

The Formation History of Our Earth Based on the Small Bang Theory (SBT)

Version 2.0

*A unified, consistently coherent linear sequence of physical events that led to
our present world*

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Foreword

The Earth formed through a "quiet & linear" process that was rarely disturbed by external events. This quiet process was disrupted only once, 66 million years ago (66 Ma, where Ma = Mega-annum), by a significant, yet endogenous event: a "non-quiet & non-linear" event that originated within the Earth itself.

Over the course of approximately 4.5 Ga (Ga = Giga-annum), there were about 15 clearly identifiable state transitions or other events that can be correlated with well-documented geological and biological epochs. Some of these correlations are more reliable than others. Four of these events had external causes, while the others resulted from the "quiet & linear" process that drives planetary formation in general.

This universal planet-formation process triggers phase transitions at specific times, depending on many factors, that have clearly measurable, abrupt impacts on both inorganic and organic life. However, each of these "abrupt" changes becomes linear, continuous, and derivable when viewed at a finer temporal resolution, essentially by "zooming in" on the timeline.

This holds true except for the limiting case where one zooms into the smallest resolutions of the universe: quantum systems. The background here is that time and energy are quantized. More precisely, "when interacting with other quanta, each involved quantum assumes a definite position. To an observer (e.g., measuring apparatus), the 'collapse of the local quantum system' then appears as a 'jump.'"

Start and End Points for the SBT

The starting point (4.5 Ga) and end point (0 Ga, today) of Earth are "sufficiently" known.

Explanation of the Starting Point (4.5 Ga)

The building material of Earth existed 4.5 Ga ago as clearly demarcated matter composed of a combination of light to heavy elements (atoms). The Sun, with 99.84% of the total mass of the solar system, had taken the largest share of light elements (H, He). The remaining material orbited the Sun, forming the basis for planetary formation. Moon formation occurred in a subsequent process.

Earth, as the 3rd planet from the Sun, with a share of 0.0003% of our solar system's mass, received, due to its relatively dense position relative to the Sun, a material distribution containing a sufficiently large amount of gases (mainly H, O, C, N).

The normal formation process of planets, and in a subsequent process also the formation of moons, occurs through gravitational accretion of mass (gas cloud, material cloud) that initially moves spherically, then circularly, and finally in a ring-like fashion around a central star (the system's center of mass). This process proceeds quietly over a period of 1 to 100 million years. The process culminates in the formation of a celestial body that, if sufficiently massive, heats up so intensely due to the pressure of its own gravity that it emerges in a liquid state.

Once the hot, internally circulating, and "viscous" celestial body (here, our Earth) had formed, the sequence known from solar system formation, "light material inside, heavy materials outside", reversed, and the exact opposite became true: "Heavy materials are inside, and light material is outside." This is why the Earth's core contains heavy materials (iron, nickel), while the lightest materials (silicate slag, granite) are found on the outer crust. Light gases are predominantly dissolved in the silicate layer, and in small quantities also in the iron-nickel core. Volatile gases reside in the atmosphere, where they are perpetually at risk of escaping into space despite gravity.

Thus, the starting point of Earth around 4.5 Ga was a relatively homogeneous, stratified, molten material sphere with an iron-nickel core of approximately 2,900 km radius, a molten silicate mantle about 3,500 km thick, and a very massive atmosphere forming from escaping gases.

Explanation of the End Point (0 Ga, Today)

The current end point of Earth in the year 2025 can be analyzed without issue in practically any depth of detail, though it is difficult to "see" deeper than 10 or 20 km into Earth's interior. For greater depth, we employ various methods that we continually improve. Nevertheless, we do not know the exact internal structure of Earth.

Development of the SBT

The development of the SBT began with knowledge of these two points: "Start-Earth and End-Earth."

The search was for the answer to the question: "How does one get from A to B without logical breaks, while respecting the laws of nature, in a coherent process?"

Invariant Statements of the SBT About Earth

The SBT makes the following statements about the state of Earth at specific times.

Note: Determining these time points and their properties, which predate written and scientific records of Earth's states, can only be achieved through logically and scientifically derived methods of "forensics." Generally, further back in time these points lie, the less reliable our scientific capabilities are to determine the exact time and environmental parameters of that moment. Nevertheless, or precisely because of this, there exists an almost infinite amount of data, analyses, and interpretations based on the most diverse measurement methods and theories.

Examples: Rock dating, atmospheric composition, presence of tides, length of Earth days, rotational energies, timing and causes of the 5 major mass extinctions on Earth.

The SBT states that around 541 Ma:

- Earth was completely covered with a roughly 20–60 km thick granite crust.

The SBT states that until 66 Ma:

- Earth had a radius of approximately 6,410 km, about 40 km more than today.
- No Moon existed, thus there were no tides.
- No axial tilt of Earth existed, thus there were no seasons.

The SBT states that only from 66 Ma onward:

- The Moon formed, and thus tides emerged.
- The known axial tilt of Earth exists, and seasons begin.
- Earth is 71% covered by water.
- Earth is 29% covered by landmass.

For Earth's developmental process, the SBT proclaims that there is only one coherent (interconnected) scientific "roadmap." The SBT provides this roadmap as a coherent framework.

This roadmap will, at the current stage of the SBT, contain the following limitations:

- Inaccurate parameters and constants.
- Faulty "constraint vectors", vectors for the mutual dependencies of parameters specified in functions (e.g., (mass, radius), (temperature, cooling gradient), (mass, escape velocity)).
- Altered sequences of events, especially for overlapping events such as pressure fronts, depressurization fronts, explosion fronts, impulse injections, moments of inertia, rotational energies, temperature gradients, crystallization processes, convection, etc.
- Faulty assignments (mix-ups) of external and endogenous events to known geological and biological epochs.
- Faulty physical and chemical justifications for the emergence of phase transitions, the development of states, and the triggering of events.
- Faulty interpretations of known geological and biological epochs.

Note: Every comprehensive scientific theory will always possess a degree of "imprecision" (uncertainty). The goal of the scientific process is to eliminate these imprecisions as much as systemically possible. Absolute, i.e., 100% accuracy and certainty will never exist due to systemic constraints.

The SBT calls upon every scientist to contribute to its supplementation, correction, and consolidation. The SBT provides the most important foundation for this in the form of unified coherence. Thus, the respective partial results can and must fit together within the structure of the SBT's overall roadmap.

The Hot Phase of Earth's Formation

SBT Roadmap:

4.6 – 4.5 Ga

Formation of the solar system with 99.86% of the total mass in the Sun and 0.14% of the

total mass in the planets. Of this, 71% belong to Jupiter and 21% to Saturn. Mercury, Venus, Earth, Mars, Uranus, and Neptune share the remaining 0.04% of the mass of our solar system. Earth possesses 0.0003%, and the Moon 0.0000037%, of the solar system's mass.

4.5 Ga – The Starting Point of Earth for the SBT

Earth was so hot that it was completely molten.

The following 3 rules apply to Earth and its atmosphere:

1. Due to gravity, the lightest material moves to the surface, while the heaviest material sinks inward. ("Density-Radius Gradient")
 - This applies only if the material is sufficiently "fluid" or "mobile."
2. Convection repeatedly causes temporary shifts in the gravity-induced stratification.
3. Chemical transformations change the density, viscosity, and other properties of the material. This impacts rule 1.

From these 3 rules, it follows that Earth was not (entirely) homogeneous.

The atmosphere was massive due to the initially very strong "outgassing", the escape of chemically dissolved gases from the Earth's mantle and core. It may have been several thousand kilometers thick. Accordingly, the air pressure was several hundred times that of today's air pressure. The thickness of today's atmosphere is approximately 15-20 km.

Through eruptions, lava was ejected into the air. Upon solidification, i.e., the cooling of the lava, the markers for a commonly used dating method are set. This "freezing" of the age-determination markers is "erased" when the material falls back into sufficiently hot lava. Only when the lava's temperature falls below specific values does the initial "birth age" of the rock become fixed. This fixation temperature differs for various types of lava or lava components.

4.4 – 3.7 Ga

The oldest rocks (4.4 Ga), in the form of zircon crystals, are found in sediment (3.7 Ga) or host rock (3.7 Ga) at Jack Hills, Australia, and 300 km north of Yellowknife, Canada (4.03 Ga), there within a different sediment or host rock.

Note: Minor occurrences of rock have been discovered with ages between 4.4 and 4.03 Ga. However, again not as host rock, but as small inclusions within sediments or host rock.

The first permanent crusts (slags) formed at the two upright-rotating poles of the Earth, still without its 23-degree axial tilt, due to the lack of solar radiation there. "Permanent" in this context means that this rock did not sink after solidification and was not remelted in an "age-resetting" manner. Minerals floating in the atmosphere as dust (aerosols) are brought to the Earth's surface by gravity, adhesion to surfaces, and rain (moisture in the atmosphere).

Zircon crystals ($ZrSiO_4$ from zirconium) form in sufficiently cooled lava with strong H_2O outgassing. Isotopic signatures (e.g., δD , $\delta^{18}O$) in ancient zircons point to an early water-rich, granitic degassing during their crystallization.

As the lava became increasingly viscous, especially at the two poles, the movement of Earth's surface caused by convection diminished. This led to increasing insulation of the Earth. The temperature decline gradient became significantly shallower, meaning Earth cooled more slowly.

The oldest rocks (4.4 to 4.03 Ga), floating in the lava, remained at the surface. The lava, the future host rock, remained so hot for several hundred million more years that the aforementioned "fixation temperature" for the host rock was not reached. The first areas where the fixation temperature fell below the crucial age-fixing value were the first emerging "continental areas." These were located at the two poles.

Once continental areas with sufficiently low temperatures had formed, sediments developed from the aerosols, which fell via gravity, adhesion, and condensation (rain, "cloud condensation nuclei") onto the increasingly cooler lava/landmass.

The two poles of the upright-rotating Earth can thus be located on our present-day, approximately 23-degree tilted Earth: they are Jack Hills, Australia, and Yellowknife, Canada, with their "oldest rocks."

Note: Both sites where the oldest rocks are found are exceptionally rugged. This is because these two locations contain the first granites, which formed from the most impure "lava slag." At these two sites (Jack Hills and Yellowknife), one also finds iron-bearing sediments (banded iron formations), which are the result of the first "lakes", condensed moisture in depressions, on the forming Earth with a solid crust.

Circa 3.7 – 1.8 Ga

Note: The period between the initial solidification ("host rock is age-dated") at the two poles (circa 3.7 Ga) and the complete, pressure-tight sealing of Earth's interior (541 Ma) has been analyzed by me in more depth but is not published in this version of the SBT, because a) the data situation is sparse and unclear, and b) I currently cannot yet assign enough clearly defined research time points to the phase transitions or state changes occurring on Earth.

Through Earth's cooling, a solid, dense granite crust slowly forms on almost the entire surface due to the insulating properties of the viscous lava. This granite crust becomes increasingly denser, i.e., more pressure-resistant, through deposits from outgassing and through cracks and pores in the granite being sealed. The background to this is that carbon-containing fluids (gases, fluids) under pressure and temperature within granite lead to carbonate, graphite, bitumen, or quartz deposits, which physically and chemically seal the pores and cracks.

Only the area around the equator remains free of a pressure-resistant granite crust for a very long time. This is especially because outgassing from the entire Earth increasingly must occur exclusively through the remaining openings at the equator. It is reasonable to assume that, due to the massive atmosphere, air pressure on Earth was 100 to 500 times higher than today. The reason for this is that at the beginning of Earth's formation, the amount of gas outgassing from the molten silicate was highest, then decreased over time. The decline in

outgassing proceeds, due to the different gases and molecules in which the elements are present, over approximately 4.5 billion years with varying slopes. Outgassing occurs globally, diffusely, and non-explosively. This results in a water vapor-rich, CO₂-poor primordial atmosphere.

As soon as the temperature on the granite crust, relative to the pressure and temperature of the atmosphere, becomes low enough, hydrothermal salt lakes form.

Slowly, the quality of the atmosphere improves because the introduction of "toxic" gases at the equator is far away for most places on Earth. The moist atmosphere provides „filtration," i.e., the removal of toxic components from the atmosphere. Through moving water, triggered by rain, uneven terrain, and evaporation, the toxic portions such as sulfur compounds (SO₂), ammonia (NH₃), and water-soluble aerosols (silicate ash, sulfates) are washed out of the mixture of the then "air" (atmosphere), consisting of N₂, O₂, SO₂, NH₃, CO₂, silicate ash, sulfates, etc., and deposited in depressions.

2.5 – 1.8 Ga

The often still cracked and permeable granite crust becomes increasingly stable and begins to consolidate and grow in thickness, except in the equatorial region. Consequently, less gas can outgas through the granite crust, and the gas must find its way to the openings at the equator.

1.8 – 0.8 Ga

This period is also called the "boring billion." Little happens because the granite crust is stable and the openings at the equator are large enough to allow Earth's outgassing. The onset of the Joule-Thomson effect likely began already in this phase and represents a quasi-automatic temperature and pressure regulation circuit. Colloquially: cooling through pressure relief, often used for cooling hydrogen tanks.

0.8 - 0.541 Ga

The temperature drops so much that more openings at the equator become clogged with solidified lava. The Joule-Thomson effect prevents the pressure under the granite crust from rising too much and cools the granite crust at its surface.

Over a longer period of 100 to 300 million years, gases and lava flowed through the openings at the equator into the atmosphere at very high velocity. These jets or "permanent volcanoes" had two effects:

- a) The already existing rotation of Earth was accelerated, though only slightly by 1-20%, depending on the modeling and parameterization of the calculation.
- b) Age-dated rock formed near the equator, which is not identical to today's equator.
- c) Age-dated sediment formed across the entire Earth's surface through the deposition of dust and aerosols, with a physically determined distribution structure.

Start of a very long note:

For assigning the positions of deposits, we must consider 3 important SBT statements for the

time point 66 Ma. These are:

- a) The shift of the two poles to the positions Jack Hills, Australia, and Yellowknife, Canada.
- b) The yet-to-be-determined precise shift of other granite crust fragments (our present-day continents).
- c) The partial shattering of the granite crust.

To allow the reader to follow the SBT roadmap more easily, I must take a quick detour to the SB (Small Bang, 66 Ma), the central event of the SBT. After the pressure-tight sealing of the granite crust, it was only a matter of time until the pressure caused the granite crust to burst at its weakest point. The crust held for quite precisely 475 million years, from 541 Ma to 66 Ma.

According to my estimate, the debris from this explosion "landed":

1. Either on the Moon, together with the partially solidified and age-dated lava beneath the granite crust, or
2. As small fragments that sank into the lava or formed islands, or as a very high-ejected fragment that only fell back to Earth after some time, Chicxulub.
The part of the crust that was not shattered was pushed under the lava during the SB as large, coherent so-called tectonic plates.

The precise physical explanations regarding the impulses, the differing inertia and displacement of crust, mantle, and core, the current motion vectors of the tectonic plates, and the flattening of Earth at the poles are contained in the chapter on the process of the SB.

End of the very long note.

The Life-Generating Phase of Earth's Formation

Note: The basis of organic life most certainly originated many hundreds of millions of years before 541 Ma. However, this was most likely only very primitive "life", perhaps just the formation of nucleoids and amino acids from carbon (C), hydrogen (H), oxygen (O), and nitrogen (N).

541 Ma

The last opening (jet or permanent volcano) closes. Earth is now firmly sealed. This has two consequences:

1. Pressure will build up beneath the granite crust for 475 million years, unnoticed. Gases may still diffuse through remaining pores and cracks in the granite crust. This diffusion seals the pores and cracks through deposits, but as internal pressure rises, finer pores and cracks are penetrated, thereby sealing them ever more tightly.
2. There is a rapid improvement in air quality. The outflow of toxic gases has nearly ended and continues to diminish. "Nature" begins to develop significantly faster because organisms must invest less effort in detoxifying their metabolism.

443 Ma, 359 Ma, 252 Ma, and 201 Ma

Over these 340 million years, similar and interesting organisms, plants, and animals could develop multiple times in succession. The atmosphere remained very massive, and there was enormous atmospheric pressure. However, this "air pressure" steadily decreased since the pressure-tight sealing of the granite crust. Because no new gas outgassed from Earth, the thickness of the atmosphere decreased from an estimated 500 km to an estimated 100 km. Currently, we have an atmospheric thickness of 12 km (poles) – 18 km (equator).

Furthermore, the composition of the atmosphere became "healthy" in a relatively short time (for geological timescales). On this now over 4-billion-year-old Earth, there were:

- No tides (no Moon)
- No seasons (no axial tilt)
- No oceans & seas (continuous granite crust)
- No mountains

Thus, the habitat, compared to today's Earth, was relatively homogeneous and accordingly "boring", evolutionarily unchallenging. Consequently, the evolutionary emerging animal and plant worlds were relatively uniform compared to those on today's Earth.

Note: On the topic of "How organic life originated on Earth and how it always emerges as a system-immanent process in similar configurations," I dedicate a separate chapter in another document titled "SBT 2.0 The Origin of Life.docx." Surprisingly, this chapter is comparatively short and understandable because the fundamental prerequisites for a "life-generating system" are few, simple-to-describe conditions. How life develops in detail from these prerequisites is not predictable due to the complexity of possible branching paths and is therefore not part of the document on the origin of life. However, the following derived relationship is evident: "A simple habitat produces simple organisms, while a demanding yet supportive, i.e., non-toxic, habitat triggers more complex organisms."

The 5 Mass Extinctions Through 5 Different Small Bangs (SBs)

One of the special assertions of the SBT is the logical and comprehensible explanation for the following 5 mass extinctions on Earth: the Ordovician, Devonian, Permian, Triassic, and Cretaceous extinctions. The latter is often referred to as dinosaur extinction.

In the period 0.8 - 0.541 Ga (800 Ma – 541 Ma), I gave a "very long note" about the SB (Small Bang), jumping ahead temporally to 66 Ma. In that note, I provided explanations of the SB process to aid understanding. The SB refers to the expansion/explosion of Earth's pressure-tight granite crust after 475 million years of slow pressure buildup inside Earth.

This explosion transported more than 1.23% of today's Earth mass into orbit. How much more exactly will be determined by future calculations and simulations based on existing and

new, specifically sought rock findings. The 1.23% figure given above corresponds to the mass of the Moon.

Some theories suggest that in similar scenarios, approximately 1 to 2 lunar masses escape the planet's gravitational field, while about ½ to 1 lunar mass falls back to the planet. This would mean that Earth lost about 2.46 to 3.69% of its mass during the SB. I have not conducted further investigations into this. For my calculations in this document, I have assumed an estimated mass loss through the SB of 2%.

Regarding the transport of terrestrial material into orbit, we can distinguish between 3 different scenarios:

1. Material falls back to Earth
2. Material orbits Earth and eventually forms the Moon
3. Material moves away from Earth

The material that moves away from Earth crosses the orbits of other planets. Material that does not impact other planets lands in the Sun, orbits the Sun temporarily (planetary orbit), or escapes into space.

Of the material orbiting near Earth's rotational disk, the Moon collects material that is about 60,000 km from its orbit (384,000 km). Material below approximately 324,000 km (and with a tangential orbital velocity lower than $v_k = 7.96$ km/s) falls back to Earth.

The precise analyses and calculations on this are contained in the document "SBT 2.0 The Formation of the Moon.docx."

The Effects of the Various Small Bangs (SBs) on Earth, Moon, and Planets

The SB on Earth had the following permanent effects on Earth, the Moon, and other planets:

- Formation of the Moon
- Transport of matter into space
- Axial tilt of Earth
- Mass extinction on Earth and possibly on other planets (Mars)

When we look at the other planets in the solar system, we notice that some have moons and some have tilted rotational axes.

Note: The formation process of solar systems with their planets is a quiet process resulting in planets orbiting a central star (the system's center of mass) with a vertically standing own rotational axis. However, this solar system formation process does not result in planets forming moons. For moon formation around a planet, one requires a further recursive generation of the "rotating mechanism" valid throughout the universe. This mechanism for moon formation is the SB (Small Bang), which generates the necessary rotating material

cloud. However, moon formation is only triggered on suitable planets (mass, material composition, solar distance, available time, etc.).

What if some of our other planets also had an SB?

Suitable candidates are quickly found. We can assign these 4 candidates relatively well through the correspondence of planetary properties and the causes of the mass extinctions. Uranus and Neptune are very distant, large, and cold planets with axial tilt and moons. Therefore, their assignment to the two "cold" and "protracted" mass extinctions is relatively straightforward.

Venus and Mars are Earth's two neighbors. They are Earth-sized hot planets with axial tilt. Therefore, their assignment to the two "hot" and "short" mass extinctions is relatively straightforward.

*Note: Jupiter and Saturn have certainly already had their respective SBs. Possibly even multiple SBs, as they have formed many moons. My assumption is that their respective SBs occurred before the pressure-tight sealing of Earth's granite crust (541 Ma). Therefore, these SBs had no major impact on life on Earth. However, it could be that some events (state changes) on early Earth (before 541 Ma) were influenced by debris from the SBs of Jupiter and Saturn.

Extinction Event	Most Likely Candidate	Notes
Ordovician Extinction (End-Ordovician, ~443 Ma)	Uranus	Half the distance of Neptune; strong SB (97.8° tilt)
Devonian Extinction (Late Devonian, ~372-359 Ma)	Neptune	Moderate SB (28.3° tilt); slow debris dispersal
Permian Extinction (Permian-Triassic boundary, ~252 Ma)	Venus	Stronger, hotter, and more toxic than the SB of Mars
Triassic Extinction (Triassic-Jurassic boundary, ~201 Ma)	Mars	Weaker, not as toxic & hot as Venus's SB
Cretaceous/Dino Extinction (K-Pg boundary, 66 Ma)	Earth	We were in the middle of it

The causes of the characteristics of the 5 mass extinctions are described in detail in the document "SBT 2.0 Differences and Commonalities of the 5 Mass Extinctions.docx." In the present document, only brief explanations are given.

Limitation: The assignment could be different. It could also be that Venus, as a liquid planet, could not build up high pressure and thus had 2 SBs. However, after weighing the properties of these 4 planets in concert with the other planets, particularly their properties in relation to Earth, the assignment above is the most probable.

Note: The calculation or estimation of the probability with which debris from an SB hits other planets is summarized in other documents. In short, debris spreads 3-dimensionally around the SB planet in space. Debris that reaches the solar system's escape velocity (very little) escapes into space, i.e., it escapes the Sun's gravitational field. Debris that does not fall back onto the planet either hits other planets (very rarely) or is forced by the Sun's gravitational field back into the planetary orbits to subsequently crash into the Sun.*

The fifth and final SB was Earth's Small Bang. This caused the dinosaur extinction 66 Ma ago. And with Earth's SB, we can correlate cause and effect with a much higher probability than with the SBs of the other four planets.

More Detailed Examination of the 4 "SB Planets":

Note: Sun-near and Sun-far planets have no or few moons. Planets in the "middle" have many moons. Reason: The Sun or space "swallows" the material of the rotating material cloud around the respective planet.

Venus: (Rocky, Sun-near (0.72 AU), +500°C, Earth-sized, no moon, tilted ~180°)

- Rock (core and mantle liquid) → SB tilts the planet by 180 degrees.
- Sun-near → forms no moon, as the nearby Sun "swallows" the building material.
- Medium-sized → ejects little material into space.
- Near Earth → high probability of Earth impacts.
- Hot → Earth impacts cause fires and heat on Earth.

Earth: (Rocky, Sun-near (1.00 AU), +15°C, Earth-sized, 1 moon, tilted ~23°)

- Rock (core liquid) → SB tilts the planet by 23 degrees.
- Sun-near → forms only one moon.
- Medium-sized → ejects little material into space.
- Near Earth → high probability of Earth impacts.
- Moderately hot → explosions, lava, and fallback material cause fires on Earth.

Mars: (Rocky, Sun-near (1.52 AU), -60°C, ½ Earth radius, 2 moons, tilted ~25°)

- Rock (liquid) → SB tilts the planet by only 25 degrees.
- Sun-near → forms 2 moons.
- Small → ejects little material into space.
- Near Earth → high probability of Earth impacts.
- Hot → causes fires and heat on Earth, but less than Venus's SB.

Uranus: (Ice giant, Sun-far (19.2 AU), -224°C, 4x Earth radius, 27 moons, tilted ~97.8°)

- Ice → strong SB tilts the planet by 97.8 degrees; Uranus "rolls around the Sun."
- Sun-far → forms many moons.
- Large → ejects much material into space.
- Far from Earth → low probability of Earth impacts.
- Cold → causes long ice ages on Earth.

Neptune: (Ice giant, Sun-far (30.1 AU), -214°C, 4x Earth radius, 14 moons, tilted ~28.3°)

- Ice → moderate SB tilts the planet by 28.3 degrees.
- Sun-far → forms many moons.
- Large → ejects much material into space.
- Very far from Earth → very low probability of Earth impacts, widely distributed material.
- Cold → causes long ice ages on Earth.

The more detailed analyses, evaluations (interpretations), and explanations are treated in the document "SBT 2.0 Differences and Commonalities of the 5 Mass Extinctions.docx."

It is interesting how strongly the employed theory influences interpretations, evaluations, and explanations. This even applies to analyses that "normally" should be independent of theories to be applied later.

In this document, only a very brief explanation follows of the reasons why the conventional explanations of the mass extinctions currently still differ from the SBT interpretation. It seems almost "funny" that the conventional explanations claim the exact opposite regarding "external cause" or "terrestrial cause." The SBT postulates that only the last mass extinction was of terrestrial origin.

The General "SBT Answer" Regarding the First 4 Mass Extinctions (below):

There were no seas, only depressions (lakes) on the granite crust. Earth was flat and completely covered with lakes and swamps. It was a boring habitat without seas and without mountains. The poles were colder and the equatorial zone was warmer. There were no seasons and no lunar tides. The atmosphere was warm, humid, massive (up to 1,000 km), and there was high air pressure. Incoming meteorites or other celestial bodies were "gently" decelerated. They transfer much of their cold or heat to the atmosphere, making their impact significantly less destructive. The granite crust, 25 km to 60 km thick, withstood all impacts.

1. **Ordovician Mass Extinction:** SBT explanation focuses on huge ice debris from Uranus causing global freezing. Conventional explanation cites glaciation and sea-level fall.

2. **Devonian Mass Extinction:** SBT explanation involves smaller, long-lasting ice debris from Neptune. Conventional explanation cites anoxic ocean events and plant evolution effects.
3. **Permian-Triassic Mass Extinction ("The Great Dying"):** SBT explanation involves huge, glowing debris from Venus causing global heating and toxic gases. Conventional explanation cites Siberian Traps volcanism, CO2 release, and ocean anoxia.
4. **Triassic-Jurassic Mass Extinction:** SBT explanation involves hot debris from Mars causing regional heating. Conventional explanation cites CAMP volcanism and associated climate change.

And now we have come to the 5th mass extinction on Earth. The genesis of this mass extinction is the central theme of the SBT.

The central event of the SBT is the SB (Small Bang), which occurred on our Earth 66 million years ago.

Here are the details:

5. Cretaceous–Paleogene Extinction (66 million Years Ago)

The General "SBT Answer" Regarding the 5th Mass Extinction, the K-Pg Extinction

In 66 Ma, there were still no seas, only depressions (lakes) on the granite crust. Earth was flat and completely covered with lakes and swamps. It was a boring habitat without seas and without mountains. The poles were colder and the equatorial zone was warmer. There were no seasons and no lunar tides. The atmosphere remained warm, humid, but already less massive (perhaps 100 to 200 km). Compared to today, there was very high air pressure. The granite crust, 25 to 60 km thick, was under extreme pressure. All the gases that the magma and Earth's core had outgassed over the last 475 million years had "settled" in the various layers. When the granite crust could no longer withstand the pressure, the crust ruptured at its weakest point and triggered a complex, multifactorial expansion/explosion.

*Technical-physical details of the multifactorial expansion/explosion process, the SB, are to be found following the details of the 5th mass extinction. Here, only the events that caused the mass species extinction are mentioned.

Current Scientific (Conventional) Description of the Facts:

The specific "SBT answer" regarding the responsible SB planet, Earth, and the events that caused the mass extinction are listed in points A) through Y). These details supplement the general "SBT answer" from above:

A) The granite crust ruptured at its thinnest point, at the equator. The precise location corresponds to today's Pacific region.

B) The fissure propagated eastward and westward.

- C) The fissure extended northward.
- D) Outflowing, exploding gases tore apart large sections of the thinner granite crust (approx. 30%, Pacific area) and propelled them upward.
- E) Cohesive, viscous lava flowed afterward from the Earth's mantle (Pacific area) with high pressure and great velocity.
- F) Gases dissolved in the lava bubbled up, ignited, and propelled the flying lava, together with the pieces of the thin granite crust, to extreme heights.
- G) The recoil pushed the Earth's core backward toward the South Atlantic.
- H) The two poles and large surrounding areas remained in the same position due to their inertia and thus shifted forward by several thousand kilometers on the lithosphere (toward the Pacific).
- I) The lava beneath the granite crust followed Earth's curvature. However, Earth is flatter at the poles by about 30 km. Thus, huge portions of the granite crust were pushed under the lava, which was additionally expanding due to gas pressure.
- J) The rear part of the poles ruptured a few thousand kilometers away.
- K) Due to the impulse directed obliquely southward, Earth's rotational axis shifted by about 23 degrees with a slight wobble.
- L) As a result of the displacement of the two poles on Earth's surface, the poles now ended up at Yellowknife, Canada, and Jack Hills, Australia.
- M) Earth burst open in many places due to pressure waves and depressurization waves.
- N) The gas flowing in for a long time created a "ground effect" for the many explosions and depressurizations, which brought granite crust fragments and lava into orbit.
- O) The entire atmosphere was replaced by a new atmosphere during the SB.
- P) The huge, unbroken crusts, our present-day continents, provided shelter for some animals and plants. However, surviving species had to be capable of subsisting for years with little to no food.
- Q) The lava, due to the immense impulse of the first explosion, formed one or more viscous waves that traveled around Earth multiple times. Wave fronts collided with each other, continents developed fissures from these waves, some granite crusts were slightly pulled downward, solidified, and now form the shelf areas (12%).
- R) The various granite crusts moved under or over the lava, initially quickly and today only at speeds of a few centimeters per year. The submerged granite crusts are partly today's so-called "tectonic plates."
- S) Thus, only 41% (29% + 12%) of the granite crust was now "floating" in viscous lava. The rest of the granite crust was:
- a. Driven into orbit, together with adhering lava from below (estimated 25%) → Moon and space/Sun.
 - b. Submerged under the lava as large, coherent plates (approx. 10%) → tectonic plates.
 - c. Fallen as fragments onto the continents, shelves, and into the lava, and sunk (approx. 24%) → Discordance of the entire Earth's surface.
- T) The enormous quantities of expanding and partially exploding gases (H, N, C, O) ensured that approximately 2% (estimate) of Earth's mass at that time was accelerated (explosions),

driven (volume expansion of gas), and flung (Earth's rotation) into orbit as viscous, cohesive lava with Earth's rotational velocity.

a. 1.23% of today's Earth mass formed the Moon, whose rock thus acquired an average age of about 2 Ga, because the granite crust at the equator was on average about 2.0 Ga old and the viscous lava beneath the thin granite crust (20 km) was often already "age-dated" due to temperature. These figures are estimates and must be checked and adjusted through rock samples and other methods.

b. A small portion of the mass escaped into space. The larger portion was attracted by the Sun.

c. The rest of the ejected matter fell back to Earth in various forms and at various speeds.

i. as ice and water,

ii. as gases, which formed the now significantly less massive atmosphere of our Earth,

iii. as meteorites, which show various degrees of vitrification depending on fall height, and

iv. as large granite boulders, which caused various discordance phenomena on the Earth's crust depending on their size. Typically, there are millions of mountains from "small" boulders (also geometrically co-flying groups of boulders) or thousands of mid-sized mountain ranges from a series of "medium" boulders and about 10 global central mountain ranges from a series of large boulders. The larger and heavier such a granite boulder was, the more the underside of the continent subsided. This is the cause of the formation of underground mountain roots.

*Note: The Himalayas are an interesting mountain range that reveals much about the dynamics of the SB. During the SB, the granite crust in the Pacific region was uplifted by many kilometers. Due to Earth's rotation, the flatter Earth at the poles, and the crustal displacement of up to 50 degrees, the Asian granite crust rotated and pushed under the uplifted Pacific granite crust. Therefore, the Himalayan surface consists of sedimentary rock, namely, the top of the Pacific granite crust. Depending on the explosion dynamics during the SB, fragments were overturned, folded, uplifted & deposited, broken, fanned out, etc. Further details can be found in the document: SBT 2.0 The Geological Structure of Earth.docx.

The Ural Mountains were not, or only partially, formed by falling granite blocks, but by the breaking of the entire granite crust (continent: Eurasia) from north to south. Through the fissures, the already "age-fixed at about 200 Ma" granite lava beneath the granite crust was pressed upward. Confusion is caused by the ubiquitous overprinting by the many granite fragments and lava shreds aged more than 66 Ma that impacted the entire Earth's surface after the SB.*

v. as Chicxulub, which was a granite crust fragment that, like most of the granite crust, failed to achieve the necessary escape velocity and thus fell back to Earth.

U) The lava on 71% of the surface was rapidly cooled by weeks of continuous rain from ice and water, hence showing its typical "pillow" structure from "shock solidification." The basalt layer beneath cooled slowly, forming the known gabbro.

V) Due to the rise in sea level, the shelf areas (12%, granite crust) were flooded, so that today we have a proportion of landmass on Earth, with the original granite crust, of 29%.

W) Many continents and islands developed fissures during and after the SB, particularly at the edges and in narrow areas. The fissures were filled with lava.

X) Due to the presence of continents and islands separated by oceans and seas, as well as the now-existing seasons and later the emergence of tides, plants and animals now had a significantly "more demanding" habitat, leading to the development of many new animal and plant species.

Y) Some of the surviving organisms (plants and animals) set out, in the form of adapted evolutionary attributes, to develop new species and gradually conquer the seas and oceans, just as these plants and animals conquered high mountains, deep lakes, vast deserts, frosty poles, remote islands, and other "niches."

Considering points A) through Y), the information below on the extent, victims, and survivors of the K-Pg extinction is logically derivable. Surviving organisms adapted to the new habitat or perished.

Extent, Victims, and Survivors of the Cretaceous–Paleogene Extinction (66 million Years Ago)

- **Extent:** Approximately 75% of all species, including about 50% of all genera.
- **Victims - Particularly Well-Known Casualties:**
 - Non-Avian dinosaurs (all on land).
 - Plesiosaurs & mosasaurs (in the sea).
 - Ammonites and many planktonic foraminifera.
 - Numerous land plants and insects.
- **Survivors:** Mammals, birds (as the only dinosaur lineage), crocodiles, turtles, lizards, fish, many invertebrate animals.

Comprehensive documentation, including references, on the chemical and physical analyses, calculations, and simulations of pressure fronts, impulse directions, moments of inertia, etc., of the Small Bang exists in the document "SBT 2.0 The Process of the Small Bang.docx."

The Aftermath of the SB

The aftermath of the SB that occurred 66 million years ago is still recognizable today in both static and dynamic forms. These aftereffects can be divided into two groups:

1) Earth-Internal Aftereffects

a. **Migration of Earth's Magnetic Field:** Due to the large number of asymmetric impulse introductions into the inhomogeneously stratified Earth body during the SB, long-lasting

movements and oscillations were created. These movements and oscillations have slowed and weakened over 66 Ma but are still present and have integrated into the normal convection movements of Earth's mobile masses that have existed for 4.6 Ga.

b. **Drift of Tectonic Plates and Continents** in the directions imparted during the SB.

c. **Different Rotational Speeds** of crust & mantle relative to the outer core of -0.1° to -0.3° per year and relative to the inner core of -0.3° to -0.5° per year. This results in the inner core making one extra revolution relative to the crust & mantle every 720 to 1,200 years, while the outer core requires 1,200 to 3,600 years for an additional revolution.

2) External Behavior of Earth

a. **The Axial Tilt of Earth** → Earth received a corresponding rotational impulse during the SB.

b. **The Wobbling ("Nutation") of the Tilted Axis** → Earth received a laterally offset impulse during the SB.

c. **An Elliptical Earth Orbit Around the Sun** with lower energy than a circular orbit → Earth received a "braking" impulse opposite its orbital direction during the SB.

d. **The Deviation of Earth's Orbit from the Plane of the Average Planetary Orbits** → Earth received an impulse during the SB that pushed it downward out of the plane of the planetary orbits. Thus, Earth now moves half of its orbit below the plane and the other half above it.

The External Aftereffects of Planetary SBs

Earth distinctly "felt" the SBs of 4 planets because the granite crust was in place and new habitats with new plant and animal life had formed each time.

It is likely that other planets have also had SBs, as they exhibit axial tilts and moons. The effects of these SBs are more difficult to find and less reliably assignable to specific planets because they live further in the past, and much granite crust has been lost, displaced, or altered.

Indications of a Possible Solar SB

The tilt of the Sun's equator relative to the plane of the averaged planetary orbits suggests that the Sun, too, has undergone pressure release at least once, or probably even multiple times. On Earth, widespread "burning" or "melting" of the forming granite crust can be observed at regular intervals.

Considering the size of the Sun and its proximity to Earth, such pressure releases from the Sun would cause regional to global thermal events on Earth. In searching for these "burned" areas, we must consider that large parts of the equatorial granite crust were either not yet sealed, have been overprinted by volcanic eruptions, were almost completely destroyed during the SB, current surface positions do not match pre-SB positions, and solar heat waves would have left a different intensity pattern on Earth between the equator and poles. These positions are pre-SB positions.

Note: Volcanic activities, earthquakes, and seaquakes are, despite the aftermath of the SB, mainly part of the normal convection movements in "large fluid (mobile) systems."

Consequences of the SBT (Small Bang Theory)

Difficulties in Mentally "Embracing" the SBT

People believe that 66 million years is too short a time to produce something as beautiful, complex, and fascinating as our present-day Earth. On the timescale of 4,600 million years since Earth's formation, we intuitively believe that 66 million years is too brief a period for major changes.

However, we must consider that within and on a large, glowing sphere, such as Earth, almost nothing sustainable is "produced" in the span of 1 billion years, and scarcely any notable changes occur. This glowing sphere releases gases, arranges itself into layers, generates convection currents, and "cools down." That is almost all this sphere does.

In the SBT, we claim precisely that.

- From 4.6 Ga to 0.541 Ga, Earth essentially does only one major and decisive "thing": It cools down and gradually forms on its surface a habitat for organic life, sealed off from the glowing interior.
- From 541 Ma to 66 Ma, Earth "proves" that "no matter what terrible events" bombard it, new organic life always forms again.
- From 66 Ma to today, Earth "shows" us that a complex and healthy habitat produces a great diversity of LIFE.

Note: The following natural mechanism applies equally to each of these three major time periods: "The more complex the building materials (atoms vs. amino acids) and the more demanding the requirements, the more interesting evolutionary change processes arise." Organic life may have reached its highest stage of such a change process, as the increase in granularity in the chain of base materials and building materials (quantum field, quanta, atoms, molecules, nucleotides, amino acids, bacteria, unicellular organisms, multicellular organisms) can now only be improved "locally" and not structurally changed or expanded. A self-reproducing AI could create a branch before the nucleotides in this chain and would no longer need us as its organic "bootloader" afterward. This fascinating and dangerous topic is explored in more detail in the documentation "The Origin of Life."

Contrary to our intuitive notion that changes take a long time, we must imagine that:

- A planet or moon forms from a rotating matter cloud within 1 to 10 million years.
- Organic life (a carbon-oxygen-water-based life) forms within a few million years if conditions are favorable.

- With a division of the habitat into two different property profiles (food, predators, temperature, soil, atmosphere, etc.), clear differences in a previously largely homogeneous animal and plant species arise within a few generations.
- Geological processes are mostly slow (Ga, billions of years), organic evolutionary processes are moderately fast (Ma, millions of years), and cognitive-analytical, intelligently goal-directed processes are fast (decades to centuries). The reasons for this are:
 1. Geological: There is no goal.
 2. Organic: The implicit goal is achieved through evolutionary selection.
 3. Intellectual: Goal achievement occurs through the targeted development of the solution.

The Drivers for Establishing the SBT

The SBT is not one theory among many, it is the only physical theory that coherently and predictably explains all phenomena currently known to me, i.e., it solves the many anomalies that exist:

- The isotopic identity of Earth and the Moon
- Earth's rotational energy
- The geology and surface of Earth
- The axial tilt of Earth and other planets
- The age of rock contained in Earth's crust and its local distribution
- The age of the oldest rock (4.4 and 4.03 billion years) and the locations of the Acasta Gneiss (Yellowknife, Canada) and the Jack Hills zircons (Australia)
- The origin of the immense amount of water in the oceans
- The formation of the "ridges" (ocean floor)
- The formation of large and small mountain ranges, their structure, and their mountain roots
- The fit and position of the continents
- The axial and orbital tilt, polar wander, and Milanković cycles
- The different distribution of landmass in the northern and southern hemispheres
- The origin of stresses in Earth's crust (earthquakes)
- The origin of tectonic plates and the explanation of so-called subduction

- The explanation of the approximately 5-degree deviation between the orbits of "Moon around Earth" and "Earth around the Sun"
- The absence of tidal cycles in old rock
- The explanation of why birds survived the Small Bang, but pterosaurs died out
- The extinction of the dinosaurs and the evolutionary transformation of the surviving animal species
- The emergence of carbon-based organic life as a fundamental principle of system dynamics in our universe
- And over 100 more of my documented explanations for these so-called anomalies

The SBT is a holistic and scientific model that can be examined, confirmed, modified, and falsified. It forces the relevant scientific disciplines to collaborate and offers & demands the scientific (biological, chemical, physical), simulative, and mathematical depth that humanity should seek in research and teaching.

Note: Every model and every theory is always only a good "copy" of reality. Therefore, every complex model or theory will always be further refined. So too with the SBT. This refinement will now be carried out by the various scientific disciplines. I am curious about the dynamics of this process.

The Genesis of the SBT

The SBT originated with the idea of an expansion or explosion, the SB, that "shattered" Earth's granite crust.

But at the beginning of my research, there was no SB at all. At the start, there were only a few serious doubts about minor details of the current "scientific narratives about Earth's formation."

The exact genesis of the SBT is recorded in the document "SBT 2.0 My Journey to the Center of the Earth.docx." For me, now, it is not so much the SBT itself that is the "thriller," but the story behind its creation.

The path to the SBT was a very winding one. There was hardly a straight line in it. Practically everything I initially considered "unshakeable" changed along this narrow and winding path, often transforming into the complete opposite.

The current rate of change in the details of SBT has now reached a gradient where I integrate new details every day, but the logical sequence hardly changes anymore. The cumulative probabilities of the many coherently fitting and physically possible steps of the formation process are so overwhelming that from now on, only individual details will change. Therefore, I consider the maturity level of the SBT, as of today, sufficient to present Version 2.0 to the public.

Note: The publication of SBT Version 0.7 occurred on 28.11.2025 on the website smallbangtheory.de. The status from 08.12.2025 was frozen there as Version 0.93. Since

there were fundamental, particularly physical, problems in the intended SBT Version 1.0, I froze Version 0.93 and made extensive changes.

The Naming

The path from SBT 1.0 to SBT 2.0 is also the path from "Expansion Theory" to "Reduction Theory."

Due to the physical constraints of the density and stability of matter (gases, silicates, and metals), my SBT 1.0, based on the concept of "Expansion Theory: Growth of Earth's radius from about 3400 km to 6371 km", proved to be scientifically untenable.

For in SBT 1.0, either the mass of the "small" Earth was at least 6 times denser ($>33 \text{ g/cm}^3$) or the "large" (today's) Earth consisted of material with 6 times less density ($<1 \text{ g/cm}^3$) than present-day Earth (5.5 g/cm^3).

My many "desperate" attempts, involving very different densities of layers, such as a large inner Earth core made of tungsten ($22\text{-}24 \text{ g/cm}^3$), massive gas-metal layers, and questioning the seismic measurements of Earth's various layered densities (lithosphere, silicate mantle, iron core), failed. This repeated failure forced me to abandon my cemented basic idea that "Earth must have expanded, because the original landmasses of Earth covered only 29% of the surface."

But what, then, is the solution?

The solution, which gradually developed into the current SBT 2.0, integrated itself elegantly and harmoniously into many of the already existing developmental steps that were already part of SBT 1.0.

Note: Whenever new thoughts fit harmoniously into my worldview, I become attentive and vigilant. "Confirmation bias" lurks everywhere. Like horses that ALWAYS want to cut corners when riding a rectangle, the human brain loves to stop thinking at the first somewhat suitable solution idea.

The solution idea was found very simply in the form of the following question:

What if the 29% were only the surviving part of a much larger granite crust?

- The first 12% of the granite crust were quickly found in the form of shelves or shelf seas.
- The search for the remaining 59% was also quickly successful.
 - A small part of the granite crust was flung into orbit, often together with cohesive, viscous lava.
 - A second, much larger portion was detached from the lava adhering beneath it and transported upward, but, since it by far failed to reach the necessary escape velocity, was thrown back onto Earth's surface.

On the visible part of Earth's surface (29%, continents), the various observable geological structures were thereby formed. The technical term for this is "discordance." One could

claim that practically all areas of the landmass were hit by granite fragments. Through the distribution pattern on landmass and shelves, science will obtain a significantly more precise picture of the SB process through calculations and simulations than SBT 2.0 currently describes.

The largest fragments formed the great mountain ranges; smaller ones formed mid-sized mountain ranges (e.g., Harz, Black Forest, High Tatras). The entire Earth's surface was impacted by a combination of small to large fragments.

Granite crust that crashed onto the lava-covered Earth surface (59%) likely sank or melted despite its lower density (2.7 g/cm^3 vs. 2.9 g/cm^3 for basalt).

For me, the "most interesting" granite fragment is Chicxulub. This fragment may have remained in orbit for some time (estimated months) and only fell back to Earth after the basalt layer (seafloor) had solidified. Calculations and simulations will provide more precise data here.

- Another part of the granite crust was pushed under the lava as intact plates by the angular momentum imparted to the granite crust on the Earth, which is flattened at the poles by about 40 km. These are today's tectonic plates.

Note: The blasting off of the granite crust, or the granite "armor," can be imagined like the emergence of a butterfly from its chrysalis. However, with the difference that the human habitat exists exclusively on the crust of old granite (landmass) and the new basalt (seafloor, except shelf seas).

Since Earth lost about 2% of its original mass during the SB, one could have called SBT 2.0 "Reduction Theory." However, the loss of radius was only about 40 km, which, with Earth's radius of 6371 km, is well under 1%. The term "Small Bang" expresses, compared to its big brother, the central Big Bang, that it is only a small, local event in the life of a planet.

Outlook

After the publication of SBT 2.0, the "real" work begins.

It is very difficult to estimate how long my brain required to develop SBT 2.0. In the final phase, it was several hundred hours of intensive, goal-oriented work.

But the preliminary work that enabled my brain to conceive and coherently assemble these roughly 15 logical steps, from the formation of the liquid Earth sphere 4.6 billion years ago, likely lies in the range of many tens of thousands of hours.

My Future Activities

For me, my future work lies in:

- a) Disseminating the idea of the "Small Bang Theory,"
- b) Expanding the depth of detail of the "Small Bang Theory," and
- c) Intensifying my research in the area of TOE (Theory of Everything), which I run under the name "Grand Unified Theory of Everything." Extensive documentation exists on this.

The Target Audience of the SBT

The SBT is understandable for "ordinary" people. The reason is that all events explained in

the SBT are events that occurred on Earth, i.e., in a space comprehensible with natural human senses.

In the SBT, no speed near the speed of light need to be considered, nor are any quantum effects to be accounted for. All explanations within SBT are logical narratives that are physically possible. They therefore lie within the evolutionarily available thinking capacity of all people. Consequently, the SBT narratives are comprehensible for every person.

Whether one believes these narratives or alternative narratives is not the task of a physical theory. Every person decides, consciously or unconsciously, which explanations they incorporate into their worldview and which they do not.

Many people know several explanations for the same phenomenon. Often these explanations are incomplete, contradictory, or only very "vaguely" present.

From the abundance of explanations, parents, teachers, role models, society, or one oneself chooses the combination that best fits personal life.

For most people and their lives, it is superficially and at first glance irrelevant whether the Moon, Earth's axial tilt, the oceans, the mountains, the actual mainland, and much more have existed for 1 billion years, for 1,000 years, or, as the SBT explains, for 66 million years. However, the more someone is interested in the backgrounds that constitute their worldview and belief system, the more they will benefit from a single, coherent model of Earth's formation. Anyone who imagines in the High Tatras that this entire granite boulder landed there as one piece 66 million years ago will see the world with different eyes.

What I wonder is whether the people who named the highest peak in the Harz Mountains "Brocken" (German for "boulder") had a premonition of SBT 2.0?

What is certain is that geography and biology lessons will become more interesting and easier for students. Also, in physics lessons, the idea that the granite crust was shifted by an impulse onto the Earth's mantle could arouse curiosity, or the calculation of escape velocity, and many more physical events of enormous dimension that one can nevertheless observe daily.

The Speed of Acceptance Spread for the SBT

For the various "recipients" of the SBT idea, different propagation speeds will crystallize.

Here is my forecast of the adaptation speed (from fastest to slowest):

1. Resource exploration firms ("projecting") and young scientists
2. Individual scientific disciplines
3. General acceptance within all scientific disciplines
 - 3.1 Emergence of an interdisciplinary, unified theory of Earth's formation based on the SBT
 - 3.2 Emergence of a new field of study with various academic chairs. This new field will be embedded in the larger picture of the generative capabilities of "rotating systems" in the universe.

4. Working through the old paradigm and the gradual integration of the SBT into the old paradigm will require at least one decade. Quite practically speaking: "Who rewrites all the textbooks?"