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Heavy nuclei formation in black holes, fission in stars and in telluric planets – an explanation for volcanism, gravitational waves and a risk for nuclear reactors

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nucleosynthesis

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Abstract : Recent astrophysical discoveries, including actinid-rich stars and protostars close to a black hole, as well as geophysical research (for instance the proximity of zirconium and barytine mines, stable decay products of major fission products, to volcanic areas), allow to confirm, rearrange and expand the hypothesis first developed by J M Herndon in the 1990s by adapting it fully to star cores and linking it to volcanism. I offer a contradiction of the R-process and of the chondritic model for the Earth's composition: I claim that U and Th chains are not synthesized in supernovas, but at the origin of stars and planetary cores and synthesized in black holes thanks to gravity forces, offer a link between nuclear fission and fusion through ternary fission processes, claim that supernovas are the main factor for super volcanic eruptions (explaining volcano clusters) and suggest that neutrons expelled by supernovas, accelerated by the disappearance of attraction forces, constitute accelerated matter explaining gravitational waves. These neutrons are obviously able to destroy as well nuclear plants on a large perimeter.

The « actinid boost » in a number of stars is a long-time issue which can be resolved – so is the issue of “volcano clusters” and the extreme solar particle events leading to recorded spikes in ^{14}C and ^{10}Be , as well as the depletion in ^{238}U in volcanic lavas, star “bursts” in nebulae, and antineutrinos found in acute levels near subduction areas. All of these events, among others that will be presented below, can be linked to the same simple explanation.

Some stars have been confirmed to be uranium and thorium-rich. This is confirmed by spectral research, see for instance Hill et al (2017) as well as Barbuy et al (2011). Both teams found U and Th – rich stars and used the classical theory to assess that these stars are very old. They may on the contrary be extremely *recent* agglomerates of matter. The discovery that barytine and zirconium mines are located close to old volcanoes confirms that nuclear fission is the motor for magmatic formation and explains the contribution of water to explosive increases of magma in subduction magmatic chambers, as water brought by subduction is the perfect incident neutron moderator for

nuclear fission supercriticalities propped up sometimes by the impact of neutrons from nuclear supercriticalities in stars. It suggests a direct link between novas, supernovas and volcanism. R. J. De Meijer and W. van Westrenen 2008 note that « *The KamLAND collaboration presented the first*

50 *evidence for geoneutrinos (antineutrinos produced within the Earth) in July 2005. Development of direction-sensitive antineutrino detectors should provide a means for a critical test of our hypothesis. The first step in the development of this type of detector has recently been completed with success. Measurements with an array of these detectors could reveal whether elevated concentrations of U and Th are present in the CMB, and if so, could identify the process by which*

55 *heat is produced.* ». G. V. Domogatsky et al (2004) also note a possible antineutrino confirmation of fission in the Earth's core. G.J. MacDonald (1988) also notes findings of dihydrogen gas in the Kola borehole in Russian territory. Last point, the findings that zirconium and barytine mines are concentrated near old extinct volcanoes or hydrothermal areas are a good confirmation that these elements are the stable decay products of nuclear fissions underground. This is also shown by the

60 explosive nature of “tornillos” associated with magma production in subduction areas that can easily be compared to the typical signal of underground nuclear tests. This is also confirmed by the very high intensity of the antineutrino flux in KamLAND (much higher than in other detectors), close to a subduction area of the Pacific belt, as well as by research on the actinid content of volcanic ash. The ash of the St Helens volcano, for instance, was depleted in ^{238}U and ^{232}Th

65 (Strauss et al 1981) when compared with surrounding soils. ^{238}U was also depleted relatively to ^{230}Th in volcanic ash (Huckle et al 2016). ^{238}U was more depleted than ^{232}Th in granite rocks (Rosholt et al 1973), including up to 165 feet underground after drilling the rock. The “removing” of uranium is easily explained by fission instead of erosion (as suggested by the authors of the last article). ^{238}U has in average higher fission cross sections than ^{232}Th , even for neutrons above 1

70 MeV. These elements confirm that ^{238}U , ^{232}Th are major contributors to fission underground (involving therefore extremely fast neutrons, i.e. relativistic particles that have only begun to be slowed down by the impact onto the superior layers of the Earth's crust). Supercriticalities are

triggered by the intense pressure of rocks. Each supercriticality causes a “tornillo” and the light part of the molten down rock percolate in the direction of the surface of the Earth, leading to magmatic chamber formation. This percolation depressurizes temporarily the underground, slowing down the nuclear reactor until a new supercriticality is triggered by 1. spontaneous fission or, exceptionally, a nova / supernova where obviously supernovas are the main factor for the most violent cases 2. more pressure from the plaques or an addition of water (and carbon from the organic debris on the plaques) from subduction (or both). For the 1., along with spontaneous fission must be added as well reactions of neutron spallation such as α, n (and, less frequently, γ, n if an activation product of an anterior nuclear fission reaction has a gamma ray emission powerful enough to trigger a "photoneutron" - or, obviously, gamma rays from the nuclear fission itself, or photo-fission...). This is just a natural nuclear reactor. For the continuation of the nuclear fission chain reaction, even the neutron spallation caused by a proton (from neutron decay, or ternary fission product) onto a heavy element like lead (much more frequent underground than the light elements needed for α, n and γ, n), and of course n, n and $n, 2n$ with the same heavy elements, can help.

Many low-scale volcanic events can be triggered without a significant nova (for instance the permanent activity of the Stromboli volcano), yet supernovas are easy to link to simultaneous intense volcanic activity (high VEIs and supervolcanos) in geographic clusters (indicative of impact zone for supernova neutrons), as I show below. These element can allow us to reconstitute not only a planetary motor for temporary increases of fission and fusion (where, underground, the intense pressure onto ternary fission products may allow for some nuclear fusion, explaining the accumulation of dihydrogen as well as other light elements close to the Earth’s surface found for instance in the Kola peninsula noted by MacDonald in 1988), but also of course for the permanent dual fission-fusion motor of stars, under a much higher pressure due to the initial mass, which I claim to be constituted solely by heavy atoms, i.e. actinids and transuranics beyond the actinid class, or maybe even more massive atoms, and thus more likely to fission (and thus obviously unlikely to remain if these atoms have all fissioned earlier in the Universe’s history even though

some should remain deep underground and in dwarf stars ; or, better said, in the history of our local
100 area, visible to our instruments). Type 1A supernovas are evidence : the passing of a big star close
to a very small one mean that the small one will receive much more neutrons as well as hydrogen
captured by gravity than it is accustomed to in its internal nuclear equilibrium ; thus it reacts
extremely violently, and goes hypercritical. The bright light of Type 1A supernovas confirms that
dwarf stars are mostly made of heavy actinids and transuranics beyond the actinid class likely to
105 fission (the heavier the atom, the more likely it has a good cross section for fission !), but failed to
light up due to insufficient mass and thus did not accumulate the much needed hydrogen moderator
and fusion fuel. The amount of unfissioned heavy actinids and transuranics beyond the actinid class
explains extremely well the brightness of these supernovas which are highly dominated by fission
whereas other supernovas are more equilibrated between fission and fusion (as the internal core
110 made out of actinids and transuranics beyond the actinid class collides with the outer sphere at
detonation, compressing it and fusing it). Research on Pluto's core should confirm that.

The discovery by the team of James Head (2011) of an intense volcanism on Mercury also confirms
the heavy interaction between solid heavy atoms planetary cores and neutrons from the permanent
115 fission processes in stars. Mars, where iron oxyde is significant, can be opposed to Venus, with a lot
of basalt and volcanoes (where the planet seems an immense volcano bubble), and thus Mercury
certainly was even more active but has, in a way, "expired" because of too much neutron fallouts
from the Sun burning fast its actinids and transuranics beyond the actinid class. The organisation of
the Solar System seems in a way to show that in the proto disk, much more compressed, iron
120 separated the dense U and Th chains on one side and the lighter elements on the other (reproducing
in reverse the Aston curve), where actinids and transuranics beyond the actinid class have likely
accumulated in the planets closer to the Sun (this is also confirmed by research by Schaefer and
Fegley (2003) showing lead and bismuth snow on Venus). Mars is in an intermediary position,
where iron from fusion processes in the proto disk would have already accumulated. Gases, partly

125 fused, from ternary fission processes, have been mostly expelled beyond, on the form of giant gas
planets. The chondritic asteroid belt would represent a rupture zone (for instance from the impact of
an massive object like a very small star) where iron would have been the interface in the proto disk,
explaining thus that the iron-rich chondrites do not match the content of planetary cores closer to
the Sun. This again suggests a vast amount of actinids and transuranics beyond the actinid class in
130 the cores of planets (as proposed initially by J M Herndon¹).

It is obvious that gas bubbles would not alone survive close to a black hole. A much heavier star
core, made with actinids and transuranics beyond the actinid class, would however resist the
permanent attraction of the black hole. The recent discovery of proto stars close to a black hole is an
135 excellent confirmation that stars are not made with light elements but with heavy, radioactive
actinids and transuranics beyond the actinid class, compressed up to a permanent fission reactor
thanks to the strength of gravity, where complex nuclear reactions create the hydrogen fuel (tritium
for instance is an unfrequent fission product from ternary fission) for the parallel nuclear fusion
process and the thermalisation of neutrons, whereas gravity also slows down neutrons.

140 Neutrons from fission will themselves decay over a certain time into protons, with a beta minus
decay, they are the basic bricks of hydrogen. Ternary fission sometimes produces protons. All of
these protons can combine with beta particles from fission products to produce hydrogen. Positrons
from the capture of helium-4 nuclei of actinid & transuranic decay and ternary fission products
(where lighter elements capturing an alpha particle decay by emitting a positron) are another
145 element as they conjoin with neutrons and beta particles of fission products to create hydrogen.
Fission products beta particle decay is crucial and demonstrates here its “usefulness” in the global
star cycle. Tritium from ternary fission also is a source for helium-3 which then produces protons
through neutron impacts. Fission products and their transmutation are a key in production of other
elements together with nuclear fusion of for instance helium-4 from ternary fission products (in

¹ I discard any relation with his claims on « chemtrails », « geoengineering » or 9/11 conspiracy theory !

150 combination with the electrons of fission products beta decay). Hence ternary fission is key in providing the usual nuclear fusion cycle with its fuel. I claim that light elements in stars are solely the product of nuclear fission, ternary fission products and radioactive decay, through combinations of the elementary particles in a context of high gravity forces and temperature, and of course slow capture of neutrons, which also contributes obviously to the diversity of heavy elements beyond the iron limit of the Aston curve, from neutron activation of fission products combined with radioactive decay.

Neutron stars are also an excellent way to see the expulsion of all fission product matter outwards in violent hypercriticality events where only neutrons remain at the end, agglomerated and compressed by their own gravity forces.

160 A thermonuclear reactor at equilibrium is obvious (where the progressive loss of heat & mass leads to decompression and the slowing down of fission and fusion), where interactions with nearby supernovas are a major and essential factor in star divergence onto supernova through intakes of neutrons and other elements (hydrogen and helium gas for instance) disrupting the internal equilibrium, and “waves of supernovas” from one star to another (one future example could be Saiph, variable supergiant red star near Barnard’s Loop, where the variations of magnitude are a good indicator of the recent impact of neutrons from the supernova that created Barnard’s Loop, or maybe another cloud of gas in the Orion constellation). These neutrons are major constituents of the masses of accelerated matter that explain gravitational waves (which is also confirmed by the recent confirmation of gravitational waves in association with the collision of neutron stars, likely to expel 170 a lot of neutrons at impact and implosion under themselves).

It also appears that supernovas close to Earth like the one giving birth to Barnard’s Loop are linked to supervolcanoes, in this case the Huckleberry Ridge Tuff and Cerro Galan supervolcanos. Neutrons from the Lagoon Nebula may also be linked. It may be possible to envision a better 175 datation by linking Lagoon Nebula initial blast to Barnard’s, which could have happened closer to

each other than thought until now, and a method for predicting supervolcanoes from supernovas. The high temperature of stars around SN1987A even more suggests that the dramatic event provided neutrons to the fission core of these stars. The sudden relapse of gravity when a star explodes could act as a propulsive power for its own fission and fusion neutrons, which may gain speed up to close to the speed of light. All the VEI 6 volcanic eruptions in the 20th Century can be linked to supernovas which happened close to Earth in recent times : G1.9+0.3 happened approximately in 1898 according to recent research and this event can be linked to the Santa Maria (VEI 6) and Montagne Pelée (VEI 4) eruptions of 1902 as well as the beginning of the activity of Novarupta (1912, VEI 6²) and of the Cerro Azul (1903, which led to a VEI 6 eruption in 1932 after a succession of volcanic events). SN 1987A may be linked to the Pinatubo eruption of 1991 (VEI 6), Hudson in Chile (1991, VEI 5+) as well as Rabaul (1990 - 1995) and Unzen volcanos (1991). For the Samalas supervolcano in 1257 (see Lavigne et al (2013) as well as Oppenheimer (2003)), SN1006 could be the ideal explanation (in which the magma would have accumulated during a longer period than usual, leading to a bigger eruption than in the VEI 6 cases discussed above). SN1054 and SN1181, after SN1006, may also have contributed if the Indonesian archipelago was on their side at impact. SN 1604 may be linked to a lengthy accumulation of magma leading to the Mount Tambora supereruption (with the possible supplementary contribution of Cas A), and can even be linked locally to events such as the small volcanic eruptions that actually took place in the granitic – uranium-rich Mercantour massif in the French Alps, recorded in 1612 after the disappearance of an entire village (St Jacques) into a crater of “flames” (a plaque still commemorates the event near Valdeblore with the inscription “Hic omnes disparuerunt requiesant in pace – 1612”) and another lava flow recorded at the same time (in the nearby Cians under the Raton mountain near the Dôme du Barrot) – see Rossi (2017), historian relating this event in what is obviously a remain of the Alpine Arc volcanic chain, close to the Mediterranean and thus still

² « However, there are also abundant data for magma interactions leading to disequilibrium assemblages over a range of time scales leading up to the 1912 eruption. » Hammer et al (2002)

200 likely to be rich in water in the underground. SN1604 also coincides with highly destructive
eruptions in the Mediterranean area (Vesuvius 1631, Kolumbo (Santorini area) 1650 and Etna
1669). It actually makes sense that light may be refracted and slowed down for instance in the
Milky Way because of clouds of refractive materials with no similar effect on fast neutrons so that
neutrons come *earlier*, hence linking Type 1a SN1006 with the Mount Baekdu supervolcano in the
205 end of the 10th century (sometimes dated in 946 but with some uncertainty), where the magnitude of
a Type 1A supernova explains the magnitude and quickness of development of the event. It is
extremely critical to see that the 993-994 14C boost (confirming neutron impact) matches perfectly
the timeline of that event. Another more powerful 14C boost in 774 – 775 corresponds with a stellar
event noted by Chinese astronomers as “comet crash” or “thunderstorm” according to Chai and Zou
210 (2015) but which ought obviously to be another more powerful supernova leading to more powerful
super eruptions. Of course as always it is a precise side of the planet that is blown and thus a cluster
of eruptions in a localized area, e.g. one continent, ensue. Spontaneous fission of actinids
underground and smaller novas should be related to less powerful eruptions...

215 The SN1987A-triggered wave of eruptions in the Pacific matches the K431 accident in Vladivostok
area in August 1985. Light from the supernova could easily have been slowed down for a few years
by refractive material. We see the first seismic activity in the Nevado del Ruiz in early September
1985 (yet it can be expected that underground nuclear fission, propped up by supernova neutrons,
takes nevertheless months or years to diverge to above criticality threshold, because molten down
220 matter will go up, reducing pressure and thus increasing critical mass, every time the natural reactor
accelerates). The K431 nuclear attack submarine was, according to reports, surfacing and in
refueling at the moment of the blast, and hence unshielded from fast neutrons by layers of water. A
bad manipulation in refueling would have officially triggered the supercriticality, nevertheless a
simple melting down of the core could have been expected, yet the supercriticality was explosive. For
225 that reason, and because it is in the target area for SN1987A and matches the beginning of volcanic

activity in the Nevado del Ruiz, I suggest that fast neutrons coming from SN1987A came on August 10 and destroyed the K431 reactor. K431 was highly likely a fast neutron reactor, which together with its surfacing explains the isolated nature of the event in relation to a relatively small supernova.

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The cross section for fission at very elevated neutron speeds of all actinids including ^{238}U , ^{232}Th are rising due to second-chance fission, i.e. $(n, 2nf)$, third-chance fission, etc. and giant dipole resonance. Tarrío et al (2011) allow to suggest that even lead, bismuth will fission at high neutrons speeds. It is obvious that the impact of a significant neutron wave will result in the destruction of all working nuclear reactors in a wide area.

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SN1987A was, compared with Kepler's Star or Tycho's Star, magnitudes less powerful. Nuclear reactors can be expected to be destroyed by the impact, not simply molten down, and the catastrophe should happen simultaneously in reactors on a wide area, e.g. continent-wide.

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Such waves cannot be predicted. Clouds of dark matter may make it for instance impossible to see dwarf stars that are in the path of giant red stars, and Type 1A are the most neutron-rich supernovas.

It is impossible to shield completely nuclear reactors but building very large pools of water above and on top of current nuclear plants could be a partial remedy, yet the structure must be solid enough to avoid any chance of an explosion bringing flows of water on a molten nuclear core. It is a

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good for a bad. The alternative is to use dihydrogen tanks all around confinement areas, with the obvious fire risk and the clear target it represents for terrorism, yet that light gas should not totally enter in contact with the core in case the confinement is broken by a blast and the moderating effect on neutrons would be much more limited. In future times all new nuclear plants should be built

deep underground and all employees should control the plant from a significant distance, allowing

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that any explosion of the plant be solely an underground earthquake without any human casualty (and I also personally campaign for the generalization of subcritical designs, cooled with helium,

using ^{238}U and its decay products, i.e. mine tailings (^{234}U , ^{230}Th ...). The costs for building underground plants will be very significant, reducing significantly the competitiveness of nuclear energy. States using nuclear energy for e.g. aircraft carriers should look for alternatives, e.g. low energy nuclear reactions and lasers, and the same comment applies for space missions with onboard nuclear reactors. The massive spreading of such underground nuclear reactors would still represent a danger in case an extremely powerful supernova was to happen very close to us, even though this is much more minimal. The use of subcritical technology combined with burying deep underground (e.g. one kilometer underground) future reactors would allow for a very good level of safety.

The “bursts” leading to the formation of stars in “waves” (Beccari et al 2017) can be easily explained by waves of what I call *black hole eruptions*. Black holes are the obvious place for the formation of heavy atoms in high volume. It is the sole place where it can be expected that forces are concentrated enough to conflate particles into i.e. uranium and even heavier atoms. The accumulation of energy in black holes cannot and never will be infinite even though it is on human time scales. Planck’s temperature leads to this conclusion and the jets of plasma flowing out of black holes are already very well known. Findings of proto-stars close to black holes, as noted in the beginning of this article, and of formation of stars in “bursts” in a nebula known for its black hole (where another black hole is very likely to be expected right at the center of the “three cities”), leads to these black hole eruptions, i.e. the rapid propulsion of fresh blocks of very heavy atoms (which can be suggested to be far away from the known end of the periodic table of elements, even with all experimentally known exotic atoms included). Black holes are in a metastable state because of the huge amounts of energy captured by atoms very far at the end of the Aston curve and this energy is always ready to erupt, especially when there is an exogenous disruption. It is very easy to suggest that the so-called Big Bang was solely a massive burst from a super giant black hole that could still be at the center of the known universe, that the cycle of atoms in space has no beginning and end and that there is no center in space (which makes sense and can simply be explained by

black matter in the path making it impossible to see too far !). And, I will suggest, to conclude this paper, that micro black holes are very likely to sit *inside* stars and telluric planets (certainly not into gaseous giants) and explain the volcanic hot spot dynamics as black hole eruptions here explain the occurrence of flood volcanism through the very rapid rejection of matter (again as actinids and transuranics beyond the actinid class prompting a quick chain reaction from the very core of the Earth and producing the heavy amounts of magma leading to flood basalt provinces) that accumulated and fused over millions of years inside these black holes. For stars, it suggests superflares and provides an ideal explanation for the black hole that is found after very powerful supernovas and, in case of a neutron star formation from the neutrons of the stellar hypercriticality, the (in this case smaller) black hole is simply to be found at the center of the neutron star.

Conclusion

The surveillance of dwarf stars getting close to super giant stars and of other stars likely to explode, as well as of neutron star collisions, will require a significant effort to try to predict gravitational waves and reduce their human impact. The existence of black matter and its significance for dwarf star detection means that there will still be an underlying “relativistic risk”. Black matter, which is presumably made of a significant portion of actinids, is a true barrier to the observation of the entire space but the “snooker-like” dynamics of gravitational waves, black hole eruptions and other supernovas could be computed to attempt to predict the next possible points of origins of gravitational waves.

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