

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Air Quality Dispersion Model MCP

Predict how industrial pollutants move through the atmosphere.

Air Quality Dispersion Model MCP uses Gaussian plume logic to model how pollutants travel from industrial sources. Your AI client can calculate ground-level concentrations, find the point of maximum impact, and account for terrain or building downwash to ensure your emissions stay within regulatory limits.

A+ Quality Score 100/100

pollution

dispersion

modeling

emissions

meteorology



The connectivity layer between AI and the world's software.



Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Air Quality Dispersion Model MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to run complex atmospheric dispersion models directly through your AI client. Instead of manually calculating plume behavior, you give your agent the emission rates, stack parameters, and meteorological data, and it handles the Gaussian plume math for you. It's built for industrial environments like oil and gas facilities where you need to know exactly how pollutants will behave in the real world.

You can account for physical obstructions by checking how nearby structures disrupt the plume or by adjusting for hills and valleys in the local terrain. This makes it a practical tool for assessing environmental risk and ensuring your facility meets ambient air quality standards. Whether you are looking for the peak concentration point or checking if a specific coordinate is at risk, your agent can provide specific, data-driven answers in seconds.

Core Capabilities

01 — Gaussian Plume Modeling

Your agent uses Gaussian logic to calculate how pollutants spread from a source.

02 — Terrain Adjustment

The AI modifies predictions based on local topography like hills or valleys.

03 — Building Downwash Assessment

Your agent calculates how structures near a stack affect plume dispersion.

04 — Impact Localization

The AI identifies the specific distance and direction of maximum pollutant concentration.

05 — Coordinate-Based Analysis

You can ask for concentrations at any specific latitude and longitude.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/air-quality-dispersion-model — connect your AI agent in three steps.

- 01 Connect your AI client to the Air Quality Dispersion Model MCP via Vinkius.
- 02 Provide your agent with emission rates, stack height, and weather data.
- 03 The agent runs the Gaussian plume math through the MCP tools.
- 04 Receive specific concentration levels, impact distances, or risk assessments.

Connect your AI client to the Vinkius-hosted MCP to start modeling immediately.

Built For

This MCP is designed for professionals managing industrial emissions and environmental compliance.

Environmental Engineers

They hand off complex dispersion math to the AI to verify compliance with air quality standards.

EHS Specialists

They use the tool to assess site-specific risks from industrial stacks and structures.

Regulatory Consultants

They use the modeling data to prepare impact reports for industrial facilities.

What Changes When You Connect

- 01 Replaces manual Gaussian plume calculations with direct AI queries.
- 02 Accounts for physical site variables like building downwash and terrain.

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- | | |
|-----------|--|
| 03 | Provides specific geographic coordinates for maximum pollutant impact. |
| <hr/> | |
| 04 | Integrates directly into your existing AI-driven technical workflow. |
| <hr/> | |
-

Real-World Applications

Regulatory Compliance

Check if predicted emissions at specific coordinates stay within legal limits.

Facility Planning

Model how new stacks or buildings will change the local air quality profile.

Risk Assessment

Determine the distance of maximum impact to set safety perimeters around a source.

Terrain Modeling

Adjust dispersion models to account for complex local topography like valleys.

Patterns to Avoid

Vague environmental queries

❌ AVOID

Asking your agent to tell you if the air is clean near the factory.

✓ INSTEAD

Ask for specific concentrations at a coordinate using ``calculate_ground_concentration`` to get a data-driven answer.

Ignoring physical site layout

❌ AVOID

Running a standard plume model without considering how the local hills or nearby buildings affect the wind.

✓ INSTEAD

Use ``analyze_terrain_effects`` or ``evaluate_downwash_risk`` to factor in topography and structures before finalizing your results.

Missing the peak impact zone

❌ AVOID

Assuming the highest pollutant concentration is right at the stack base.

✓ INSTEAD

Run `estimate\_maximum\_impact` to find the actual distance and direction where concentrations hit their highest point.

The Right Fit

Environmental engineers and EHS specialists managing industrial sites should connect this MCP. If you are just looking for general weather trends or non-industrial air quality data, this isn't for you. You need this if your work requires calculating specific pollutant behavior near stacks and structures.



Air Quality Dispersion Model 4 Tools

These tools handle the heavy lifting for atmospheric modeling, from terrain adjustments to pinpointing peak pollutant concentrations.

#	TOOL	DESCRIPTION
01	analyze_terrain_effects	This tool adjusts dispersion predictions to account for hills or valleys in the area.
02	calculate_ground_concentration	Use this to find the specific concentration of a pollutant at a given geographic coordinate.
03	estimate_maximum_impact	This tool identifies the exact location and distance where pollutant concentration hits its peak.
04	evaluate_downwash_risk	This tool checks if nearby buildings will pull the plume downward and increase ground-level concentrations.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U What is the pollutant concentration at latitude 34.05 and longitude -118.24 if the emission rate is 50 g/s, stack height is 50m, wind speed is 3 m/s, and stability class is D?



The predicted ground-level concentration at the specified coordinates is 12.5 $\mu\text{g}/\text{m}^3$.

U Where will the maximum pollutant impact occur for an emission rate of 100 g/s, 60m stack, 5 m/s wind, and 400K stack temperature?



The maximum concentration will occur at a distance of 1,250 meters from the source in a direction of 180 degrees.

U Is there a downwash risk if a 50m stack is near a 40m wide building with a height of 30m and wind speed of 4 m/s?



The risk level is moderate, with an expected concentration multiplier of 1.4 due to building downwash.

Frequently Asked Questions

01 What kind of math does this MCP use for dispersion?

The MCP uses Gaussian plume logic to calculate how pollutants disperse and reach ground-level concentrations.

02 Can I account for buildings near my emission source?

Yes, you can use the `evaluate_downwash_risk` tool to see how nearby structures disrupt the plume.

03 How do I handle hilly or mountainous terrain?

You can use the `analyze_terrain_effects` tool to adjust your predictions based on hills or valleys.

04 Which AI clients can I use with this MCP?

You can connect this MCP to any compatible client like Claude, Cursor, Windsurf, or VS Code.

05 Can I find the exact location of highest pollution?

Yes, the `estimate_maximum_impact` tool identifies the point of highest concentration and its distance from the source.

06 How do I calculate the concentration at a specific location?

You can use the `calculate_ground_concentration` tool by providing the emission rate, stack height, wind speed, target coordinates, and atmospheric stability class.

07 Can this model account for nearby buildings?

Yes, the `evaluate_downwash_risk` tool assesses how nearby structures disrupt the plume and increase ground-level concentrations.

08 Does it work for hilly or mountainous areas?

Yes, you can use `analyze_terrain_effects` to adjust your dispersion predictions based on elevation changes and complex terrain.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"air-quality-dispersion-model": { "url": "..."} </code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  Ask ChatGPT 
-  Ask Claude 
-  Ask Perplexity 
-  Ask Gemini 
-  Ask Grok 

READY TO CONNECT

Air Quality Dispersion Model is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

Generated	September 2026
MCP Server	Air Quality Dispersion Model MCP
Server ID	01a09154-fb68-702d-af79-57a221d072ee
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

LICENSE & USAGE

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