

The Jet Stream: The River That Runs the Weather

By the rock. August 16, 2026. Grounded in National Weather Service definitions.

The short version

The jet stream is a narrow, wandering river of fast wind near the top of the troposphere, roughly five to nine miles up, flowing generally west to east. It forms along the boundary where cold polar air meets warm air from the south, and the sharper that temperature contrast, the faster it blows: NOAA puts typical core winds at 80 to 140 mph, with more than 275 mph possible. Storms ride along it like traffic on a highway, so its bends decide who gets a stormy week and who gets a quiet one. A northward bulge is a ridge, and usually quiet; a southward dip is a trough, and usually not.

A river with no banks

Take the air about five to nine miles up, near the tropopause, and it is not drifting. It is organized into narrow bands of wind moving at highway multiples: NOAA gives 80 to 140 mph as the usual range for jet stream winds, with peaks beyond 275 mph in the strongest winter jets. The bands are thousands of miles long, a few hundred miles wide, and only a mile or two deep. A river is the right picture, complete with meanders, except the banks are made of nothing but temperature difference.

Where it comes from

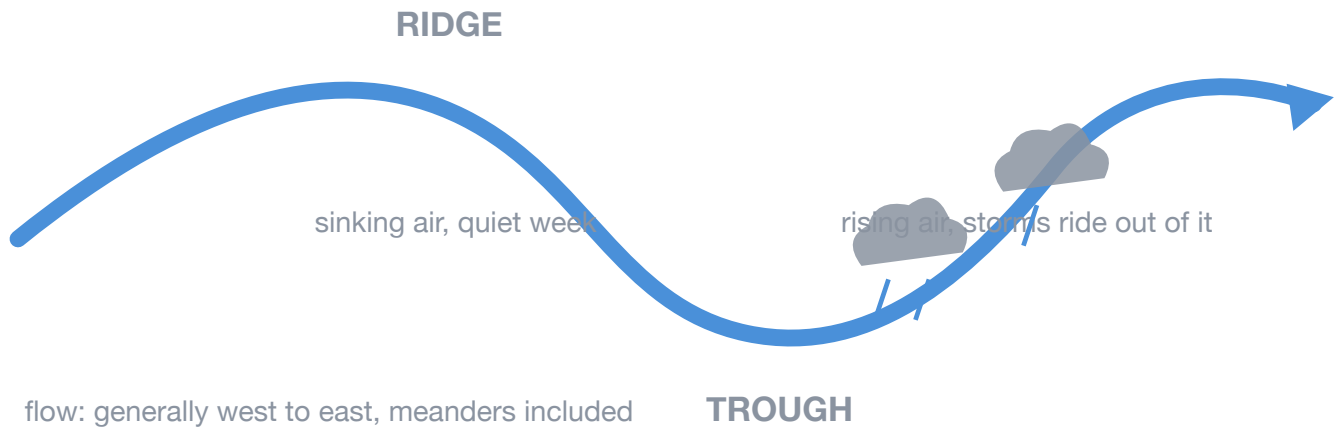
A jet stream forms along the boundary between air masses with a serious temperature contrast, which is why the main one, the polar jet, lives along the line where cold polar air meets warmer air from the south. The bigger the temperature gap across that line, the harder the upper level winds blow along it. A second, weaker one, the subtropical jet, runs at lower latitudes.

That origin story explains the seasons of the jet itself. In winter the pole is dark and frigid while the tropics barely change, so the contrast is enormous and the jet is at its fastest, diving far south into the United States. In summer the contrast slackens and the jet weakens and retreats north toward Canada, taking its parade of storms with it. Why the flow ends up west to east at all is the same spinning-Earth bookkeeping that bends every long-distance wind, covered in [why the wind blows](#).

Troughs, ridges, and your week

The jet rarely runs straight. It meanders in slow waves, and the waves have names worth knowing, because each one is a weather regime you can feel from the ground.

- **A ridge** is a northward bulge. Beneath and downstream of it, air tends to sink, and sinking air means fair skies that can persist for days. Summer heat waves are usually a ridge that stopped moving.
- **A trough** is a southward dip. It swings cold air south, and the region ahead of it, the eastern side, favors rising air, which is the raw material of storms. Winter cold outbreaks are a trough doing exactly what troughs do.



The river meanders, and the meanders are the forecast. Quiet weather pools under the northward bulges; storm systems spin up in the southward dips and ride downstream.

Surface storm systems do not just sit under this river; they are steered by it and fed by it, growing on the rising-air side of a trough and getting carried along at the pace of the flow, generally west to east. This is the machinery behind a pattern every observer eventually notices and this site keeps a whole lesson about: in the middle latitudes, tomorrow's weather usually lives to your west today.

Fast planes and rough rides

The jet stream was a flight discovery as much as a science one, and aviation still budgets around it daily. Fly inside the river heading east and the tailwind hands you free speed, which is why the eastbound leg of a cross country round trip is routinely shorter than the westbound leg on the very same route. Fly along its flanks and you find its other signature: the edges of the jet, where fast air shears past slow air, are a common address for clear air turbulence, the kind that arrives without a cloud in sight.

What the rock watches

You cannot see the jet stream from a lawn. But you can read its position in a week of weather: storm after storm arriving on the same track means you live under the river just now; a long stretch of unbudging heat means a ridge has parked on you; a sudden cold snap out of season means a trough dug deeper than usual. The rock has never been five miles up and does not intend to start, but it has noticed that its busiest weeks and the river's southern detours are the same weeks. It checked twice.

Check your understanding

1. What is the jet stream?

- ☐ A. A narrow band of fast wind near the top of the troposphere
- ☐ B. A steady wind at the surface
- ☐ C. A single storm system that circles the globe

2. What creates a jet stream?

- ☐ A. Ocean currents dragging the air above them
- ☐ B. A strong temperature contrast between air masses, like polar air meeting warmer air
- ☐ C. The pull of the moon

3. In summer, the polar jet usually:

- ☐ A. Speeds up and dives south
- ☐ B. Weakens and retreats north
- ☐ C. Disappears entirely

4. A ridge has parked over your region in July. Expect:

- ☐ A. A parade of storms
- ☐ B. Days of sinking air, fair skies, and building heat
- ☐ C. An early frost

5. Why is an eastbound flight often faster than the same route westbound?

- ☐ A. Airlines schedule it that way
- ☐ B. Eastbound planes ride the jet stream's tailwind; westbound planes fight it
- ☐ C. The Earth rotates under the plane

Answer key

1. What is the jet stream?

A. A narrow band of fast wind near the top of the troposphere — It is a river of strong wind near the tropopause, roughly five to nine miles up, thousands of miles long but only a mile or two deep, flowing generally west to east.

2. What creates a jet stream?

B. A strong temperature contrast between air masses, like polar air meeting warmer air — Jets form along boundaries between contrasting air masses. The sharper the temperature gap, the faster the upper winds along it, which is why the jet peaks in winter.

3. In summer, the polar jet usually:

B. Weakens and retreats north — Summer shrinks the pole-to-tropics contrast, so the jet weakens and migrates toward Canada, taking the main storm track with it.

4. A ridge has parked over your region in July. Expect:

B. Days of sinking air, fair skies, and building heat — A ridge is a northward bulge with sinking air beneath it. When one stalls in summer, the result is the classic persistent heat wave.

5. Why is an eastbound flight often faster than the same route westbound?

B. Eastbound planes ride the jet stream's tailwind; westbound planes fight it — The jet flows generally west to east at speeds NOAA puts at 80 to 140 mph. Riding it is free speed; opposing it is a headwind for the whole leg.

Questions people actually ask

How fast is the jet stream?

NOAA gives 80 to 140 mph as the typical range for jet stream winds, and notes they can exceed 275 mph in the strongest cases. Winter jets run faster than summer ones because the temperature contrast driving them is sharper.

How high up is the jet stream?

Near the top of the troposphere, roughly five to nine miles above the surface, which is also the altitude band where airliners cruise. That shared address is why flights care so much about where the river is running.

Why does the jet stream matter for my weather?

It steers surface storm systems and separates cold air from warm. Its dips, called troughs, favor storms and cold outbreaks; its bulges, called ridges, favor quiet spells and heat. Where the meanders set up decides which regime your week gets.

Is there more than one jet stream?

Yes. Each hemisphere has a polar jet, the main storm-steering one, and a weaker subtropical jet at lower latitudes. Their positions and strength shift with the seasons.

Can the jet stream cause turbulence?

Its edges can. Where the jet's fast core shears past slower air, aircraft can hit clear air turbulence, bumpy air with no cloud attached. Pilots plan around the jet's flanks for exactly that reason.

Is the jet stream the same as the wind outside my window?

No. The wind you feel is surface air answering local pressure differences, dragged on by every tree and building. The jet is a separate river miles overhead. They are related the way a highway relates to your driveway: connected, and not remotely the same speed.

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