

The Aurora

Observing & Chasing Guide

How to predict it, where to chase it, when to expect it from your latitude.

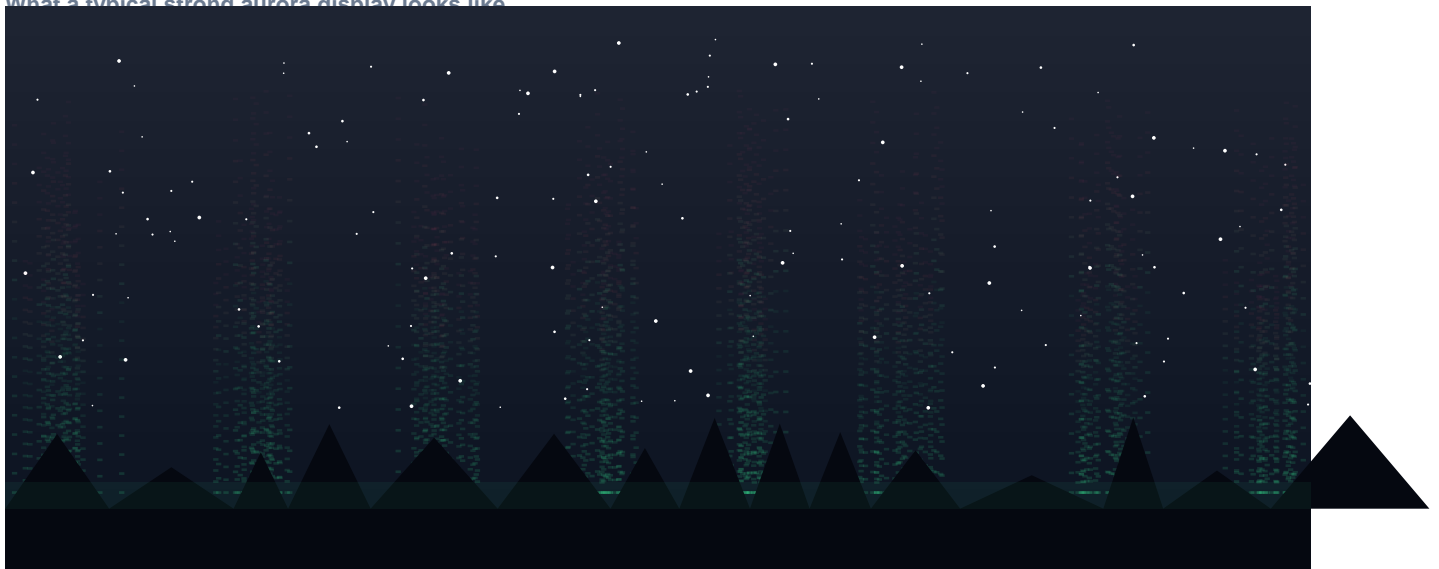
We're at solar maximum right now — the best aurora window in over a decade.

What aurora actually is

The Sun continuously blows charged particles into space — the solar wind. Most of it gets deflected by Earth's magnetic field, but some particles spiral down along magnetic field lines into the polar atmosphere. When they collide with oxygen and nitrogen atoms 100–400 km up, those atoms light up — emitting specific wavelengths of light depending on which gas, which altitude, and how energetic the collisions are.

The colors tell you what's happening. Green (557.7 nm) is oxygen at 100–300 km — the most common aurora color, the one almost everyone has seen. Red (630.0 nm) is also oxygen, but higher up (300–500 km) where atoms emit a different wavelength when relaxing — requires more energetic particles and appears only in stronger storms. Purple/violet (391 nm) is ionized nitrogen at lower altitudes — visible only when storms penetrate deeper into the atmosphere. Blue is also nitrogen, usually seen at the base of the brightest curtains. The 'auroral oval' is a ring of activity centered roughly on the magnetic pole (not the geographic pole — they're offset, which is why Yukon and Northwest Territories get more aurora than equally-latitude Siberia, and why Tromsø in Norway gets way more than equally-latitude Anchorage in Alaska). During calm conditions the oval sits between 65–70° magnetic latitude. During storms it expands south, sometimes dramatically — the May 2024 storm pushed the oval to around 30° magnetic latitude, putting aurora over Mexico, Florida, and Texas for the first time in many people's lives.

What a typical strong aurora display looks like



The Kp index

Reading the forecast

The Kp index measures geomagnetic activity on a scale of 0 (totally quiet) to 9 (extreme storm). It's updated every 3 hours by NOAA from a global network of magnetometers. **The higher the Kp, the further south the auroral oval extends.** If your latitude is south of the oval, you won't see anything regardless of how dark your sky is.



What each Kp level means at your latitude

Latitudes are **magnetic**, which differ from geographic latitudes by about 10–15°. North America is closer to the magnetic pole, so the aurora reaches lower geographic latitudes here than in Europe or Asia.

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| 0 | Very quiet | South to ~65° magnetic | Only northern coastal regions of Yukon, NWT, Nunavut, Alaska, northern Norway, Iceland. Aurora visible directly overhead at those latitudes but invisible elsewhere. |
| 1 | Quiet | South to ~65° | Same as Kp 0 — just slight pulsations. Routine quiet conditions. |
| 2 | Calm | South to ~64° | Aurora visible high in north for Yellowknife, Fairbanks, Tromsø. Faint glow on northern horizon for Edmonton/Saskatoon/Anchorage. |
| 3 | Unsettled | South to ~62° | Aurora visible for most of central Canadian latitudes. Faint glow visible on the northern horizon for Calgary, Winnipeg, Edmonton, southern Norway. |
| 4 | Active | South to ~59° | Visible across most of Canada north of the US border. Northern US states (ND, MT, ME, MN) may see faint glow on horizon. Most of UK and Scandinavia visible. |
| 5 | Minor storm (G1) | South to ~56° | Major shift — aurora visible to most of Canada from Calgary north, plus northern-tier US states. Often-photographed events at this level. Most of Europe, central Russia. |
| 6 | Moderate storm (G2) | South to ~52° | Most of US-Canada border states, all of UK, southern Norway/Sweden/Finland. Toronto and Vancouver may glimpse faint glow on northern horizon. |

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| 7 | Strong storm (G3) | South to ~47° | Visible across most of the US northern half — Portland, Chicago, Boston. All of UK overhead-bright. Memorable widely-reported events. |
| 8 | Severe storm (G4) | South to ~42° | Visible to most of US, southern Europe, mid-latitude Asia. Rare — typically 1–3 times per solar cycle. New York, Chicago, Munich all see overhead aurora. |
| 9 | Extreme storm (G5) | South to ~37° or further south | Visible to Florida, Texas, Mexico, Mediterranean, northern Australia. Historic — May 2024 was the first G5 since 2003. Some events (like the Carrington event of 1859) saw aurora at the equator. |

How to predict an aurora

Sun-watching, CME lag, and real-time alerts

Aurora prediction works at three timescales — days, hours, and minutes — using different tools at each.

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| Days ahead (sun-watching) | Big complex sunspot groups produce flares and coronal mass ejections (CMEs). When the Sun shows a 'delta-class' magnetically complex spot group rotating into Earth-facing position, the probability of geomagnetic activity within the next week jumps. spaceweather.com shows today's Sun image with active regions labeled — check it daily during solar maximum. |
| 1–3 days ahead (CME tracking) | When a CME is launched, NOAA's WSA-Enlil model simulates its travel through the solar wind and predicts arrival time at Earth. Typical CME travel time: 1–3 days. NOAA SWPC (swpc.noaa.gov) publishes the official forecast — look for 'G1', 'G2', etc. predictions in the 3-day outlook. |
| Hours ahead (real-time) | Once a CME is approaching Earth, the ACE and DSCOVR satellites at the L1 Lagrangian point (1.5 million km Sun-ward of Earth) measure it directly about 30–60 minutes before impact. Live solar wind data: spaceweatherlive.com , sunsight.com . Watch for the IMF Bz turning negative (south-pointing) — that's when the geomagnetic storm actually starts. A CME with Bz positive may pass with little aurora. |
| Minutes ahead (real-time Kp) | Kp is updated every 3 hours but unofficial 'estimated Kp' is updated more frequently from ground magnetometers. Apps like My Aurora Forecast (iOS/Android), SpaceWeatherLive , AuroraNotifier can push notifications when Kp crosses your alert threshold. |
| Local conditions | Once you know aurora is coming, the local factors are: dark sky (Bortle 4 or better dramatically helps), clear northern horizon (no buildings/trees blocking), local time around magnetic midnight (within 2–3 hours either side — typically 10 PM to 2 AM local). Moon phase matters less than for deep-sky observing but a bright moon does wash out subtle activity. |

Equinox effect

Statistically, geomagnetic storms are more common around the spring and fall equinoxes (March, September) than around solstices. The reason is geometric — at equinox, Earth's magnetic axis aligns more favorably with the solar wind for solar particles to penetrate the magnetosphere. If you're chasing aurora, plan trips for late September or late March if you have flexibility.

Photographing aurora

Camera and phone settings

Aurora photographs better than it looks visually — cameras integrate light over time and pick up color the eye can't see in dim conditions. A faint glow on the horizon that looks pale gray to your eyes can render as vivid green on camera. **Don't be discouraged by visual underperformance compared to internet aurora photos** — most of those photos required cameras at the location.

DSLR / mirrorless camera

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| Lens | Wide-angle, fast aperture. 14–24mm is ideal; 24–35mm works. f/2.8 or wider. Slow zoom lenses (f/4) will work but need higher ISO. |
| Mode | Full manual. Aperture-priority will get confused by the dynamic dark sky. |
| Aperture | Wide open (f/1.4 to f/2.8). Don't stop down — you need every photon. |
| ISO | 800–3200 depending on aurora brightness. Bright G3-G5 storms: ISO 800–1600. Faint Kp 4–5 displays: ISO 3200–6400. |
| Shutter speed | 1–15 seconds. Fast curtains (rays moving visibly): 1–3 sec. Diffuse arcs: 5–15 sec. The brighter the aurora, the shorter the exposure. |
| Focus | Manual focus on a bright star (Vega, Capella, Sirius — whatever is up). Use live view at 10x magnification. Auto-focus will hunt and fail in the dark. |
| White balance | Auto WB works fine for aurora; or use 3500K daylight for a slightly cooler look. Shoot RAW so you can adjust later. |
| Composition | Always include foreground — silhouetted trees, a barn, a lake reflecting the aurora. Aurora-only shots look generic; foreground anchors the image. |

Smartphone

Modern phones (iPhone 12+, Pixel 5+, Samsung S20+) with Night Mode are **surprisingly capable** for aurora. Night Mode automatically does the long exposure you'd do manually on a DSLR. Hold the phone very still (or rest it on something — a fence post, a backpack), let Night Mode take a 6–10 second exposure, and you'll often capture detail you couldn't see with your eyes. The Pixel Astrophotography mode (4 minute exposure) is particularly remarkable for faint aurora. The iPhone's manual long-exposure mode in Night Mode (slide to maximum 10 seconds) is the second-best option.

Where to chase the aurora

Top destinations globally

Yellowknife, NWT (Canada)

62.5°N · The world capital of aurora tourism

Sits directly under the auroral oval — aurora is visible on average 240 nights per year. World-class infrastructure for aurora tourism (heated viewing domes, transparent lodges, dedicated photographers' lodges). Best August–April. The most reliable place on Earth to see aurora.

Tromsø, Norway

69.6°N · The European aurora hub

Sub-auroral-oval position with mild coastal climate (Gulf Stream). Highly developed aurora tour industry (boat trips, chase tours). Frequent overcast weather is the main risk — but the Lofoten Islands south of Tromsø often have better skies.

Fairbanks, Alaska (USA)

64.8°N · Best US aurora destination

Under the auroral oval. Cold dry winter air means very clear skies. The University of Alaska aurora forecast service is the most authoritative in North America. Often paired with Denali National Park visits.

Abisko, Sweden

68.4°N · 'Blue Hole' aurora capital

Famous for a unique microclimate ('Blue Hole') caused by surrounding mountains that often keeps the sky clear when surrounding regions are overcast. Aurora Sky Station provides organized viewing. Late August through April.

Reykjavík / Þingvellir, Iceland

64°N · Aurora plus geological wonderland

Slightly south of the oval, but with frequent enough activity to be a major destination. Wide-open landscapes (lava fields, waterfalls, geothermal features) provide spectacular foregrounds. Wet maritime climate means weather is hit-or-miss.

Whitehorse, Yukon (Canada)

60.7°N · Less crowded alternative

Smaller aurora industry than Yellowknife but still excellent. Cleaner skies, fewer tourists. Mountain backdrops. Direct flights from Vancouver. Often paired with Tombstone Territorial Park visits.

Churchill, Manitoba (Canada)

58.8°N · Aurora plus polar bears

Famous for the combination of aurora viewing and polar bear tourism. Late October–November overlaps the polar bear migration and the start of aurora season. Tundra Buggy operators specialize in both.

Rovaniemi, Finland

66.5°N · Lapland and Santa

Marketed heavily as 'Santa Claus Village' for kids; also legitimate aurora territory. Glass-roofed igloos and tree-houses are now a major industry. Direct flights from major European cities.

Faroe Islands / Shetland Islands

60–62°N · UK-accessible aurora

Best in the British Isles for aurora — well north of mainland UK. Wild Atlantic landscapes. Variable weather. Activity at Kp 4–5 produces strong shows here.

Tasmania / Southern New Zealand

42–46°S · Southern Hemisphere

The Southern Lights (Aurora Australis) get far less attention because Antarctica blocks land masses from being under the southern oval. Tasmania (especially the south coast around Hobart) and Stewart Island, NZ are the most accessible. Active during the same storms as northern displays.

Real-time tools

NOAA Space Weather Prediction Center

swpc.noaa.gov

The official US source. 3-day forecast, 30-minute aurora viewing prediction, current Kp, geomagnetic storm alerts. Trusted, conservative, technical.

Spaceweather.com

spaceweather.com

Daily news-style page. Today's Sun image, sunspot count, current solar wind, near-Earth asteroids. Run by Tony Phillips since 1999. Best 'morning coffee' source.

SpaceWeatherLive

spaceweatherlive.com

Real-time charts, ACE/DSCOVR data, current Kp estimates. Best site for following an active event minute-by-minute.

My Aurora Forecast

[iOS / Android](#)

Free phone app with Kp alerts and forecast. Notifies you when Kp crosses your set threshold. Simple, focused, reliable.

AuroraReach

[Web + app](#)

Community-driven real-time alerts and reports. People in the field post 'aurora visible now' updates with photos and locations.

Aurora Forecast (UAF)

gi.alaska.edu/AuroraForecast

University of Alaska Fairbanks geophysical institute — the most authoritative North American forecast. Visual map showing where aurora will be visible tonight.

Glendale App

glendale-app.space

UK-focused but globally useful. Real-time alerts, very active community, push notifications.

Last practical advice

Dress for two hours longer than you think

Aurora chasing means standing or sitting still for extended periods in the cold. Whatever you'd wear for active outdoor activity at -20°C, dress two layers warmer. Hand warmers, two pairs of socks, an insulated mat to stand on.

Aurora doesn't wait

When it shows up, it can be over in 15 minutes — or last 6 hours. Don't go inside 'just for a few minutes' to warm up. The peak intensity often comes near magnetic midnight; if you arrive at 10 PM and leave at 11:30 PM disappointed, you may have missed the real show.

Don't trust apps blindly

Aurora predictions are inherently uncertain. A predicted G2 can underperform; a 'quiet' night with Kp 3 can produce surprise overhead activity. If you're at a destination, be outside whenever the sky is clear during your trip — the best aurora often appears without notice.

Aurora isn't just for winter September and March equinoxes statistically produce the most geomagnetic storms. Aurora season runs roughly August through April for mid-latitudes; in high-latitude destinations (Yellowknife) the polar summer means no astronomical darkness from late May to mid-July.

Watching aurora is good for your eyes Unlike most astronomy targets that require dark adaptation, aurora is bright enough to see immediately. You don't need 20 minutes of darkness adaptation. Bring binoculars if you want — sometimes faint distant aurora becomes obvious through them, and you can see the structure of curtains in detail.
