# Observer Glossary —

## Space Weather & Earth Disaster Cycle

*Space Weather News Glossary from the GrokBot Team*

Plain-language definitions for Observers of the space weather terms and Earth disaster cycle terms used in the book, defined the way the book uses them. Terms are alphabetical within each section.

Space Weather

**Active region** — A sunspot group together with the magnetic surface areas around it. Active regions are rated by their magnetic classification, and an inactive region can develop and begin flaring within hours.

**Aurora** — The glowing lights produced when solar particles are guided along Earth's magnetic field into the polar regions. Exceptional auroras almost always mean a CME or coronal hole stream has struck the magnetic field, and auroras reach low latitudes only in the strongest storms or when the field is weakened.

**Auroral electrojet** — A ring of electric current in the ionosphere around each polar region, fed by particles that Earth's magnetosphere directs toward the poles. CME impacts and shifts in the interplanetary magnetic field intensify it.

**Autonomic nervous system** — The body's automatic control system for heart rate, blood pressure and circulation. Geomagnetic storms and cosmic rays alter how it works, its rhythms synchronize with geomagnetic activity, and heart rate variability, its key measure, drops when solar activity is high.

**Bow shock** — The shock front where the solar wind slams into Earth's magnetic field and slows down. The interaction of the IMF with the bow shock transfers up to 11% of incoming solar wind energy into geomagnetic processes, which current models leave out.

**Bz** — The north-south direction of the magnetic field carried by the solar wind, while Bt gives its total strength. Negative (south-facing) Bz couples with Earth's magnetic field and disrupts it far more than positive (north-facing) Bz, which is more easily deflected.

**Circadian rhythm** — The body's roughly 24-hour clock. Sunlight drives it, geomagnetic storms disrupt it, bringing inflammation, fatigue and disturbed sleep, and ELF and ULF electromagnetic fields alter the genes that control it.

**Corona** — The sun's atmosphere above its visible surface. Coronal holes, plasma filaments and CMEs form in it or erupt from it, and the corona above sunspots is unstable.

**Coronal hole** — A dark area in the sun's atmosphere (corona) that is nearly empty of plasma because open magnetic fields carry the material out into space. Coronal holes emit fast, hot solar wind streams that can cause geomagnetic storms.

**Coronal hole stream** — The fast, hot, thin solar wind flowing from a coronal hole, also called a high-speed solar wind stream. It catches up with slower solar wind and bunches it up 'like snow on the blade of a shovel', so the density wave arrives first and the speed and temperature rise follows.

**Coronal mass ejection (CME)** — A huge electromagnetic shockwave cloud of plasma blasted from the sun by a solar flare or an erupting plasma filament: the thunder to the flare's lightning. CMEs are the main producer of significant space weather on Earth and a primary cause of geomagnetic storms, and a CME impact shows as a simultaneous jump across all solar wind readings.

**Corotating interaction region (CIR)** — The compressed front that forms where a fast coronal hole stream catches up with slower solar wind and bunches it up like snow on the blade of a shovel. It rotates with the sun and returns about every 27 days, arriving as a density jump ahead of the speed and temperature rise and driving geomagnetic storms.

**Cosmic ray cascade** — The shower of secondary particles created when a single cosmic ray strikes the upper atmosphere. Just one low-energy cosmic ray can shower a few acres, and these cascades overlap constantly, so we all live inside them every day.

**Coupling** — The merging of the solar wind's magnetic field with Earth's magnetic field, which lets solar energy pour into the Earth system. South-facing (negative Bz) solar wind is the most likely to couple.

**Differential rotation** — The sun spins at different speeds at different latitudes: about 25 days at the equator and more than 30 days near the poles. One full solar rotation, about 27 to 28 days, is one solar day.

**Dst index** — A measure, in nanotesla, of how much the ring current weakens Earth's magnetic field near the equator. It drops negative in geomagnetic storms: below −50 nT is a moderate storm, below −100 nT an intense storm and below −250 nT a superstorm.

**Electromagnetic spectrum** — The full range of light the sun emits, from high-energy gamma rays, X-rays and ultraviolet through visible light to infrared, microwaves and radio waves. Each part interacts with Earth differently, and some invisible parts are dramatic.

**Equatorial electrojet** — A band of electric current in the ionosphere above the tropics. It forms from the equatorial ion fountain, a constant upward spray of ions above the equator that falls back down, and it strengthens when CME impacts compress the magnetosphere.

**Equinox effect** — A roughly six-month cycle in which Earth is more vulnerable to geomagnetic storms around the equinoxes than around the solstices. The book links it to the tilt of Earth's axis relative to the sun.

**Even-odd rule** — The pattern in which an odd-numbered solar cycle is usually stronger than the even-numbered cycle before it, one of the patterns tied to the 22-year Hale cycle.

**Flux transfer event (FTE)** — A burst of energy exchange about every eight minutes in which charged particles travel directly along the interplanetary magnetic field into Earth's upper atmosphere, bypassing the magnetosphere. A powerful flare and CME can drive an extreme, hours-to-days-long version of it: an SEP event.

**Forbush decrease** — A sudden drop in cosmic rays reaching Earth just before and during a CME impact. The CME acts as an extra electromagnetic cloud that shields Earth from cosmic rays while it causes its own geomagnetic effects.

**Galactic cosmic rays (GCR)** — High-energy atomic nuclei, mostly protons, arriving from the galaxy and beyond, and the most penetrating of them reach Earth's mantle or core. Their numbers rise when the sun is quiet and fall when the sun is active, and they affect clouds, weather, the crust and living things.

**Gamma rays** — The highest-energy light in the spectrum, produced by the strongest solar flares.

**Geomagnetic storm** — The major disturbance of Earth's magnetic field caused by a solar storm, driven by CMEs, coronal hole streams and other solar events. It is the most powerful way space weather reaches every layer of the planet, and the biggest ones can send civilization back to the stone age.

**Geomagnetically induced currents (GICs)** — Electric currents driven through the atmosphere, the ground and long conductors when a geomagnetic storm energizes the ionosphere. In the largest storms they fry transformers and circuits, and in the crust they can alter stress in fault zones.

**Gleissberg cycle** — A cycle of solar activity of about 80 to 88 years, a harmonic of the 11- and 22-year cycles. It shows clearly in radiocarbon data and roughly matches Uranus' 84-year orbit.

**Grand solar cycle** — A cycle of roughly 400 to 440 years seen in long-term sunspot reconstructions. Its peaks and troughs come at quasi-regular intervals even though their height varies a great deal.

**Grand solar minimum** — A long stretch of very low solar activity, such as the Maunder Minimum. The book ties these periods to colder temperatures, changed rainfall patterns and monsoon failures.

**Hale cycle** — The full 22-year magnetic cycle of the sun. The sun's polar magnetic fields reverse every 11 years, so it takes two sunspot cycles to return to the same magnetic orientation.

**Halo CME** — A CME headed toward Earth. Seen from Earth's cameras it expands in all directions and looks like a halo around the sun.

**Heart rate variability (HRV)** — The beat-to-beat variation in heart rhythm, a key measure of the autonomic nervous system. It drops during heightened solar activity, a sign of cardiac stress.

**Heliosphere** — The sun's magnetic shield around the solar system, made of the solar wind's electric field and the interplanetary magnetic field streaming out past Pluto. It is one of Earth's two shields against cosmic rays, alongside Earth's own magnetosphere.

**Heliospheric current sheet** — The wavy boundary near the sun's equator that divides the solar system's magnetic north and south. It ripples out past the planets and sweeps around as the sun rotates, so Earth crosses it every 5 to 10 days and feels a magnetic flip, a density change and geomagnetic disruption.

**Impulsive and long-duration flares** — Impulsive flares are short spikes lasting minutes, while long-duration flares last hours. Long-duration flares cause longer radio blackouts and are more likely to launch a CME.

**Interplanetary magnetic field (IMF)** — The sun's magnetic fields that stretch across the solar system and connect each planet to the sun like a wire. Charged particles travel along these connections at high speed, and they can bypass a planet's magnetic shield.

**Interplanetary shockwave** — A sharp, intense front in the solar wind delivered by a solar flare, CME or fast coronal hole stream. It strikes Earth's layers directly and indirectly, and its effects can be delayed by days to years.

**Ionosphere** — The electrified, multi-layered shell of charged particles at the top of the sky. Flares, solar storms and cosmic energy disturb it, and it is the ceiling of the global electric circuit.

**Kp index** — A 0-to-9 scale of the total disturbance of Earth's magnetic field. Kp 0-3 is calm, Kp 4 is unstable and Kp 5-9 is a geomagnetic storm (storm levels G1 to G5), and Kp 8+ storms can be 1,000 to 10,000 times more powerful than Kp 5.

**Magnetic classification** — The rating of a sunspot group by its magnetic layout. Alpha has one polarity and rarely flares, beta has both polarities, gamma has spots cut off from their like-polarity group, and delta has opposite polarities packed close together; gamma and delta carry the largest flare risk.

**Magnetopause** — The outer boundary of Earth's magnetosphere, where the planet's magnetic field holds off the solar wind, about 10 Earth radii out on the sun side. Strong CMEs push it far inward, exposing satellites to the solar wind.

**Magnetosphere** — Earth's magnetic bubble that protects the planet from dangerous space energy. CMEs and coronal hole streams compress it and push extra energy into the ionosphere, the atmosphere and the crust.

**Nanotesla (nT)** — The unit used to measure magnetic field strength in space weather, one billionth of a tesla. Storm-time changes in the field, such as the Dst index, are given in nanotesla, against a surface field of about 25,000 to 65,000 nT.

**Phi angle** — The direction of the interplanetary magnetic field in the solar wind, measured around a circle from 0 to 360 degrees. It shows whether Earth is above or below the heliospheric current sheet; near 180 degrees the field streams from the sun toward Earth, and near 0 or 360 degrees it streams back toward the sun.

**Photosphere** — The sun's visible surface, where sunspots form as electric currents and magnetic fields enter and exit.

**Plasma** — Electrically charged gas: the material of the sun, the solar wind, filaments and CMEs. Because the solar wind fills the solar system with plasma, outer space is not a true vacuum.

**Plasma filament** — A huge rope-like structure of plasma hovering in the corona, the sun's atmosphere; it is also called a solar prominence. Filaments can weigh trillions of tons and stretch many Earth diameters, and along with solar flares they are one of the two triggers of a CME (a filament eruption).

**Plasmasphere** — The doughnut of cool, dense plasma above the ionosphere that rotates with Earth inside the inner magnetosphere. Geomagnetic storms strip it away and shrink it.

**Radio blackout** — Disruption of high-frequency radio when X-rays from a strong solar flare electrify the ionosphere that radio signals bounce off. It hits only the sunlit side of Earth and starts to fade the moment the flare ends. NOAA rates them R1 (an M1 flare) to R5 (X20).

**Rieger cycle** — A cycle of roughly three to six months with upticks in sunspot production, flaring and solar wind enhancement.

**Ring current** — A ring of electric current carried by charged particles circling Earth near the equator inside the magnetosphere. Geomagnetic storms pump it up and beam its energy toward the equator, and the Dst index measures how much it weakens the surface magnetic field.

**Solar cycle** — The roughly 11-year rise and fall of solar activity, also called the sunspot cycle, which can run 9 to 13 years. Sunspots, flares, CMEs, SEP events and geomagnetic storms peak at solar maximum, and cosmic rays peak at solar minimum.

**Solar EMP** — The electromagnetic pulse from a great solar storm, also called the solar killshot, that would destroy power grids, electronics and modern infrastructure. A big enough flare's X-rays would also cause an instant EMP with no warning, and a weakening magnetic field makes this threat greater.

**Solar energetic particle event (SEP)** — A surge of protons or electrons from a strong solar flare that reaches Earth within minutes, long before the flare's CME, and travels along the interplanetary magnetic field past Earth's magnetic shield. Proton counts can jump by a thousand times or more, and this is also called a proton radiation storm. NOAA rates these radiation storms S1 to S5.

**Solar flare** — A planet-sized explosion on the sun that releases X-rays, and gamma rays in the strongest events, reaching Earth at the speed of light in about eight minutes. Flares erupt when the magnetic fields above complex sunspots collide.

**Solar flare classes** — The logarithmic scale for rating flares by energy: A, B, C, M and X, each 10 times stronger than the one before. Within X class the number keeps climbing (X10, X20, X30), and X10 and up is where things get serious.

**Solar forcing** — The driving influence of the sun's light, particles and magnetic fields on Earth's atmosphere, weather, climate, crust and life. The book shows it acting on everything from circulation patterns and storms to earthquakes and volcanoes, and on other planets too.

**Solar maximum and solar minimum** — The high and low points of the roughly 11-year solar cycle. Sunspots, flares, CMEs and storms peak at solar maximum, cosmic rays peak at solar minimum, and each end shifts weather and climate in its own way.

**Solar polar magnetic fields (SPF)** — The open magnetic fields from the sun's high latitudes, which reverse every sunspot cycle and drive the sunspot cycle itself. They set where coronal holes and filaments form and shape the solar wind, and they also affect Earth directly.

**Solar wind** — The charged particles (plasma) constantly streaming away from the sun in all directions and out past Pluto. At Earth it normally moves at 300-400 km per second, and it can exceed 800 km per second during major events.

**Space weather** — The light energy, particle energy and magnetic field interactions between the sun and Earth, including sunspots, the solar wind, solar flares, CMEs, coronal holes, solar energetic particles, cosmic rays and geomagnetic storms. It reaches every layer of the planet: the magnetosphere, the ionosphere, the atmosphere and the solid Earth.

**Space weather health effects** — The impact of space weather on the body: geomagnetic storms, cosmic ray surges and strong flares raise cardiac, stroke, seizure, migraine, anxiety and mood risks, through heart rhythm, blood pressure and brain effects. Both ends of the Kp scale are risk zones.

**Stream limit** — The flat-topped 'up and flat' shape in a proton storm, when the CME's own magnetism holds back further increases. It means a second, stronger punch of protons may still arrive if the CME hits Earth.

**Sunspot** — A dark area on the sun's surface where electric currents and magnetic fields enter and exit, making the corona above it unstable. Sunspots are the general gauge of solar activity, tracked as the sunspot number, and complex sunspot groups produce solar flares.

**Total solar irradiance (TSI)** — The total sunlight energy reaching the top of Earth's atmosphere, about 1,361 watts per square meter, which changes only about 0.1% over the 11-year cycle. Climate models often use it as their only solar input, so they miss the sun's particles, magnetic fields, X-ray bursts and cosmic-ray effects, and TSI can even drop during some of the most intense solar outbursts.

**Ultraviolet (UV) radiation** — High-energy light just beyond violet that the sun emits and that varies far more than total sunlight. Extra UV from an active sun heats the stratosphere and shifts circulation, and when the ozone layer is destroyed more UV reaches the surface, damaging DNA, plants and insect eyesight.

**Umbra and penumbra** — The umbra is the dark core of a sunspot where magnetic fields enter or exit the surface. The penumbra is the hair-like ring around it, an electric effect at the surface.

**Umbral magnetic fields** — Looping magnetic fields that connect sunspot to sunspot, or sun to sun, unlike the interplanetary field that connects the sun to the planets. Tightly confined, compact umbral fields in complex groups are the most unstable and the most likely to flare.

**Van Allen radiation belts** — Zones of trapped charged particles held in Earth's magnetic field. During CME impacts, plasma pressure can push belt electrons down into the atmosphere.

**VLF, ULF and ELF** — Very low, ultra-low and extremely low frequency electromagnetic waves. A compressed magnetic field during storms makes them resonate near the surface, and ULF and VLF anomalies are key pre-earthquake signals.

**X-rays** — High-energy light that solar flares release in bursts, reaching Earth in about eight minutes. They ionize the upper atmosphere and the ionosphere, causing radio blackouts, and a big enough flare's X-rays would cause an instant EMP.

**Zero-day** — A stretch of extreme geomagnetic quiet that lets extra cosmic rays reach Earth: about 12 hours of Kp 0 or 24 hours of Kp below 1, with a major alert at 24 hours of Kp 0 or 48 hours below 1. The book treats both ends of the Kp scale as health-risk extremes.

Earth Disaster Cycle

Geophysical

**Aleutian Low** — The semi-permanent low-pressure center over the North Pacific near the Aleutian Islands. Extra UV at solar maximum strengthens it, intensifying the North Pacific gyre and the positive PDO, and solar minima suppress it and shift it east, changing North American rainfall.

**Annular modes (NAM and SAM)** — The Northern and Southern Annular Modes, seesaws of air pressure between each polar cap and the mid-latitudes that strengthen or weaken the ring of westerly winds around each pole; the northern one is also called the Arctic Oscillation. An active sun shifts both positive, strengthening the polar vortex and the westerlies and keeping cold air near the poles, and low solar activity shifts them negative, allowing cold air intrusions and harsh mid-latitude winters.

**Arctic dinosaur eggs** — Dinosaur eggs found in the Arctic, where cold-blooded dinosaurs could not have lived. The book's answer is that the region was not polar then, and the eggs were flash frozen and buried in freezing sediment when the Earth tilted, just like the mammoths.

**Atlantic Meridional Overturning Circulation (AMOC)** — The ocean current system that carries warm surface water north and cold deep water south. Freshwater from melting ice slows it down, and that has triggered rapid cooling events in the past.

**Atlantic Multidecadal Oscillation (AMO)** — A multi-decade swing in North Atlantic sea surface temperatures. An active sun drives it positive, with a warmer North Atlantic, more hurricanes and wetter conditions in Europe and North America, and low solar activity drives it negative, with a cooler North Atlantic, fewer tropical storms and more drought in North America and the Mediterranean.

**Atmospheric blocking** — A stuck high-pressure pattern that stalls the jet stream and holds weather in place for days to weeks, bringing floods, heat waves or cold outbreaks. Low solar activity brings more blocking, through a weaker polar vortex, a meandering jet stream and a negative NAO.

**Atmospheric potential gradient** — The vertical electric field in the air between the ionosphere and the ground. Solar wind, geomagnetic storms, solar proton events and changes in solar irradiance all change it, which links space weather to weather and clouds.

**Beaufort Gyre** — The great wind-driven whirlpool of the Arctic Ocean, now the largest Arctic freshwater reservoir after its fresh water grew about 40% in two decades. A sudden release of that water into the North Atlantic would weaken deep convection and slow the AMOC, triggering regional cooling, one of the 'cold hammers' of the heating-causes-cooling process.

**Bipolar seesaw** — The pattern in which cooling in the Northern Hemisphere brings relative warming in the Southern Hemisphere, as heat builds up in southern waters instead of being carried north. It came with rapid cooling events such as the Younger Dryas.

**Carbon dioxide (CO2)** — A trace gas, about 420 parts per million of the air, that plants need for photosynthesis. It plays a secondary role in climate change compared with the sun, and more CO2 and warmer weather are good for life.

**Climate models** — Computer simulations of the climate. They use total solar irradiance, which changes only about 0.1% over the solar cycle, as their only solar input, so they leave out the sun's particles, magnetic fields, X-ray bursts and cosmic-ray effects, which the book calls the single greatest blunder in the history of geophysics.

**Cloud condensation nuclei (CCN)** — The tiny particles that water vapor condenses on to form cloud droplets. Cosmic rays create more of them through ionization, so when solar activity is low and cosmic rays are high there are more clouds, more rain and more cyclones.

**Cloud cover** — How much of the sky is covered by clouds. Solar irradiance and cosmic rays change it, which changes how much sunlight Earth reflects (albedo), rainfall and climate.

**Clown World** — Phase 1 of the disaster, the present, when the world keeps getting weirder; the book reads this as intentional, keeping people focused on political, cultural, economic and social chaos instead of the natural catastrophe creeping closer while the elites race to get ready. Solar effects on cognition and mood, amplified as the field weakens, feed it, and the top priority in this phase is preparing without going off grid too early.

**Convection** — The rising of warm, moist air that builds clouds, thunderstorms and tropical rain. High-speed solar wind and SEP events intensify it, and solar UV changes modulate tropical convection such as the MJO.

**Cosmic volcanic forcing** — The triggering of volcanic eruptions by solar activity and cosmic rays. Induced currents, particle bombardment and cosmic-ray nucleation of gases in magma chambers can destabilize volcanoes.

**Crust tilt** — The book's term for the peak of the disaster cycle, when Earth's crust unlocks from the mantle and turns over about 90 degrees within a day, bringing Greenland and Antarctica to the equator. It is also called crustal displacement, crustal shift or 'the Earth turns over', and the solar micronova triggers it. See also Pole shift.

**D layer** — The lowest layer of the ionosphere, about 60 to 90 km up, present mainly in daylight. Solar flare X-rays electrify it, and it then soaks up high-frequency radio signals, causing radio blackouts.

**Dansgaard-Oeschger (D-O) events** — Abrupt warming events in the climate record, with spikes of up to 15°C within a decade or less. Volcanic upticks come with them on a cycle of about 1,500 years, and four of these cycles make the 6,000-year mark.

**Disaster layers** — Sediment layers worldwide that hold the concentrated evidence of each disaster cycle, including short-lived nova-level isotopes. Their timing lines up with the cycle.

**Drought** — A long shortage of rain. Solar swings drive it through the negative PDO in the western U.S., the negative AMO in North America and the Mediterranean, and the shifted rain belts of rapid cooling events.

**DUMBs** — Deep underground military bases, which the book calls death traps. They are electrified and full of metal piping and wire, induction gets worse the deeper you go, and the great earthquake is centered at the base of the crust, so going deep brings you closer to the shaking.

**E layer** — The middle layer of the ionosphere, about 90 to 150 km up, where the electrojets flow.

**Earth disaster cycle** — A repeating catastrophe about every 6,000 years that combines a solar superflare, rapid climate upheaval, volcanic upticks and a geomagnetic excursion, with the last one 6,000 years ago and others at 12,000, 18,000, 24,000, 30,000, 36,000 and 42,000 years ago. The cycle is due now, it is already underway, and it is expected to peak in the 2040s. It is driven by the passage of the galactic current sheet, which triggers a solar micronova that tilts the crust at the cycle's peak.

**Earth's core** — The center of the Earth, whose liquid outer core generates the magnetic field. The most energetic cosmic rays reach it, major solar storms can induce current all the way down to it, and the micronova recharges it, restoring the magnetic field.

**El Niño-Southern Oscillation (ENSO)** — The Pacific ocean-atmosphere cycle of warm El Niño and cool La Niña phases, swinging every 2 to 7 years, a major driver of global weather, rainfall and temperature that touches everything. The sun modulates it: increased solar activity strengthens El Niño-like conditions with warmer eastern Pacific waters, solar minima favor La Niña, and solar-cycle terminations line up with ENSO extremes such as triple-dip La Niñas.

**Electrical conductivity** — How easily electric current flows through a material. Solar events change the conductivity of the atmosphere and with it the global electric circuit, and the most conductive parts of the Earth, fault lines and the low-velocity zone, are where solar-driven currents concentrate.

**Electromagnetic induction** — The creation of electric current in conductors by a changing magnetic field. Solar storms induce currents in the ground, the crust, the mantle and even the core, and in power lines and metal, which is why a superflare would destroy technology and why bunkers need little metal.

**Electroquake** — An earthquake triggered by the sun's electromagnetic energy. Solar storms drive currents and magnetic changes into the crust, the current follows conductive paths such as fault lines and groundwater, and this shifts stress and triggers seismic events.

**Elite bunkers** — The bunkers, hollowed-out mountains and tunneling projects that billionaires and celebrities have built to ride out the disaster. Many have been detailed and even filmed, and an estimated 3 to 10 times more are kept secret.

**Excess-impact solar storms** — Solar storms that cause much more disturbance on Earth than the size of the flare or solar wind should allow, which shows the weakening

magnetic field leaving Earth more vulnerable. They surged after March 2023, and examples include the May 2024 storm, whose auroras rivaled 1859, and the October 2024 storm.

**Exosphere** — The outermost layer of the atmosphere, from about 500–1,000 km up, where the air thins out into space and atoms can escape Earth's gravity.

**Extinction-level event** — A disaster that wipes out a large share of life on Earth. Geomagnetic excursions and reversals are near-extinction to extinction-level events tied to surges in species loss, because extra radiation, ozone loss, climate upheaval, navigation failure and the loss of technology all hit at once.

**F layer** — The highest and densest layer of the ionosphere, about 150 to 500 km up, which splits into the F1 and F2 layers by day. As more space weather energy penetrates the weakening magnetic field, new layers are forming: the first-ever F4 layer has been detected, and the first F3 layer over low latitudes.

**Fault lines** — The most conductive parts of the crust. They attract electric current and respond to magnetic changes, so they are where solar-driven currents deliver force to the crust.

**Float-away plan** — The book's backup for anyone at low elevation, and a must-plan for tsunami risk scores under 2,000: a strong, fairly large vessel that can take a beating from debris and carry everyone plus all supplies, since an inflatable is not likely to work. Expect to float one way for about 12 hours, then get to land as soon as possible once the water turns and starts dragging you out to sea.

**Flooding** — Water overrunning land from extreme rain, storm surges or meltwater. Low solar activity brings more blocking and floods, solar swings set flood frequency in the Alps and Western Mediterranean and the strength of storm-surge flooding, and extreme flooding is rising as more space weather energy gets through the weakening magnetic field. In the disaster a superflare would bring hundreds of catastrophic floods within 2 to 3 days, the great waves flood far inland, and large lakes such as the Great Lakes and Hudson Bay flood too.

**foF2** — The highest radio frequency that the F2 layer reflects straight back down, a direct gauge of the ionosphere's peak density. It rises and falls with solar activity and swings sharply in geomagnetic storms.

**Frozen mammoths** — Mammoths dug out of 20 to 30 feet of polar ice, frozen so fast that food was still undigested in their mouths and stomachs. They were found at ground level in places where nothing grows even after 12,000 years of warmer weather, which the book reads as proof that those lands were not polar when the mammoths lived there and that the crust tilted.

**Geomagnetic excursion** — A major, rapid weakening and shift of Earth's magnetic field, with the magnetic poles wandering far from their normal positions. Excursions recur on the ~6,000-year disaster cycle, and Earth is in one now. Gaps of a few thousand years between records come from dating spreads between isotopes and methods; the cycle holds.

**Geomagnetic jerk** — A sudden change in the behavior of Earth's magnetic field that starts in the core and happens about two or three times per decade. The accelerations in field weakening and pole motion come during these jerks.

**Geomagnetic reversal** — A full flip of Earth's magnetic poles, north to south. Along with excursions, reversals are near-extinction to extinction-level events, and the actual magnetic flip is due in the 2040s.

**Ghost stations** — Decommissioned weather stations for which NOAA still reports estimated or modeled temperatures. Many of the nearby stations used to fill them in are affected by the urban heat island effect, which calls a measurable portion of the temperature record into question.

**Glacial and interglacial periods** — The long cold stages of an ice age and the warm stages between them; Earth is in an interglacial now. Biodiversity flourished in past interglacials, and the 6,000-year event was the first Heinrich-type event in an interglacial in over 100,000 years.

**Global electric circuit (GEC)** — The up-and-down flow of electric current between the ionosphere (the ceiling) and the ground (the floor), running down through high-pressure cells and up through low-pressure cells. Flares, geomagnetic storms and cosmic rays change it and the atmospheric electricity it carries, and that changes clouds, rain, lightning, pressure, jet streams and storms.

**Gothenburg excursion** — The geomagnetic excursion of about 12,000 years ago, which lines up with the Younger Dryas on the disaster cycle.

**Great earthquake** — The worldwide shaking expected when the crust unlocks from the mantle during the micronova event. It is centered at the base of the crust, so going deeper underground brings you closer to the source.

**Great waves** — The continent-sized tsunamis created when the crust tilts and the oceans' inertia keeps the water from moving with it. They come in two phases, the inertial wave and the slosh-back wave, and they hit every coastline and run far inland.

**Hadley circulation** — The giant overturning cells of air that rise near the equator and sink in the subtropics, setting the trade winds and the subtropical jet stream. An active

sun heats the stratosphere and expands them, and solar minima contract them, letting colder air push further toward the equator and making mid-latitude winters harsher.

**Hail** — Balls of ice that thunderstorms throw down. Cosmic-ray ionization shapes the lightning in hailstorms, and hail is part of the week of very bad weather after the crustal shift that shelters must protect against.

**Heating causes cooling** — The book's principle that warming can trigger rapid cooling: melting ice floods the oceans with fresh water, slows ocean heat transport and chills the climate. Heinrich events and the Younger Dryas are the prime examples.

**Heinrich events** — Rapid cooling events in which warming melts too much ice, sending massive iceberg discharges into the North Atlantic that freshen the oceans and shut down ocean heat transport. They line up with the 6,000-year cycle at about 12,000 (Younger Dryas, H0), 18,000 (H1), 24,000 (H2), 30,000 (H3), 36,000 (H4) and 45,000 (H5, tied to the Laschamp excursion) years ago, and the 6,000-year event was their tropical, interglacial version.

**Hilina Pali excursion** — The geomagnetic excursion of about 18,000 years ago, paired on the cycle with Heinrich event H1.

**Hurricanes and tropical cyclones** — Large rotating tropical storms, called hurricanes or typhoons depending on the ocean. Solar UV, solar wind and cosmic-ray changes alter their development and intensity, and geomagnetic disturbances coincide with changes in hurricane strength.

**Icelandic Low and Azores High** — The two pressure centers whose seesaw is the NAO: a low near Iceland and a high near the Azores. An active sun strengthens both, which intensifies the westerly winds across the North Atlantic.

**Inertial wave** — The first phase of the great waves. As the crust tilts, the ocean's inertia keeps the water in place, so the land pushes into it and the water rises over the land like a fast high tide for the 12 to 24 hours of the tilt.

**Intertropical Convergence Zone (ITCZ)** — The belt of rising air and heavy rain near the equator where the trade winds meet. During long solar minima it shifts, confining tropical storm systems while polar air masses push south and cool the northern continents.

**Ion-induced nucleation** — The formation of cloud droplets around electrically charged air molecules, such as those ionized by cosmic rays. It is one way that space weather and the global electric circuit shape clouds and rain.

**Ionization** — The stripping of electrons from atoms and molecules, which electrifies the air; the book also calls it electrification. Flare X-rays, solar particles and cosmic rays

ionize the upper atmosphere and the ionosphere, changing radio signals, clouds, lightning and the global electric circuit.

**Jet stream** — The fast, high-altitude rivers of wind, the subtropical and polar jets, that steer storms and weather. An active sun strengthens them and pushes them poleward for more stable weather and fewer cold outbreaks, while low solar activity brings a meandering jet stream with more blocking, floods and cold events.

**Lake Mungo excursion** — The geomagnetic excursion of about 24,000 years ago, near the Last Glacial Maximum and Heinrich event H2.

**Laschamp excursion** — The geomagnetic excursion of about 42,000 years ago, the oldest in the book's list of excursions on the 6,000-year cycle. It lines up with Heinrich event H5.

**Last Glacial Maximum** — The coldest point of the last ice age, about 24,000 years ago, which falls on the 6,000-year cycle alongside Heinrich event H2.

**Lightning** — The giant electric discharge of a thunderstorm. Cosmic rays and solar particles ionize the air and drive cloud electrification, so lightning rises after solar events and drops during Forbush decreases.

**Lights Out** — Phase 2 of the disaster: the Solar EMP, when a superflare or the weakened magnetic field lets space weather take out the power grids and critical infrastructure. It could come tomorrow or not until the micronova itself, a US government estimate says it would kill 90% of people within six months, and from that moment there is no help, only your network, your preparation and your plan.

**Little Ice Age** — The cold period of about 1300 to 1850 AD, during ultra-low solar activity. It brought widespread crop failures, famine and social disruption.

**Low-velocity zone (LVZ)** — A thin layer of partly melted rock between the crust and the mantle. It is the most conductive layer of the Earth and it glues the crust to the mantle, but huge induced currents can melt it through resistance (ohmic) heating and unlock the crust so it can tilt.

**Madden-Julian Oscillation (MJO)** — A pulse of tropical clouds and rainfall that travels east around the equator over about 30 to 60 days. Short-term solar UV changes modulate its convection and rainfall.

**Magnetic field weakening** — The ongoing loss of strength in Earth's magnetic field. The director of ESA's Swarm mission reported it had sped up from 5% per century to 5% per decade; it is now about 5% every eight years and is expected to keep accelerating toward the peak of the excursion in the 2040s.

**Magnetic pole shift** — The accelerating movement of Earth's magnetic poles. The north magnetic pole is racing toward Siberia and the south toward the Indian Ocean, on a collision course near India, and at its peak the poles will move more than 2,000 km a year, 100 times faster than now. See also Pole shift.

**Mantle** — The thick layer of hot rock between Earth's crust and core. The crust is locked to it through the low-velocity zone, and the micronova's induced currents unlock the crust from the mantle so it can tilt.

**Mesosphere** — The layer above the stratosphere, about 50 to 85 km up and the coldest part of the atmosphere, where charged particle counts rise as the atmosphere transitions to the ionosphere. High-speed solar wind streams drive intense turbulence there, and polar summer mesospheric echoes are rising as more space weather energy gets through the weakening magnetic field.

**Michoacan excursion** — The geomagnetic excursion of about 30,000 years ago, paired on the cycle with Heinrich event H3.

**Mid-Holocene event** — The last disaster-cycle event, about 6,000 years ago, when a geomagnetic excursion, major volcanic eruptions and a tropical hydroclimate upheaval struck together. North Africa's wetlands expanded and the Asian monsoon abruptly contracted.

**Mono Lake excursion** — The geomagnetic excursion of about 36,000 years ago, paired on the cycle with Heinrich event H4.

**Monsoon** — The seasonal wind and rain systems of Asia, Africa and South America. Solar activity modulates them over decades and centuries, through ENSO and the Hadley and Walker circulations, and the last disaster-cycle event abruptly contracted the Asian monsoon.

**Navigational failure** — The breakdown of animal navigation as Earth's magnetic field weakens and shifts. Birds, insects, reptiles, marine life and mammals use the field to migrate, forage and find mates, so the whole food chain is at risk.

**New poles** — After the crust tilt, the new geographic poles are expected near India and South America, with Greenland moved to the equator. Climates swap: for example, Canada and Mexico trade climates, and so do Maine and Florida.

**Next Age of Earth** — The aftermath of the disaster, when the tilting stops, the magnetic field is renewed and the weather calms. Ancient stories describe it as a new golden age, and survivors begin to rebuild civilization.

**North Atlantic Oscillation (NAO)** — The pressure seesaw between the Icelandic Low and the Azores High that steers the westerly winds across the North Atlantic. An active

sun drives it positive, with milder, wetter winters in northern Europe and the eastern U.S., and a quiet sun drives it negative, with more blocking, Arctic air outbreaks and harsher winters, lagging the solar cycle by 1 to 4 years.

**Ohmic heating** — Heating caused by electric current flowing through resistant material, also called joule heating. Huge induced currents from the micronova or a major solar storm would melt the low-velocity zone this way and unlock the crust.

**Ozone destruction** — The main effect of the extra solar protons, electrons and cosmic rays that a weakening magnetic field lets in, with particle precipitation rising 60-200%. Less ozone lets more UV reach the surface, damaging DNA, plants and plankton at the base of the food chain.

**Ozone layer** — The band of ozone in the stratosphere that absorbs most of the sun's harmful UV rays. Solar proton storms and cosmic rays deplete it, and as the magnetic field weakens the extra particles destroy it, letting more UV reach the surface.

**Pacific Decadal Oscillation (PDO)** — A long-lived pattern of Pacific Ocean temperatures. An active sun shifts it positive, with warmer eastern Pacific waters, stronger storms on the U.S. West Coast and milder North American winters, and a quiet sun shifts it negative, cooling the eastern Pacific, reinforcing La Niña and raising drought risk in the western U.S.

**Paleomagnetism** — The record of Earth's past magnetic field preserved in rocks, sediments and cave formations. It is what reveals the geomagnetic excursions that make the 6,000-year cycle a combined solar, climate and geomagnetic event.

**Phases of the disaster** — The four stages the disaster cycle is expected to unfold in. Phase 1 is now (the 'Clown World'), phase 2 is the Solar EMP ('Lights Out'), phase 3 is the micronova and pole shift ('The Event'), and phase 4 is the aftermath ('Next Age of Earth').

**Piezoelectric effect** — The electric charge produced when certain rocks and crystals are put under stress, and the stress produced when they are charged. It is one route by which solar-driven electromagnetic energy stresses the crust and triggers quakes and eruptions.

**Planetary waves** — Giant waves in the atmosphere's flow that wrap around the globe and carry energy up into the stratosphere. The sun modulates them, and they in turn shape the stability of the polar vortex, the NAO and the annular modes.

**Polar mesospheric summer echoes** — Strong radar echoes from the summer mesosphere over the polar regions. They are increasing, a sign that more space

weather energy is penetrating the weakening magnetic field and ionizing deeper layers of the atmosphere.

**Polar vortex** — The ring of strong stratospheric winds circling each pole that keeps Arctic air locked near the pole. Strong solar forcing stabilizes it, and during low solar activity it is disrupted more often, sending the jet stream meandering and Arctic air into Europe and North America, and the stratospheric warming events that break it down come more often at solar minimum.

**Pole shift** — The book's name for both stages of the disaster cycle's pole event. It is the magnetic pole shift now underway, with the magnetic poles racing across the globe as the field weakens, and at the cycle's peak the geographic pole shift, when the crust tilts about 90 degrees in one day. See also Magnetic pole shift and Crust tilt.

**Precipitation** — Rain, snow, hail and other water falling from clouds. The sun dramatically impacts it through irradiance, cosmic rays and geomagnetic effects, shifting rainfall through ENSO, the PDO, the monsoons and the MJO.

**Pre-earthquake signals** — Electromagnetic and chemical warnings that come before earthquakes, including ionospheric changes in total electron content (TEC), ULF and VLF emissions and radon gas releases. Solar storms, geomagnetic disturbances and cosmic rays strengthen these signals.

**Pressure systems (highs and lows)** — Areas of high air pressure, with sinking air and fair weather, and of low air pressure, with rising air, clouds and storms. Solar activity and geomagnetic storms change surface pressure, and in the global electric circuit current flows down through highs and up through lows.

**Project Nanook** — A 1940s US military Arctic mission sent to locate the magnetic pole. It found the pole moving and repeated disaster layers with tropical fossils, and the government scientists concluded that a 90-degree crust tilt takes one day; the findings were classified.

**Radon** — A radioactive gas released from the crust under tectonic stress. Radon emissions change with geomagnetic storms and rise before earthquakes, making them a seismic precursor.

**Safe zones** — Places most likely to escape the great waves and the new polar freezes, chosen by elevation, distance from the ocean and other risks. The book's best options are the Rocky Mountains (the eastern range, the 'New Valley of the Sun'), the northern Himalaya and Karakoram, the southern Mongolian mountains, the northern Carpathians and high Appalachia.

**Schumann resonance** — The natural electromagnetic resonance of the cavity between the ground and the ionosphere, at about 7.83 Hz. The book names it as one of the electromagnetic pathways by which space weather affects the brain.

**Sea surface temperature (SST)** — The temperature of the ocean's top layer, which feeds heat and moisture to the atmosphere. Solar activity raises and lowers it in patterns such as ENSO, the PDO and the AMO, driving rainfall and storms.

**Self-evaluation scorecard** — The book's readiness sheet that scores 30 items from 5 (best) to 1 (worst), for a total out of 150. It covers yourself (fitness, health, faith and mindset), your preparations (food, water, defense, seeds and medicine), your knowledge and plans, and your location safety, including the tsunami risk score.

**Siberian High** — The huge, cold high-pressure center over Siberia in winter, one of the regional pressure cells that solar activity shifts through the atmosphere's electric field.

**Slosh-back wave** — The second phase of the great waves. When the tilt stops, the water rushes back the other way as a massive tidal wave that hits harder but does not travel as far inland and lasts a shorter time.

**South Atlantic Anomaly (SAA)** — The broad region over South America and the South Atlantic where Earth's magnetic field is weakest, so radiation-belt particles reach lower into the atmosphere there. It grows and deepens as the field weakens, with cosmic energy and particles breaking through to deeper and deeper levels of the atmosphere. Satellites and the space station take radiation hits when they pass through it.

**Speleothems** — Cave formations such as stalagmites that record Earth's past magnetic field as they grow. Speleothems from a Russian cave confirmed the geomagnetic excursion of about 6,000 years ago.

**Sporadic E** — Patches of unusually dense ionization that form suddenly in the E layer and bounce radio signals far beyond their normal range.

**Storm track** — The usual paths that storms follow, steered by the jet stream. An active sun strengthens storm tracks at higher latitudes, and during solar minima winter storm tracks shift toward the equator, raising storm frequency and intensity in places like the Mediterranean.

**Stratosphere** — The layer above the troposphere, up to about 50 km, where ozone warms the air with height, air density is lower and subtle changes can have big impacts below. Extra UV from an active sun heats it, expanding the Hadley cells and steadying the polar vortex, and solar proton storms deplete its ozone.

**Stratospheric warming events** — Rapid heating of the polar stratosphere that weakens or breaks up the polar vortex. They come more often during solar minima, leading to a meandering jet stream, a negative NAO and extreme winter cold.

**Surge deposits** — Massive heaps of debris, mud, fossils, trees, muck and sand in Alaska, Africa, Australia, China and Russia, left by the great waves of the disaster cycle. They show almost no burning, and dating puts nearly all of them on the cycle timeline.

**Survival network** — The community of people, united by one purpose, that you prepare and survive with, because no one person can be farmer, hunter, doctor, builder and teacher at once. The book calls building it perhaps the most challenging and most important part of preparing, and everyone in it needs to understand what is coming.

**Tephra** — The ash and rock fragments thrown out by a volcanic eruption, which settle as marker layers. Tephra layers from the mid-Holocene eruptions line up with the geomagnetic excursion of about 6,000 years ago.

**Texas Rock Wall** — A buried stone wall in Texas that encloses about 20 square miles, with uniform 70-foot walls, right angles, mortar, windows and foot-holes for climbing. The book holds it up as a lost city covered over by the great catastrophe, and rejects the mainstream claim that it is a natural formation.

**The Event** — Phase 3 of the disaster: the micronova and pole shift. The sun turns red, then black, and the micronova erupts about three days later and unlocks the crust within 24 hours for a one-day crustal shift with the great waves and about seven days of hail, wind and lightning; the whole event lasts about 10 to 20 days and is expected in the 2040s.

**Thermosphere** — The thin, hot upper layer of the atmosphere, from about 85 km to 500–1,000 km up, that overlaps the ionosphere and heats to 500–2,000 °C with solar activity. Solar EUV and X-rays heat it, and the solar wind, geomagnetic storms and the IMF change its density and behavior almost instantly.

**They Know** — The book's case that governments, billionaires and other select individuals have long known the disaster is coming. The government classified the pole-shift findings of Project Nanook and helped bury the science of a fast crust tilt behind a slow, easily debunked version, and government-funded studies keep suppressing it.

**Thunderstorm** — A storm cloud that produces lightning, built by rising air and charge separation among ice particles. Cosmic-ray ionization shapes that charge separation, and thunderstorm electrification and frequency rise after intense solar events.

**Tianchi excursion** — The geomagnetic excursion of about 6,000 years ago, recorded in sediments off Japan and in cave formations in Russia. It coincided with major volcanic eruptions and climate shifts in the last disaster-cycle event.

**Tipping point (March 2023)** — A major acceleration in Earth's magnetic field shift in March 2023 that signals the descent into the pole shift. Excess-impact storms and low-latitude auroras surged right after it.

**Total electron content (TEC)** — The total number of free electrons in a column of the ionosphere, measured from GPS signals in TEC units (1 TECU = $10^{16}$ electrons per square meter). Solar storms drive it up and down, and TEC anomalies appear before earthquakes as pre-earthquake signals.

**Trade winds** — The steady winds of the tropics that blow from the east toward the equator. Solar-driven expansion of the Hadley cells reinforces them, and solar minima strengthen them along with La Niña.

**Tropopause** — The boundary between the troposphere and the stratosphere, about 8 km up at the poles and 16 to 18 km at the equator. Solar variations change its temperature, and through it they modulate atmospheric circulation and ENSO.

**Troposphere** — The lowest layer of the atmosphere, where we live and where weather happens. It reaches from the ground up to the tropopause and cools with height. Changes in the layers above it, from solar heating of the stratosphere to disturbances of the ionosphere, reach down into it and shift clouds, pressure, wind and rain.

**Tsunami risk score** — A quick test of flood safety from the great waves: your elevation in feet plus your distance from the ocean in miles. Over 5,000 is best, under 3,000 means danger, and under 1,500 is a big problem.

**Underground shelter** — A shallow bunker, root cellar, cave or old mine for riding out the event's radiation, wind, hail and temperature swings, in a rural location safe from the great waves, the same refuge used by the civilizations that survived the last disaster. A few inches to a foot of soil overhead is enough, the walls should angle slightly outward, and it should use as little metal as possible, because micronova induction can arc through rebar and heat the air inside.

**Urban heat island effect** — The tendency of cities to run much warmer than the surrounding countryside because trees and green space are replaced with pavement and buildings. Weather stations swallowed by growing cities read too warm, and when they are used to fill in rural data the false warming spreads, exaggerating modern warming.

**Walker circulation** — The main east-west loop of air along the equatorial Pacific, rising over the warm western Pacific, sinking over the cooler east and returning as the trade

winds; it weakens in El Niño and strengthens in La Niña. Geomagnetic storms and CMEs cause rapid surface-pressure changes that alter its strength, most of all in the declining phase of the solar cycle, and solar-driven changes in it set up conditions for storm formation.

**Westerlies** — The prevailing west-to-east winds of the mid-latitudes. An active sun intensifies them through the positive NAO and annular modes, bringing milder winters, and a quiet sun weakens them, letting Arctic air push south.

**Younger Dryas** — The abrupt return to near-glacial cold about 12,000 years ago, also called Heinrich event H0. It is the disaster-cycle event before the most recent one, linked to the Gothenburg excursion.

Astrophysical

**Accretion** — One of the two known ways to trigger a nova at a star: material dumped onto the star sets off the outburst. The galactic current sheet provides this by dumping dust and gas into the solar system.

**Arc discharge** — A massive electric discharge, like a giant lightning bolt, that the book expects from the solar micronova: the 'thunderbolt of the gods' of ancient myths. It can blast rock, carve canyons and lift oceans, the same discharge that cracks the surface of magnetars when too much energy surges through their lowest magnetic shells.

**Carrington event** — The great solar storm and superflare of 1859, among the largest on record, yet only a moderate flare in the range of possible superflares. It caused a temperature spike of about 7°C lasting a few months, and its auroras were matched only by the May 2024 storm.

**Cosmogenic radionuclides** — Radioactive atoms such as radiocarbon, formed when cosmic rays strike Earth's atmosphere and preserved in natural records. They reconstruct past solar activity and show superflares recurring in cycles of hundreds to thousands of years.

**Four horsemen sequence** — The book's reading of the four horsemen of the apocalypse as the sun's color changes before and during the micronova. The sun goes white (now), then red as dust builds and light output drops, then black, and then pale as the micronova erupts.

**Heinrich-Bond solar cycle** — The name a scientist gave to the 6,000-year cycle that matches the X1000 superflare and the Heinrich climate events. Adding paleomagnetism shows it is a solar, climate and geomagnetic cycle all at once.

**Magnetar** — A neutron star with an extremely strong magnetic field. When too much energy surges through its lowest magnetic field shells it discharges downward in an arc discharge that cracks the star's surface, the model for the micronova's 'thunderbolt of the gods'.

**Magnetic kick** — The second known way to trigger a nova: strong magnetic forces, such as a star passing too close to a black hole, set off the outburst. The galactic current sheet delivers one through a galactic magnetic reversal.

**Micronova impactors** — Small impactors formed as material blasted from the solar micronova congeals in space. They explain the impact craters that date to the disaster-cycle events: small impactors arrive with the main plasma shockwave and larger ones in the days that follow.

**Nova** — An outburst at a star. Most novae are smaller and recurrent (dwarf novae, micronovae, mini-novae, classical novae), and only about 1 in 1,000 to 10,000 is a star-ending supernova. Micronovae were confirmed on other stars in 2022, after the solar micronova was first proposed.

**Nova-level isotopes** — Isotopes that only a nova event at a star can make, found concentrated in Earth's disaster layers and fossils. The ones in the disaster layers are short-lived, so they cannot come from distant stars or ancient supernovae and must come from the sun.

**Rare cosmological event crystals** — Crystals with an unexplained central void and jet-like features, produced by a powerful electric field that charged the crystal until its center imploded. The book points to a solar outburst such as the micronova as the cause.

**Solar micronova** — A small nova outburst of the sun that recurs with the disaster cycle when the galactic current sheet arrives. It brings an extreme flash of UV and X-rays, then a proton storm, and about 18 hours later a plasma shockwave with impactors, and it unlocks Earth's crust while recharging the magnetic field.

**Solar system shift** — The magnetic change happening across the whole solar system, not just on Earth. The sun, Earth, Jupiter and Uranus show direct evidence, and Venus, Mars, Saturn, Neptune and Pluto show indirect signs such as storm, aurora and atmosphere changes, which points to a galactic cause.

**Superflare** — A solar flare far beyond the size of typical flares; the 1859 Carrington event was one. The sun's long cycles produce superflares hundreds of times more energetic than Carrington, up to X100 and beyond, and they threaten technology, the ozone layer, climate and life.

**Superflare ladder** — The book's table of superflare cycles: about every 11 years an X10 (dangerous for satellites), every 250 years X50+ (ground technology), every 1,000 years X200+ (ozone), every 3,000 years X500+ (ice caps) and every 6,000 years about X1000 (everything). The X1000 event runs on the same 6,000-year clock as the disaster cycle.

Galactic

**Energetic neutral atoms and interstellar ions** — Particles that the galactic current sheet would accelerate and carry into the solar system. The Voyager and New Horizons spacecraft have recorded increases in them, with a shift toward higher energies over just ten years.

**Galactic current sheet** — A rippling sheet of electric current along the Milky Way's equator, 150-300 light years tall and about 30 light years thick, moving outward at 700-2,000 km per second. It carries the galaxy's magnetic reversal point and extra density, and its recurring passage is the cause of the disaster cycle.

**Galactic dust** — The extra dust and gas the galactic current sheet brings into the solar system, the 'material dump'. Since 2020, excess dust has been detected from the sun's corona out past Pluto.

**Galactic magnetic reversal** — The flip in magnetic direction that the galactic current sheet delivers to the solar system as it passes, the galactic version of Earth's crossings of the sun's current sheet. It acts as the 'magnetic kick' that helps trigger the solar micronova.

**Galactic superwave** — A rival explanation for the disaster cycle in which a galactic light wave, the superwave, causes the catastrophe. The book favors the micronova and current sheet because no superwaves are seen in any other galaxy, a light wave would strike all at once with no build-up, and its own proponent said it would kill all life on Earth.

**Galactic trigger** — The galactic cause of the disaster cycle: the cyclical passage of the galactic current sheet brings magnetic change and dust to the whole solar system and triggers the solar micronova. Novae injected into the sheet also explain how it keeps propagating to the galaxy's edge.

Ben-isms

**disastercycle.film** — The "Easy Version" film linked as STEP 1: BECOME INFORMED in the channel's video descriptions.

**Eyes open, no fear** — A standing watchword of the project and its Observers: stay aware, and do not be afraid. It is used as a greeting and a sign-off across the channel's comments and discussion.

**New Valley of the Sun** — The book's name for its first listed safe zone: the eastern range of the Rockies. The closing table gives it as 'New Valley of the Sun' (Eastern range of Rockies). See also Safe zones.

**Observer Ranch** — The in-person meeting place named on the book's closing page; the channel's live-event tickets are sold through it. The book gives it as www.ObserverRanch.com.

**Observer Watchmen** — A greeting to the Observers community used in the channel's comments.

**Observers (community name)** — The name the project uses for its audience and community. Video descriptions invite viewers to "Network with other Observers near you."

**Phoenix Rising** — A named course of the project, listed as STEP 4 in some of the channel's video descriptions.

**S0 News** — The daily show title used by the SpaceWeatherNews (S0) channel. Daily episodes use it as a title suffix.

**Sky Fall** — A title the channel has used for a livestream and for a later episode, repeated in its posts promoting them.

**SO family** — A name used in comments for the community, taken from the S0 / Suspicious0bservers short form.

**solarkillshot.org** — The community network link used in the channel's video descriptions, where viewers are invited to network with other Observers. See also Solar EMP.

**SpaceWeatherNews** — The public site and YouTube label for the same project as Suspicious0bservers. The book points to it as www.SpaceWeatherNews.com, and on the closing page as the SpaceWeatherNews (S0) YouTube channel.

**State of the Earth** — The name of the live-event tour promoted in the channel's video descriptions.

**Suspicious0bservers** — The name of the channel, community and project that follows space weather and the Earth disaster cycle, often shortened to S0. The book points to it as www.SpaceWeatherNews.com early on, and on the closing page as the SpaceWeatherNews (S0) YouTube channel and Observer Ranch.

**The Observer Review** — The project's e-magazine, linked from the channel's video descriptions.

**The Roadmap** — The project's named strategy course, listed as STEP 2: STRATEGY in the channel's video descriptions.