

Astrarium — User Manual

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A synthesizer attuned to the sky. Version 0.9.x (beta).

Astrarium computes the actual sky — the positions of the Sun, Moon, and planets, the houses and aspects between them, tides, geomagnetics, and (when online) live space weather, rain radar, and earthquakes — and renders it as sound. The sky is **exact**: the same moment in the same place always gives the same planets. The world's signals are **live** and change with the day. Pick a date, pick a place, and play what the sky was doing.

1. Quick start

1. Open Astrarium (standalone, or as AU/VST3 in your DAW).
2. Play: your MIDI keyboard, or the QWERTY row — **A W S E D F T G Y H U J K** are keys, **Z/X** shift the octave (the red bracket over the keyboard shows where you are).
3. Pick a preset from the **top browser**. A preset is a sound *and* a moment: its date, place, and sky load together.
4. Drag the sky wheel to travel in time. Drag a single planet to play it. Click anywhere on the world map to move yourself. The sound follows.
5. Try “Occult Motorik”, open the **SEQUENCER** tab, press **PLAY**.

2. The header

- **SYNTH | DRUMS** — what this instance *is*. In Synth mode the keyboard plays notes; in Drums mode the whole keyboard plays the drum kit (octave-repeating: C kick, D snare, F#/G# hats, A# open hat, toms, rim). Run two instances in a DAW: one of each.
- **Preset browser** (**projects: sound+kit+groove+sky...**) — loads *everything*. For one layer only, use the scoped pickers on the SYNTH page (“load a sound only...”) and DRUMS page (“load a kit only...”) — those leave your sky, pattern, and everything else untouched.
- **SAVE/LOAD PATCH** — full patches as **.astrarium** files: parameters, sky, locks, patterns, all of it. Reloads identically offline.
- **PLAY** — the sequencer transport, from any page (the space bar works too). Starting also arms the sequencer, so the groove sounds immediately: press PLAY, then play keys over

the beat. The standalone remembers your last session on quit, so this plus **INIT** is the fastest way to jam.

- **INIT** — a fresh patch: every parameter back to the Sky-pad default. Your sky, location, and patterns are kept; ⌘Z undoes it.
- **NIGHT / DAY** — the same plate in two ink sets: Cellarius rose by day, navy by night. Remembered with the session.
- **ORRERY** (right end of the tab row) — opens the SYNTH page and puts the sky at the centre of the plate with the synth's dials on two rings around it, named along the arcs; tabs move to the left, the map becomes an inset, the keyboard runs the full width. The other pages keep their tables. Remembered with the session.
- **TOUR** (beside ORRERY) — a guided tour in sixteen steps. It moves you round the world and through the calendar, to the next real alignments, and asks you to play at each step; a lesson card narrates, points at the control in question and shows the range each push can reach. It starts from a clean patch (⌘Z brings yours back) and puts your location, moment, feeds, locks and Influence back when you leave. Escape leaves at any time.
- **Output meter** — hover it for the audio thread's health: DSP load as a percentage of the real-time budget, and a count of late audio callbacks. A red dot appears for a few seconds after a late callback. Those are dropouts; when the count climbs while the load stays low, something else on the machine is starving the audio thread (a heavy build, a render, a test run), and a larger buffer in the standalone's Options helps. The same line is written to `astrarium.log` in Documents/Astrarium.
- **DEMO / LICENSED badge** — see §9.
- **UPDATE** — appears in place of the tagline when the site has a newer release: hover for what's new, click to open the download page and install as before; your license file stays. Checked once a day over the Updates feed in NET; nothing is downloaded or installed by itself.
- **NET** — the complete list of every network host the instrument can ever contact, each with an off switch. See §8.

3. The pages

The left side is six pages behind tabs; the sky and map on the right never change.

SYNTH

Two oscillators (Saw, Sine, Pulse, **Sky** — the waveform computed from the planets, see §6 — and **Helio** — a physical model of the Sun's interior acoustics, see §6), a state-variable filter (LP/BP/HP) with envelope amount and **Keytrk** (cutoff follows the played note), amp and filter ADSR envelopes with analog RC curves, **UNISON** (up to 7 detuned voices per oscillator with stereo spread), **DRIFT** (slow analog-style wander of pitch and cutoff), voice mode (Poly / Mono with glide), and **Bend** (pitch-bend range, 0–24 semitones).

Chord plays a shape from one key: Power, Major, Minor, Maj 7, Min 7, Sus 4 — or **Sky**, where the current aspects write the chord (harmonious skies play major, tense skies minor with a seventh, real strain flattens the fifth, and an undecided sky adds a ninth; scrub the wheel and the same key changes harmony). **Strum** spreads the notes up to 250 ms like a guitar. Poly mode only.

DRUMS

The synthesized kit: Mode, Level, Tune, Decay, Tone on top; the full kit designer below — kick **Pitch/Punch/Click**, snare **Body/Snap**, hat **Tone**, and the bus: **Drive** (saturation, anti-aliased), **Crush** (sample-rate + bit reduction), **Wobble** (per-hit random detune/level, like a worn tape machine). The sky also plays the kit — moon fullness adds wobble, aspect tension hardens punch and snap, geomagnetic storms add crush — unless you light the **drm** lock.

SEQUENCER

An 8-lane step grid: seven drum lanes (which sound in *both* engine modes) plus the **SYNTH** lane (in verdigris), which gates the full synth voice.

- **PLAY/STOP** — the internal transport. In a DAW, the host transport also drives the pattern (tempo-locked, loop-aware). Nothing plays on launch.
- **ON** — arms the sequencer (whether the host transport triggers it).
- **A B C D** — four pattern slots. Click to edit; **shift-click** to **append to the chain**. **CHAIN** plays the chained slots in order (the chain readout shows the order; click it to clear). **Steps** sets each slot's length (8–32) — chain different lengths for polymetric structures.
- **Drawing**: click toggles a step; drag horizontally paints; drag vertically on a step to shape its **level** (drum lanes) or its **pitch** (SYNTH lane — snapped to the **Scale** menu, note name shown in the cell; hold **alt** to shape level instead). **Root** transposes the whole lane.
- **⌘-drag** vertically on a drum step: **ratchets** (2–4 sub-hits — rolls; shown as tick marks). **⌘-click** a SYNTH step: **tie** it into the next step (the note holds instead of retriggering — shown as a bridge).
- **Swing** delays every off-beat sixteenth. **Tempo** is used when no host clock is rolling.
- **ORBIT** — generates a pattern from the *current sky*: the Sun picks the kick figure, the Moon the snare placement (ghost notes near full moon), Mercury the hat style (retrograde plays it backwards), Mars in an angular house earns a bar-end tom fill, Saturn writes the bass line in its sign's pentatonic. Replaces the current slot; edit freely after; scrub the sky and press again for a different bar.
- **SAVE/LOAD PTN** — all four slots + chain + settings as a **.astbeat** file, independent of the patch.

MATRIX

The mod matrix: eight slots, each routing a **source** to a **destination** with a bipolar **depth** (negative inverts). Sources: the sky's signals (solar wind, Kp, moon phase, aspects, tides, rain, seismicity and more - this is where the sky becomes YOUR modulation source), two LFOs (sine and sample-and-hold, rates below), and the Pulse. Destinations span the whole instrument: filter, pitch, oscillators, unison, drift, delay, reverb, the drum bus, and the world-mix levels. Try: Kp -> Drum Crush, Tide -> Delay Time, Moon Phase -> Reverb Size, LFO 2 -> Pitch at a whisker of depth. Sky sources still respect the FEEDS chips.

Below the slots: **LFO rates** and the **MPE** depths - on an MPE controller (Seaboard, LinnStrument, Osmose) every note carries its own pitch bend (+-48 semitones), pressure (leans into loudness and opens the filter), and timbre slide (tilts the filter around its centre). Ordinary MIDI keyboards are unaffected; poly aftertouch is honoured as per-note pressure.

WORLD

WORLD settings are independent of factory presets: changing a project, sound, or kit preserves your layer levels, pulse settings, rain mode/character, and auxiliary texture. Muted environmental layers stay muted while browsing. Full saved patches and DAW sessions still restore their saved WORLD settings; INIT explicitly resets all parameters. New instances default to **Noise** rain, while existing saved rain modes are retained.

The world's own voices, mixed by vertical faders: - **PULSE** — the Schumann resonance (7.83 Hz by default) as a slow wobble of filter, pitch, amp, or tone; syncable to the host clock; its depth breathes with live seismicity and tides. - **RAIN** — the radar at your position, audible: a coloured noise wash plus a bank of resonators tuned to the planetary chord (mode: Resonant / Noise / Both). The **RAIN designer** below sets colour, radar tracking, and response curve. - **CONSTELLATION** (SYNTH page) — a second instrument built from the sky's own pairs. Each body the sky has put in a strong relationship sounds with its own identity, and the relationship itself decides what the pair does: a conjunction fuses them, a sextile answers with a struck ninth, a trine holds a sustained fifth, a square crossfades toward their product for metallic sidebands, an opposition separates their registers and trades between them. **On** enables it (off by default, so no existing patch changes). **Blend** crosses from the normal synth to this layer. **Intensity** takes it from clean layered voices to stronger relationship processing. **Hold** freezes the chosen relationships while the rest of the sky goes on moving. It follows the notes you play, never multiplying your voice count.

- **STORM** — thunder, by the physics: each strike is a lightning channel kilometres long whose every segment radiates a shock pulse; you hear them arrive by distance, near ones as the crack, far ones as the roll, with terrain echoes. Strikes happen only while a storm is actually over you (storm energy with cloud or rain), a few a minute at most, closer when the storm is overhead. The fader sets how loud; zero silences it.
- **QUAKE** — the standing rumble of seismic activity near you, plus discrete thumps when quakes strike (arriving with real distance delay).

- **STRIKE** — a lightning strike a random few kilometres off, to hear the thunder without waiting for a storm. The button strikes close enough to be unmistakable; the weather's own strikes keep their real distance and loudness.
- **AUX** — load any local audio file (Voyager plasma waves, whale song, field recordings...) as a looping texture layer; Tone darkens it. Local files only — nothing streams.
- **DEMO** — a narrated tour of every layer, fully offline.

FX

- **DELAY** — stereo, independent L/R times (host-syncable divisions including dotted/triplet), feedback with in-loop tone, mix. The tides breathe the delay times.
- **REVERB** — **Mode: Plate** (a classic Dattorro plate) or **Cavity** (an 8-line FDN parameterized by Earth-ionosphere physics: daytime D-layer absorption darkens and shortens it, night opens it, solar flares slam it, the terminator splits the stereo damping — sunset is an acoustic event). Size, Predelay, Mix. How far that physics follows the sky is governed like every other push: **Influence** scales it, the **rev** lock freezes it, and with the SKY and SUN feeds off it rests as a neutral mid-day cavity. Reverb on the drums is simply the patch's reverb: the FX page's ON, Mode, Size and Mix. Kit-only loads never touch it.
- **Master** gain and **Ceil** — a gentle output safety ceiling; bypass it if you gain-stage yourself.

4. The sky panel

The WORLD page is three plates. **PULSE** is a slow wobble at the Earth's own hum (7.83 Hz): its Rate, whether it syncs to tempo, and what it moves belong to that wobble alone. **WORLD MIX** is one fader per world voice, plus the aux texture and **STRIKE**. **RAIN** has a switch for each of its two layers - a resonant one that rings with the sky's chord, and a noise one that hisses with the radar - so rain can ring, hiss, do both, or neither. Resonance is the loud one and starts off.

In drum mode the keyboard becomes the kit's seven pads, struck harder nearer their top, and a drag across them rolls.

- **SAMPLE NOW** captures the present sky (live data if online, the deterministic model otherwise). **Live** re-samples continuously.
- **Influence** scales how hard the sky pushes on the patch. The small verdigris point outside a dial's scale shows that parameter's *effective* value after sky offsets.
- **The moment and the place** — the date is a row of flip-calendar cards (day, month, year, UTC time); the place is a plate with its name over its coordinates and a compass mark. Click the day, month or year card for a scrolling list (the days follow the month shown; a 31st moved to a shorter month lands on its last day); click the time card to type a UTC moment (`YYYY-MM-DD HH:MM`). Click the place to type any place (city,

country, US state — resolved offline from the embedded atlas; `lat`, `lon` also works). Return applies, Escape cancels. With “Use my location” on, the place is named from the atlas at once and refined online when the Place names feed is enabled.

- **The wheel** — drag to scrub time (⌘ = fast, ⇧ = fine; scroll also works). Drag a planet to move it: the engine finds the date when it truly sits there (⌘ = bend it unnaturally instead). Double-click resets.
- **The Sun** at the heart is NASA’s latest photograph of it (a boiling plasma stands in when offline). The red line across it is the sky’s waveform, the actual shape of the sound. Outside that line a paper veil covers the Sun, and the veil lifts as the instrument sounds: silent, the Sun is muted into the sheet; play, and it burns through. Shape is the sound, brightness is the loudness. Click the core to cycle four styles: pixel plasma under the veil (the default), bare photo, *sounding plasma*, whose flames follow the waveform around the disc and boil faster as you play, and the veiled photograph.
- **FEEDS** — which sources flow: SUN (space weather), SKY (planets, deterministic), WX (weather), EARTH (tides, seismicity, geomagnetics), QUAKE (quake events). **LOCKS** — which destinations the sky may touch (cut, res, env, drift, detune, blend, pw, delay, reverb, drums).
- **Sky presets** — save/load moments (`.astsky` files).

5. The map

Click anywhere to relocate (epicentre clicks relocate *and* rumble). Layers: coastlines, day/night terminator (scrubs with time), global satellite rain, your local radar tiles around you, aurora ovals when Kp is high, earthquake ripples sized by magnitude and recency. The caption reads the radar at your exact position, which is what the RAIN layer hears. ⌘-click strikes a demo quake at that spot.

6. How the sky becomes sound

The **Sky oscillator** is additive: each body owns one harmonic partial, assigned by orbital speed (Neptune the fundamental ... Moon the 16th). Each partial’s **phase is the body’s ecliptic longitude** (retrograde flips it), and its **amplitude** follows prominence × altitude above *your* horizon × house placement × aspect boosts, tilted bright/dark by solar activity. Planetary motion literally morphs the waveform. The stereo image pans each planet by its house.

The **Helio wave** is a different instrument entirely: a physical model of the Sun’s interior. The real Sun rings — convection at its surface drives millions of standing acoustic waves (the “five-minute oscillations” of helioseismology), a comb of resonances around 3 mHz split by the Sun’s rotation. Helio rebuilds that spectrum as ~36 modal resonators with the true frequency ratios, lifetimes, and rotational splitting, transposed so the spectral peak lands on

the note you play, and drives them with granulation noise. Prograde waves pan right, retrograde left — the stereo image is the Sun rotating. The solar cycle (sunspot number, F10.7) sharpens and brightens the comb; an X-ray flare crossing its threshold strikes the cavity the way real flares excite sunquakes. Velocity is how hard the convection boils. Try the “Sunquake” preset.

On top, the mapping layer adds bounded offsets — solar wind opens the filter, Kp deepens drift, aspects detune, clouds darken — all scaled by Influence, gated by FEEDS, blocked by LOCKS. With every feed off, Astrarium is a conventional professional synth; the sky is always additive, never load-bearing.

7. Keyboard, MIDI, tuning

Full MIDI note/velocity/pitch-bend (range set by **Bend**). **MPE is supported**: per-note bend, pressure, and timbre (see MATRIX page for the depths). Microtuning via **MTS-ESP**: if a master (Oddsound etc.) is running, every note retunes live. ⌘Z / ⇧⌘Z undo and redo parameter and pattern edits.

8. The network, honestly

Astrarium’s entire network surface is the list in the **NET** panel — a handful of keyless public data feeds (NOAA space weather, Open-Meteo weather, USGS quakes, NASA sun photo and rain imagery, RainViewer radar, reverse geocoding). Each has an off switch; requests to any other host are refused inside the app; there is no telemetry, no account, no update ping. Offline, everything falls back to deterministic models — the instrument is fully functional with the cable unplugged.

9. Demo and licensing

Unlicensed, Astrarium runs in demo mode: the sound gently fades out for a few seconds every three minutes, and patch saving is disabled. Everything else works. To unlock, click the **DEMO** badge and choose your `.astkey` license file — verified locally, no activation server, works offline forever. The badge turns green (**LICENSED**).

10. Shortcuts

Gesture	Where	Action
A W S E D... / Z X	anywhere	play notes / shift octave

Gesture	Where	Action
space	anywhere	play / stop the sequencer
⌘Z / ⌘⇧Z	anywhere	undo / redo
drag	sky wheel	scrub time (⌘ fast, ⌘⇧ fine)
drag planet	sky wheel	seek its date (⌘ = bend)
double-click	sky wheel	reset offsets
click / drag	map	relocate
click	date cards / place plate	type a moment or a place
⌘-click	map	demo quake
click / h-drag / v-drag	sequencer grid	toggle / paint / level-or-pitch
⌘-v-drag	SYNTH lane	level
⌘-v-drag	drum step	ratchet 1–4
⌘-click	SYNTH step	tie
shift-click	slot A–D	append to chain

11. Troubleshooting

- **No sound in the standalone:** Options → Audio/MIDI Settings — check the output device (it does not follow the system default automatically).
- **Sequencer silent:** it needs a transport — press PLAY, or roll your DAW’s transport with ON lit.
- **“offline” in the status line:** no network or feeds disabled — the deterministic model is in use; everything still works.
- **Plugin missing in the DAW:** rescan plugins; Logic/GarageBand validate new Audio Units on first launch.
- **My location’s name is wrong:** offline naming uses the nearest city in the embedded atlas; with the geocoding feed enabled you get street-level names.

Astrarium is a Suncost product. Feedback: astrarium@suncostlabs.com

Current location on macOS

In the standalone Mac app, enable **Use my location** beneath the place field and press **SAMPLE NOW**. Allow Astrarium in the macOS location prompt. Each press requests one fresh location and samples the sky and weather there; it does not start continuous location tracking. The option is on every time the app starts and stays on until you turn it off: choosing a place by hand, loading a patch or taking the tour moves the sky there, but SAMPLE NOW still asks the Mac where you are. Turn it off to sample the place you chose. Failed or denied requests leave the previous place intact.

The AU and VST3 use manual place selection, since they run inside the host app. You can also save a sky in the standalone app and load that sky in the plug-in. If access is denied, enable Astrarium under System Settings > Privacy & Security > Location Services, or continue using manual place selection.