.2
 3: 19.08 FIJI, M6.2
 4: 19.08 HONSHU JAPAN, M6.3
 5: 20.08 VANUATU, M7.1
 6: 20.08 VANUATU, M7.0

1: 09.05 MACQUARIE ISLES, M6.3
 2: 10.05 NEW CALEDONIA, M6.8
 3: empty placeholder marking an interpose day 11.05
 4: empty placeholder marking an interpose day 12.05
 5: 13.05 COSTA RICA, M6.0
 6: 13.05 HONSHU JAPAN, M6.2
 7: 15.05 MID-ATLANTIC, M6.0
 8: 15.05 PAPUA N GUINEA, M6.5

Table 5. Data for Figure 12 (top and bottom portions correspond to respective panels).