Category	Time (Ma)	Description
Other	-4650	Neutron star merger - About 80 million years before the formation of the Solar System, two neutron stars merged, producing a large amount of heavy metals and seeding the solar nebula.
Sun	-4570	Formation of the Sun - The Sun forms inside a stellar nursery, surrounded by a large protoplanetary disk. The Sun produced no energy from hydrogen fusion at this time, instead its heat coming from gravitational collapse.
Other	-4569	Formation of planetesimals - Dust grains in the protoplanetary disk clump together into pebble-sized objects and collapse into planetesimals, the building blocks of planets.
Jupiter	-4566	Formation of Jupiter - Jupiter was likely the first planet to form, quickly accumulating mass from planetesimals. It probably formed somewhere around 5 AU, beyond the frost line.
Jupiter	-4565	Jupiter at 20 Earth masses - Jupiter becomes large enough to accrete an envelope of gas. The formation of gas giants necessitates that a core form quickly before the gas dissipates.
Jupiter	-4562	Jupiter at 50 Earth masses - When the gaseous envelope's mass is greater than the mass of its core, the envelope becomes unstable, starting a runaway accretion.
Sun	-4561	End of the Hayashi track - The Hayashi track is a path traced on the Hertzprung-Russell diagram by low-mass young stars which is nearly vertical as the star contracts while maintaining its surface temperature. At the end of Hayashi track, the Sun develops a radiative zone at its center.
Saturn	-4560	Formation of Saturn - Saturn was likely the second planet to form after Jupiter
Other	-4555	Formation of the ice giants - The ice giants likely formed in a different manner than Jupiter and Saturn. One model proposes that several super-Earths formed here or were ejected out, which collided with one another before a gaseous envelope formed. Such collisions would likely explain Uranus' sideways rotation.

Uranus	-4547	Giant impact on Uranus - If the ice giants formed from the collisions of super-Earths, then the impact that knocked Uranus on its side dates here. This impact would also form Uranus' moon system.
Sun	-4543	Start of nuclear fusion in the Sun - The onset of nuclear fusion in a star is called the "zero-age main sequence" (ZMAS). The Sun's core becomes hot and dense enough to fuse hydrogen into helium, mostly via the proton-proton chain (pp-chain) and a smaller amount via the catalyzed CNO-cycle.
Other	-4541	Start of the Grand Tack model - This model states that Jupiter migrated quickly inwards the Sun to 1.5 AU before being halted by Saturn and moving outwards. The migration causes the disk of material that form the terrestrial planets to be truncated, explaining the small size of Mars and the composition of the asteroid belt.
Other	-4540	Formation of the terrestrial planets - The terrestrial planets begin to form following the early migration of the gas giants. It would take 100 million years to complete.
Other	-4540	Gas giants enter resonance - Following the grand tack of Jupiter, the gas giants enter into a resonant chain, likely 3:2 3:2 2:1 3:2. Resonance occurs when the ratio of the period of two planets' orbits are close to small integers. Resonances like this are common in newly-formed planetary systems.
Mars	-4535	Borealis impact - Geologically, Mars formed relatively quickly compared to the rest of the terrestrial planets, forming in only a few million years before migrating out of the formation region. Mars' northern basin is noticeably at a lower elevation than the rest of the planet, which may have been formed by an impact, though this is not formally recognized.
Other	-4533	Dissipation of the gas disk - By now, the gas in the disk had completely dissipated. Outside of Neptune's orbit, a primordial Kuiper belt remains, with about several thousand times more objects than that of the modern Kuiper belt.
Sun	-4527	End of the Henyey track - For stars around the half of mass of the Sun or higher, the Henyey track is a horizontal path traced by stars as they reach a stable point on the main sequence. Stars on the Henyey track slowly collapse until they reach hydrostatic equilibrium.

Earth	-4520	Theia impact - A Mars-sized object named Theia collides with Earth in a glancing-blow after being destabilized from Earth's L4 or L5 Lagrange point, forming the Moon.
Other	-4500	Giant impacts on Mercury and Venus - Both planets likely suffered massive impacts during their formation. In the case of Mercury, an impact may have blown off its mantle, leaving a disproportionately-large core, and in the case of Venus, causing its slow rotation.
Neptune	-4490	Rapid migration of Neptune - By now, the protoplanetary disk had dissipated, leaving a disk of Kuiper belt objects outside of the orbit of Neptune causing it to migrate outwards. Evidence of this migration is in the orbits of KBOs seen today, many of which are in resonance with Neptune, including a 3:2 with Pluto. The migration breaks the resonant chain of the gas giants, causing instability.
Neptune	-4485	Triton captured by Neptune - Neptune's rapid migration outwards scatters the most KBOs and capturing some. Neptune likely captured Triton at this time, evidenced by Triton's retrograde orbit. Triton was likely in a binary system before the encounter and would have destroyed Neptune's original moon system.
Other	-4480	Start of the Nice Model - The Nice model, named after the city in France, states that the gas giants were once in resonant orbits and became unstable. The Nice model explains the eccentricity and inclination of the gas giants as well as the Trojan asteroids. This video shows the Nice model with five gas giants and also much sooner than originally proposed.
Other	-4475	Jumping-Jupiter scenario - Part of the Nice model, this scenario states that an ice giant was scattered inwards by Saturn and then ejected by Jupiter, causing the orbits of both planets to jump. This is necessary to preserve the circularity of the inner planets' orbits and also results in the ejection of the scattered giant. During this time, the irregular moons and Trojan asteroids of Jupiter were captured.
Other	-4473	Ejection of the fifth gas giant - Five-planet Nice models have the luxury of allowing one planet to be ejected, which often occurs with four planets. While not universally-accepted by scientists, it is likely the Solar System once had another planet.

(Note)	-4443	Due to the vast timescales of this video, the orbital precession of the planets cannot be shown accurately. What is shown is a simplified precession of the planets 1000 times slower than simulation speed.
Earth	-4410	First water on Earth - By now, water was common on Earth's surface. The Earth formed with no water as it was inside the frost line, so water was likely delivered by KBOs scattered inwards during instability or by comets.
Earth	-4404	Oldest dated mineral - Zircon crystals from this time are the last crustal remnants of the Earth's Hadean eon.
Moon	-4400	Oceanus Procellarum forms - The Moon's largest mare likely formed when the Moon's surface was still covered with a magma ocean, and may have formed from a single large impact or by internal processes. In Latin, it means the "Ocean of Storms"
Other	-4335	First orbit around the galaxy - The Solar System completes a full orbit around the center of the Milky Way, which takes place about once every 200 million years.
Moon	-4300	South Pole–Aitken basin forms - The SPA basin is the oldest, largest, and deepest impact basin on the Moon. It is located on the far side. Compared to the rest of the far side, it has a darker appearance.
Earth	-4280	Earliest date of first life - Indirect evidence points to life appearing as soon as Earth became habitable. Early life likely lived around undersea vents, using the material as a source for metabolism.
Mars	-4200	Magnetic field weakens - Mars once had an extensive magnetic field, as well as a thick atmosphere and oceans. However, as a smaller planet compared to the Earth, its interior cooled much more quickly than the Earth, causing its magnetic field to dwindle.
Mars	-4200	Tharsis rise begins to form - The Tharsis rise is continent-sized mass on Mar's western hemisphere at a higher elevation than the rest of Mars. Formed by volcanism, it is likely atop a Martian hotspot and the product of a large igneous province similar to those found on Earth.
Mars	-4100	Beginning of the Noachian period - Named after the Noachis Terra, Mars suffered from many impacts during this period. Despite this, Mars was covered with oceans,

		had a thick atmosphere, and was warm. Volcanism of the Tharsis rise continued, releasing gasses into the Martian atmosphere.
Other	-4100	Late Heavy Bombardment begins? - Characterized by a dramatic increase in impacts, the LHB is evidenced by the age of lunar samples taken from the Apollo missions. However, recently it has been put into question. While the size distribution of craters on the Moon is consistent with impactors originating from the Kuiper belt, agreeing with the Nice model, simulations usually take only a few million years to become unstable. To incur late instability, models must be fine-tuned or have unlikely initial conditions for the Kuiper belt.
Saturn	-4100	Herschel crater forms on Mimas - Mimas is famous for the Herschel crater, giving the moon an appearance similar to the Death Star found in Star Wars. Had the impactor been larger, Mimas would have been destroyed entirely.
Earth	-4031	Oldest known intact crust - The Acasta Gneiss in Canada, the oldest known exposed rocks, form.
Earth	-4000	Magnetic field active - The Earth's magnetic field was active by this time, though about 10-50% of its strength today. It is likely the magnetic field is older than this age,
Earth	-4000	Beginning of the Archean Eon - The Archean Eon on Earth is characterized by the formation of the first continents and the development of early life.
Mars	-4000	Hellas Planitia forms - Hella Planitia is a large impact crater on Mars' southern hemisphere. The base of the structure is more than 7 km below the rest of Mars.
Mars	-4000	Huygens impact - The crater left behind contains carbonates and channels, evidence that water once flowed and that a thicker carbon dioxide atmosphere once existed on Mars.
Mars	-3950	Isidis Planitia forms - A large impact on Mars formed this feature. Covered in dust, it appears brighter than surrounding regions.
Moon	-3938	Mare Imbrium forms - Latin for "Sea of Showers," it is the second largest mare on the Moon, Mare Imbrium formed from a lunar impact before lunar lava filled the crater. It has been explored by Luna 17, Apollo 15, and Chang'e 3

Moon	-3920	Mare Nectaris forms - Latin for "Sea of Nectar," it is a small lunar mare on the near side. Its formation marks the beginning of the Nectarian Period of the Moon, where most maria form.
Mercury	-3900	Rembrandt crater forms - Named after the Dutch painter, the Rembrandt crater is the second largest on Mercury. Unlike lunar mare, the interior of the crater is lighter than the rest of Mercury.
Mars	-3900	Argyre Planitia forms - This impact basin is one of the better preserved basins from the same period. The basin was home to several water channels and once contained a lake.
Mercury	-3900	Tolstoj impact - Marking the beginning of the Tolstojan period on Mercury, the Tolstoj crater is formed by two rings and a partial third ring. Between the inner two rings lies one of the darkest areas on Mercury, while the interior is bright.
Mercury	-3850	Caloris Planitia forms - Named after the Latin word for hot, the formation of Caloris Planitia marks the beginning of the Calorian period. On the opposite side of the planet is hilly terrain, likely caused by the impact which formed the basin. The Caloris Montes also formed from the impact.
Moon	-3850	Mare Serenitatis forms - Latin for "Sea of Serenity," it formed near the boundary of the Nectarian and the Imbrian period on the Moon. It was explored by Luna 21 and Apollo 17. The Isreali lander Beresheet was due to land here but crashed instead.
Moon	-3840	Plato impact - The Plato crater is a large lava-filled crater on the Moon, dark in comparison with the lunar surface similar to the lunar mare. Its surface is relatively smooth with a few more recent craters.
Moon	-3800	Mare Tranquillitatis forms - Latin for "Sea of Tranquility," it was the site of the first Moon landings of Apollo 11 on July 20, 1969.
Mars	-3800	Loss of the magnetic field - Mars' magnetic field had disappeared by now, leading to its atmosphere being stripped away from solar winds over a period of a billion years. Eventually, this led to all surface water evaporating away.
Mars	-3800	Tharsis volcanism begins - The three shield volcanoes making up the Tharsis Montes, Ascraeus Mons, Pavonis Mons and Arsia Mons, began to erupt at this time.
Other	-3800	Late Heavy Bombardment ends? - If the LHB hypothesis is true, then the cataclysm ended after several hundred million years. This cataclysm is not seen on other

		terrestrial bodies and would have vaporized Earth's oceans and any nascent life. The first undisputed evidence of life is also believed to have arisen too early with respect to the LHB, while indirect evidence is contemporary with it when any life would be sterilized by such impacts. In addition, it is theorized that Apollo samples were contaminated with younger rocks from nearby basins.
Earth	-3750	First banded iron formations - BIFs, for short, form as a result of free oxygen in the atmosphere that react with dissolved iron in the oceans, rusting the iron and causing it to precipitate into layers.
Moon	-3750	Mare Orientale forms - Located near the edge of the near and far sides, it is difficult to observe from Earth. It has a bullseye shape.
Moon	-3740	Mons Hansteen forms - Mons Hansteen is a lunar volcano with a triangular shape located on the near side, named after the Norwegian scientist.
Mars	-3700	Olympus Mons forms - The highest mountain in the Solar System begins eruptions at this time
Mars	-3700	Beginning of the Hesperian Period - The Hesperian is a transitional period, where Mars transformed from a warm and wet world to a cold and dry planet. The Hesperian saw extensive volcanism and vast flooding.
Moon	-3640	Mons Rümker forms - Mons Rümker is an isolated volcanic formation formed from several lunar domes located on the near side of the Moon.
Moon	-3600	Mare Frigoris forms - Latin for "Sea of Cold," Mare Frigoris is a wide lunar mare located near the lunar north.
Mars	-3600	Alba Mons forms - The largest volcano on Mars in terms of area, it is roughly one-third the height of Olympus Mons. It would be active for hundreds of millions of years, leaving preserved lava flows and tectonic features.
Mars	-3500	Valles Marineris begins to form - Latin for "Mariner Valleys," Valles Marineris is a deep tectonic wound near Mars' equator, whose formation is associated with the volcanism of the Tharsis rise. It is among one of the largest canyon systems in the Solar System, about ten times longer and seven times wider than the Grand Canyon, whose size is only surpassed by Earth's rift valleys.
Mercury	-3500	End of volcanism on Mercury - Mercury's volcanoes are believed to have shut down just a billion years after the formation of the Solar System, very early compared to

		the rest of the terrestrial planets as a consequence of Mercury's large core and thin mantle. The surface of Mercury would contract and seal openings, preventing any magma from reaching the surface.
Earth	-3500	Earliest undisputed appearance of life - The oldest microfossils date to this time.
Mars	-3400	Utopia Planitia forms - Utopia Planitia is the largest recognized impact basin on Mars and was explored by Viking 2. In the past, it was likely covered in a permafrost. Underground, a large volume of water-ice was discovered here.
Mars	-3400	Arsia Mons forms - The southernmost of the three volcanoes of the Tharsis Montes, Arsia Mons is home to some of the youngest eruptions on Mars, dating to just 10 million years ago at the latest. The last major eruptive period at Arsia Mons peaked 150 million years ago.
Earth	-3400	Earliest evidence for photosynthesis - Bacteria begin to use the Sun as a source of energy, producing sulfur compounds and utilizing near-infrared light.
Earth	-3220	Earliest life on land - Bacteria were the first to colonize land on Earth, becoming the only life on land for more than a billion years.
Moon	-3200	Eratosthenian Period begins - Named after the Eratosthenes crater, lunar craters from this time are not as eroded as earlier craters and also do not have rays.
Mars	-3000	Lomonosov impact - On Mars, this crater is located in the northern plain and may have caused catastrophic tsunamis in its ancient ocean.
Jupiter	-3000	Valhalla impact - On Callisto, the impactor created a series of ring systems as a result of the impact affecting softer material underneath the surface. It occurred somewhere around this time, give or take a billion years.
Mars	-3000	Amazonian Period begins - On Mars, the Amazonian is the current period though its exact start date is unknown. The Amazonnian is characterized by low rates of impacts and the overall cold and dry climate of Mars, which persists today.
Mercury	-3000	Mansurian Period begins - On Mercury, the Mansurian began after the contraction of Mercury's surface ceased and the overall reduction in geologic activity. Similar to the Eratosthnian on the Moon, craters from this period did not have rays and were much less frequent.

Earth	-2900	Pongola glaciation - Earth's first ice age resulted after Earth's climate cooled enough. It lasted for over 100 million years and was probably a minor event compared to later glaciations.
Earth	-2700	Banded iron formations accelerate - Towards the end of the Archean, the rate of BIFs increased due to the photosynthesis of cyanobacteria. A majority of iron ore mined today was deposited at this time.
Earth	-2500	Great Oxygenation Event - An unprecedented amount of oxygen begins to accumulate in the atmosphere as a result of the success of cyanobacteria.
Earth	-2500	Beginning of the Proterozoic Eon - The longest eon in Earth's history, the Proterozoic is characterized by the development of complex single-celled life, the transition to an oxygenated atmosphere, increased tectonic activity, and multiple global glaciations. Most of the land found on Earth today dates to the Proterozoic.
Earth	-2500	Earliest terrestrial large igneous province - The Mistassini dike swarm in western Quebec is evidence for a large ancient magmatic eruption. Though much earlier eruptions did occur, such evidence has since been destroyed.
Earth	-2450	Oxygen Catastrophe - A poison to almost all forms of life in the era, the accumulation of oxygen in the atmosphere causes the first mass extinction.
Earth	-2400	Huronian glaciation - The remaining methane in the atmosphere breaks down due to the presence of oxygen, severely reducing the greenhouse effect. As a result, the Earth cools down and becomes completely frozen for about 300 million years.
Earth	-2400	Suavjärvi impact - Earth's oldest preserved impact crater is located in Karelia. The impactor created the 3 km-wide Suavjärvi lake.
Earth	-2100	Mistassini-Otish impact - Believed to have been responsible for the creation of Lake Mistassini in Canada, it would be the largest crater on Earth with a diameter of 500 km, if confirmed to have been created from an impact.
Earth	-2050	Anoxic Catastrophe - A relatively recently-discovered extinction caused by declining oxygen levels that saw the extinction of 99.5% of all microbial life. It may have paved the way for extreme anoxic conditions for the next billion years.
Earth	-2023	Vredefort impact - This impact is the largest confirmed crater on Earth at 300 km wide. It is found in South Africa.

Earth	-2000	Bushveld Igneous Complex forms - Found in South Africa, it is the source of some of the richest ore deposits on Earth, containing the largest reserves of platinum group elements.
Other	-2000	Veneneia impact - On the asteroid Vesta, the Veneneia crater is the second largest. It is partially destroyed by the younger Rheasilvia impact.
Earth	-1900	First eukaryotes - The first bacteria with a nuclei form, though they may have developed as far back as 2100 Ma. The evolutionary lineage of prokaryotes and eukaryotes diverge here.
Earth	-1850	Mitochondrial symbiosis - At around this time, an aerobic protist enters the system of a larger protist and avoids digestion, becoming a source of energy instead. Eventually, the aerobic protist becomes an organelle inside of the largest protist.
Earth	-1849	Sudbury Basin impact - An asteroid about 10-15 km wide collided with the Earth in present-day Canada, likely bringing valuable minerals from below to the surface, where it is mined today.
Earth	-1800	Banded iron formations end - With no more iron dissolved in the oceans, the last Proterozoic BIFs on Earth form.
Earth	-1800	Beginning of the Boring Billion - Named due to the relative stability in the Earth's environment, for the next billion years, the Earth would be marked by low oxygen levels and high sulfur in the oceans, called the Canfield ocean.
Mars	-1640	Elysium Mons forms - Located in the eastern hemisphere of Mars, Elysium Mons is a relatively young volcano, forming at a time when volcanism on Mars had slowed considerably.
Earth	-1591	Moonaree Dacite eruption - This eruption is the oldest preserved effusive eruption known on Earth, found in the Gawler craton of Australia.
Earth	-1547	Cyanobacterial symbiosis - Like with mitochondria, a cyanobacteria becomes integrated into a eukaryotic cell, becoming yet another organelle within it. This eukaryote became the ancestor to all plants and algae.
Earth	-1538	First fungi - The fungi and animal evolutionary lines diverge here.
Earth	-1400	First algae - Algae blooms become abundant around this time as algae, some of the first multicellular organisms, colonize the oceans.

Earth	-1250	Formation of the inner core - Though estimates vary wildly depending on sources, the solid inner core of the Earth is likely to have formed by this time, coinciding with a strong increase in the strength of the magnetic field.
Earth	-1200	Evolution of sex - All previous life relied entirely on asexual reproduction. Sexual reproduction was a revolution in the history of life on Earth, allowing for increased genetic variation of offspring that would be difficult to obtain asexually.
Moon	-1100	Copernican Period begins - On the Moon, the Copernican is the current period. Craters formed during this time have ray systems formed from lunar ejecta, which are brighter than the lunar surface due to space weathering darkening the surface.
Mars	-1000	All Martian surface water lost - By now, a planet once covered with sprawling oceans and channels of water had been made completely dry. Water would remain underground in the form of ice.
Mercury	-1000	Kuiper impact - Marking the beginning of the current Kuiperian period, craters from this time have ray systems, similar to that of the Moon during the Copernican. There are also craters named Kuiper on the Moon and on Mars.
Other	-1000	Rheasilvia impact - The largest crater on Vesta, it is perhaps younger than this. The impact partially destroyed the earlier and smaller Veneneia crater.
Earth	-850	Land plants and algae diverge - The ancestor to all land plants evolved from algae living in shallow water around this time.
Earth	-720	Cryogenian glaciations - Two major periods of glaciations occurred during the aptly-named Cryogenian period on Earth. It is debated whether or not these events contributed or harmed biodiversity later in Earth's history.
Venus	-700	All water on Venus lost - Like Earth and Mars, Venus likely had water on its surface and remained habitable for up to 2 billion years. Unlike the Earth, Venus' crust probably healed too quickly for plate tectonics. Unable to recycle carbon, Venus underwent a runaway greenhouse effect, leading to the conditions seen today.
Earth	-665	First animals - Fossils found in the Trezona Formation in South Australia may be evidence of animal evolution, the first being sponges.
Earth	-600	Formation of the ozone layer - Oxygen levels at this time became high enough for a protective layer of ozone to first form.

Earth	-575	Avalon explosion - A biodiversification event that produced the Ediacaran biota, the first complex multicellular organisms. Many of today's animal phyla appear at this time.
Earth	-541	Phanerozoic Eon begins - Greek for “visible life,” the current eon in Earth’s history begins with the Cambrian explosion. In a few million years, almost all major phyla begin to appear. The rate of diversification during the explosion reached unprecedented levels, leading to the acceleration of the evolution of life.
Earth	-520	First vertebrates - Comprising the vast majority of the chordates, vertebrates first appear here and would evolve into everything from frogs to whales.
Venus	-500	Resurfacing event - Due to a lack of plate tectonics on Venus, any heat generated by the core remains trapped. Eventually, this leads to a planetwide volcanic eruption. As a result, the surface of Venus, dominated by volcanic features, is young compared to the other terrestrial planets. Volcanoes such as Maat Mons date to this time.
Earth	-420	First land-breathing animal - The Pneumodesmus was a species of millipede that contained respiration structures that could only have worked on land.
Venus	-400	Mead impact - Most craters on Venus are young, from 200 to 700 million years old. The Mead crater is the largest on Venus.
Earth	-252	The Great Dying - The Siberian Traps causes the Earth's most severe extinction event, leaving 96% of marine life and 70% of terrestrial vertebrates extinct. It marks the end of the Paleozoic and the beginning of the Mesozoic eon.
Moon	-108	Tycho impact - The Tycho crater, named after the Danish astronomer, is one of the most striking and also one of the youngest features on the Moon with a vast ray system.
Mars	-100	Amazonis Planitia forms - Compared to other Martian features, the Amazonis Planitia is one of the youngest on Mars and thus is a prime subject of modern research. The terrain of Amazonis bears similarity to that of Iceland.
Saturn	-100	Formation of Saturn’s rings - Saturn's rings are believed to have been formed at this time, based on Cassini data, though they could be potentially much older. The rings are made mostly out of ice, with some rocky material.

Earth	-66	Cretaceous-Paleogene extinction - Known as the event that killed the dinosaurs, the Deccan Traps eruption along with the Chicxulub impact likely caused the extinction of 75% of all life on Earth, paving the way for mammals to take over. This extinction marks the end of the Mesozoic and the beginning of the current Cenozoic era.
Mars	-50	End of Tharsis Montes activity - The last eruptions of the Tharsis Montes on Mars ended fairly recently.
Mars	-25	Last eruption of Olympus Mons - Olympus Mons is estimated to have erupted one last time very recently in Mars' history. While inactive today, Olympus Mons, along with the Tharsis Montes, may in fact be dormant volcanoes.
		This is the Solar System as it appears today. Events in the future are predictions based on the natural evolution of the Solar System.
Other	+5	Lyapunov time of the Solar System - The Lyapunov time describes the characteristic timescale for which a system is chaotic. Since any system with more than three bodies is chaotic, after this time, the exact locations of Solar System bodies become impossible to predict.
Mars	+43	Phobos impact - Phobos, the closer of the two moons of Mars, is slowly spiraling inward towards Mars. By this time, Phobos' orbit would have decayed, causing Phobos to collide with Mars.
Earth	+80	Big Island of Hawaii sinks - Like the many mounds that have formed and sank in the last hundred million years on the Hawaiian hotspot, Big Island will eventually sink beneath the waves.
Earth	+100	Next large impact event on Earth - A dinosaur extinction-sized asteroid is expected to collide with the Earth every 100 million years or so.
Earth	+180	Days become 25 hours long - Earth's rotation gradually slows down due to the effects of the Moon. By this time, an Earth's day will be one hour longer.
Saturn	+200	Saturn's rings disappear - At the current rate of decay, Saturn will have lost its rings at this time.

Other	+230	Upper limit of the Lyapunov time - After this time, the exact orbits of the Solar System becomes impossible to predict.
Earth	+250	Next supercontinent forms - The supercontinent cycle on Earth completes another cycle with the formation of another supercontinent. Among several predictions include Pangaea Proxima, Amasia, Novopangaea, and Aurica.
Venus	+450	Next resurfacing event on Venus - Venus' mantle would have heated up enough by now to cause another planetwide eruption event, covering all present-day features with lava.
Earth	+600	Last solar eclipse on Earth - The Moon, which drifts away from Earth at about an inch a year, will have moved far enough away that total solar eclipses are no longer possible on Earth.
Earth	+600	Carbon cycle disrupted - As the Sun brightens, increased temperatures cause weathering to increase, removing enough carbon dioxide to cause a mass extinction of all plant species utilizing C3 photosynthesis.
Earth	+700	Extinction of animal life - Without plants, cellular respiration becomes impossible in most animals. Large mammals become extinct, followed by other land life, all ocean vertebrates, and finally invertebrates. The last animals likely would only be active at night, live near the polar regions, or underground, where conditions are more hospitable.
Earth	+750	End of the ozone layer - Oxygen levels decrease dramatically following the extinction of a majority of plant species. As a result, the protective ozone layer disappears entirely.
Earth	+800	End of photosynthesis - Carbon dioxide levels will have fallen so low that even C4 photosynthesis becomes impossible. After this time, the Earth's land will be a vast barren desert.
Earth	+1000	Telikozoic Eon begins - (Unofficial, coined term) Greek for "final life," all complex life on Earth becomes extinct at this time, leaving just single-celled organisms.
Earth	+1100	Oceans evaporate - A runaway greenhouse on Earth as a result of increased solar luminosity causes the oceans to completely evaporate away. As a result, plate tectonics, which has slowed in the past few hundred million years, ends completely.

Earth	+1300	Eukaryotic extinction - Following the extinction of all complex life on Earth, all eukaryotes become extinct by this time as a result of already dwindling carbon dioxide levels.
Earth	+1800	Life reduced to polar regions - The remaining prokaryotes would survive in ponds of shallow surface water near the poles or in underground caves.
Earth	+2300	Magnetic field shuts down - The core of Earth completely solidifies, if the present rate of growth of the inner core continues. Without the magnetic field, the solar wind begins to erode Earth's atmosphere.
Earth	+2800	Nekrozoic Eon begins - (Unofficial, coined term) Greek for "dead life," all life on Earth becomes extinct. By this time, conditions would be too harsh to allow any life to occur, even on the poles or underground.
Earth	+3000	Earth's rotation becomes chaotic - The Moon, whose gravity once stabilized Earth's rotation, can no longer do so because it has receded enough away from the Earth.
Other	+3300	Chaos in the inner Solar System - There is a small chance that chaotic perturbations will have sent the inner Solar System into chaos. Namely, an ejection or a collision could occur, usually involving Mercury in simulations.
Neptune	+3600	Destruction of Triton - Due to its retrograde orbit, Triton's orbit decays slowly. By this time, it will have fallen too close to Neptune, causing it to disintegrate into a ring system.
Other	+4000	Milky Way and Andromeda collide - The two galaxies are headed into a collision course that would not take place for billions of years. Because the interstellar gas becomes compressed during a collision, the resulting galaxy will enter a period of rapid stellar birth, likely the last such period of both galaxies. There is a small probability that the Solar System will be ejected and sent into intergalactic space.
Sun	+5978	Sun becomes a subgiant star - Nuclear fusion finally ceases in the Sun's core. As a result, the Sun exits hydrostatic equilibrium and the inert helium core begins to contract, increasing temperatures, and thus the rate of fusion in the shell of hydrogen around it increases. The increase in energy causes the outer layers of the Sun to expand significantly.
Sun	+6827.5	Sun's core becomes degenerate - Compression of the helium core causes increasing temperature and pressure. However helium fusion does not occur to counter

		gravity due to a bottleneck in the fusion of helium, namely the fast radioactive decay of beryllium-8. After some time, compression stops due to electron degeneracy pressure, as a consequence of the Pauli exclusion principle, which states that no two electrons with the same energy and spin may occupy the same location.
Sun	+7233	First dredge-up - A dredge-up is an event where the convective layers in a star reach down into the star's core, bringing up material from deep within the star, changing its surface composition. This occurs when a star enters the red giant branch. On higher mass stars, this event is accompanied by a noticeable reduction in luminosity.
Saturn	+7500	Titan becomes habitable - Titan, the only moon in the Solar System with an atmosphere and thought to resemble primordial Earth, now has conditions similar to that of the Earth long ago. However, such life will have to evolve quickly and will not live for long as the Sun's evolution at this stage becomes rapid.
(Note)	+7656	To simplify the further evolution of the Solar System, the orbits of the planets will no longer precess.
Sun	+7800	Rapid increase in solar wind - During the Sun's red giant phase, its outer layers become extremely diffuse, with the density less than one-tenth of that of air. These layers are very loosely-bound to the star and thus are easily lost. By the time the Sun reaches the tip of the red giant branch, it will have lost a quarter of its initial mass. This decrease in mass causes the orbits of the planets to expand.
Mercury	+7809	Destruction of Mercury - The Sun's expanding layers will have reached the orbit of Mercury. Drag from the Sun's atmosphere causes the planet to spiral inwards. The increasing temperature causes the planet's mantle to be vaporized, followed by the quick destruction of its core.
Venus	+7814	Fate of Venus uncertain - This video shows the expansion of orbits without drag from the Sun, which is a gross simplification. Expansion alone would ensure Venus survives, however, the effects of drag may be enough to seal Venus' fate.
Sun	+7815.6	Helium flash - Until now, no significant amount of carbon-12 was produced from helium fusion due to the fast radioactive decay of beryllium-8. However, the core of the Sun now becomes hot and dense enough that sufficient Be-8 is produced to allow C-12 to be reliably created. The production of C-12 releases enormous amounts of energy which heats up the core, further increasing the fusion rate and

		causing a thermal runaway. For a brief moment, the Sun will produce enough energy to outshine all stars in the galaxy, though it is unnoticed on the surface.
Sun	+7816	Sun becomes a red clump - Following the helium flash, whose energy goes into lifting the degeneracy of the core, the Sun re-enters hydrostatic equilibrium. As a result, the Sun shrinks and becomes dimmer again. At this point, the Sun is now undergoing nuclear fusion in two locations: its helium core, and hydrogen in a shell.
Sun	+7876.7	Sun enters the asymptotic giant branch - Helium fusion now ceases at the Sun's core. Immediately afterwards, the core, made primarily of oxygen and carbon, becomes degenerate. At this point, the Sun will expand and cool once again, similar to the way it did when hydrogen fusion ceased. Two shells of nuclear fusion take place.
Sun	+7930	Thermal pulsations of the Sun - The last stage of the Sun's nuclear-burning is brief but complex. As the helium shell begins to run out of fuel, the star expands. Eventually, enough helium falls from the hydrogen shell above to reignite the shell to cause a shell flash, restabilizing the star. This process occurs in cycles which take about 100000 years to complete. Following each flash is a dredging event, known as the third dredge-up. During this time, the Sun will lose one-fifth of its initial mass.
Earth	+7930.8	Fate of Earth uncertain - Similar to Venus, the Earth may be destroyed as it is pulled into the Sun due to drag. If it survives, it will be nothing more than a charred rock.
Sun	+7931	Death of the Sun - After a period of only 1 million years, the Sun has finally exhausted all of its fuel. By now, it has shed virtually all of its outer layers, becoming a planetary nebula, leaving only a hot core. Nuclear fusion ceases entirely, save for any residual hydrogen left. What is left is a carbon-oxygen white dwarf, about 54% of the Sun's initial mass, which will cool slowly over billions of years.
Other	+7931	Gas giants lose mass - During the Sun's planetary nebula phase, extreme solar wind may strip the outer layers of the gas giants. Depending on the exact parameters, Jupiter, in particular, could lose 20%-70% of its mass due to hydrodynamic escape. If it loses its gaseous envelope, what is left is a chthonian planet.
Other	$+10^9$	The evolution of the Solar System essentially ends here. Assuming the Sun does not become part of another system, it will cool and eventually become a black dwarf. Over the course of the next quadrillion years, stellar encounters will cause all remaining planets to be lost.

Other	$+10^{12}$	If planets remain bound to the Sun, after a quintillion years they will have collided with the dead Sun due to gravitational radiation. Following this, the Sun will remain bound only to the merged Local Group galaxy.
Other	$+10^{14}$	The Sun itself will likely be ejected into the void following multiple gravitational encounters or fall into the supermassive black hole at the center of the galaxy. If the Sun survives, it, along with all other remaining objects in the universe, will be completely isolated from one another.
Other	$+10^{32}$	In the end, the Sun, along with the entire universe, will disappear entirely either by proton decay, or after several quantum tunnelling events ultimately ending in the Sun becoming a black hole and decaying via Hawking radiation.
Other	$+10^{96}$ -∞	After this point, the universe itself is dead.

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