Quant Atlas

PulseAtlas Use Cases

Institutional Workflows for Forward Volatility Intelligence

Quant Atlas

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Abstract

This paper presents concrete institutional workflows for PulseAtlas, the Quant Atlas systematic volatility forecasting dataset. PulseAtlas is framed around its target users, forward volatility decision workflows, integration patterns, and operational outcomes. The objective is to show how the dataset can be consumed by risk teams, volatility desks, execution teams, systematic researchers, multi-asset portfolio managers, and institutional data buyers without forcing a change in their existing investment process.

1 Executive Overview

PulseAtlas quantifies whether Average True Range is more likely to expand or contract over a selected forward horizon. It converts structured price behavior and multi-scale volatility features into timestamped forecasts containing direction, expected magnitude, an 80% prediction band, conviction tier, forecast horizon, and realized outcome tracking.

The dataset is designed as a forward volatility intelligence layer rather than a price-direction forecast. It can support risk sizing, options workflows, execution planning, volatility targeting, portfolio construction, regime analysis, and feature engineering for internal research models. Its institutional value comes from supplementing trailing realized volatility with a systematic estimate of future ATR pressure.

The default production delivery method is R2 object storage. S3, API, SFTP, email, workbook delivery, and other agreed delivery methods remain available according to the client's infrastructure and workflow requirements.

2 PulseAtlas Use Cases

> **Product summary.** PulseAtlas is a systematic volatility forecast dataset designed to quantify Average True Range expansion and contraction pressure across global assets. It converts structured price behavior and multi-scale volatility features into timestamped volatility forecasts with forecast direction, magnitude, prediction band, conviction tier, horizon, and realized outcome tracking.

2.1 Target Users

- Risk teams managing forward volatility exposure, VaR sensitivity, and position-sizing frameworks.
- Options and volatility desks requiring a systematic view on ATR expansion or contraction pressure.
- Execution desks seeking forward volatility context before routing or staging larger orders.
- Systematic research teams adding volatility forecast features to internal model libraries.
- Multi-asset portfolio managers ranking instruments by expected volatility regime and conviction.
- Institutional data buyers evaluating timestamped volatility signals for risk, execution, research, and options workflows.

2.2 What PulseAtlas Measures

PulseAtlas forecasts whether volatility, represented by Average True Range, is more likely to expand or contract over the selected horizon. Each observation is timestamped and linked to the instrument, forecast horizon, forecast direction, expected ATR change, an 80% prediction band, conviction tier, and realized outcome tracking fields.

The methodology is based on observed price behavior rather than options market data, broker flow, order flow, or survey-based sentiment. Its feature structure can incorporate:

- Multi-scale volatility and ATR dynamics.
- Range behavior and compression patterns.
- Volatility of volatility and ATR term structure.
- Return shape and recent distributional behavior.
- Trend context and directional efficiency.
- Cross-horizon persistence and transition features.

PulseAtlas is not intended to forecast price direction. Its purpose is to identify forward volatility conditions that can influence risk sizing, stop distance, options exposure, execution urgency, and portfolio construction.

2.3 Signal Interpretation and Boundaries

An expansion forecast indicates that forward ATR is expected to rise relative to its current state. A contraction forecast indicates that forward ATR is expected to decline. Forecast magnitude describes the expected size of that change, while the prediction band frames uncertainty around the point estimate.

Conviction is used to distinguish the largest absolute forecast magnitudes from the broader forecast population. High conviction identifies the top decile of absolute forecast magnitude by asset. The field is intended as an analytical and risk-prioritization layer rather than a guarantee of forecast realization.

The dataset is most naturally consumed as a feature, overlay, monitoring input, or portfolio risk layer. Its forecast should be combined with the consuming firm's own directional, options, liquidity, execution, and exposure framework.

2.4 Use Case 1: Multi-Horizon Volatility Feature

A systematic research team adds PulseAtlas to the firm's feature library as a forward volatility input. The signal is used to test whether expected ATR expansion or contraction improves risk models, strategy conditioning, or options workflow decisions.

Workflow.

1. The research team ingests historical PulseAtlas forecasts across the selected universe.
2. Forecast direction, magnitude, horizon, prediction band, and conviction tier are added to the internal feature library.
3. Candidate strategies are evaluated inside expansion, contraction, high-conviction, and normal-conviction states.
4. The team measures whether internal model performance changes when conditioned on forecast volatility pressure.
5. Features that improve risk forecasting, execution planning, options timing, or conditional stability are retained in the production research pipeline.

Operational outcome. PulseAtlas becomes a reusable volatility feature set for multi-horizon research. The firm can test whether forward ATR pressure improves existing models without treating the dataset as a standalone trading strategy.

2.5 Use Case 2: Volatility and Sizing Overlay

A portfolio manager or risk team uses PulseAtlas as a sizing overlay before adjusting exposure. The objective is to avoid increasing position size ahead of expected volatility expansion unless the position is intentionally structured for higher volatility.

Workflow.

1. The desk receives the latest PulseAtlas forecast for each held or monitored instrument.
2. Existing positions are checked against forecast direction, magnitude, conviction tier, prediction band, and horizon.
3. A high-conviction expansion forecast can prompt lower exposure, wider risk bands, revised stops, increased hedging, or closer monitoring.
4. A contraction forecast can support review of tighter sizing assumptions, passive execution, or options premium-sale workflows, subject to the firm's broader process.
5. Realized outcome fields are reviewed to compare forecast volatility pressure with actual ATR behavior.

Operational outcome. The workflow gives the desk a forward volatility reference before changing position size, risk limits, stop distance, or options exposure.

2.6 Use Case 3: Portfolio Risk Construction

A multi-asset portfolio team uses PulseAtlas to rank instruments by expected volatility regime and conviction. The objective is to build a risk allocation process that accounts for expected ATR movement rather than relying only on trailing realized volatility.

Workflow.

1. PulseAtlas forecasts are ingested across the portfolio universe.
2. Instruments are ranked by forecast ATR expansion magnitude, contraction magnitude, conviction tier, and forecast uncertainty.
3. Assets with high-conviction expansion forecasts are flagged for lower exposure, higher margin awareness, wider stops, or closer risk review.
4. Assets with contraction forecasts are reviewed as candidates for lower expected volatility allocations, subject to liquidity, concentration, and investment constraints.
5. Portfolio risk is recalibrated using both current realized volatility and forecast volatility pressure.

Operational outcome. The portfolio team receives a systematic forward volatility layer that can support position sizing, concentration control, and cross-asset risk ranking.

2.7 Use Case 4: Regime and Holding-Period Analysis

A strategy may perform differently when volatility is expected to expand rather than contract. PulseAtlas can be used to segment strategy performance by forecast volatility state, conviction tier, and holding horizon.

Workflow.

1. The client maps historical trades or strategy signals against contemporaneous PulseAtlas states.
2. Performance is segmented by expansion forecasts, contraction forecasts, high-conviction forecasts, normal-conviction forecasts, and holding horizon.
3. The client evaluates whether execution models, options strategies, or directional strategies perform differently

in specific volatility states.
4. Signal decay, entry-delay sensitivity, and horizon robustness are assessed inside each state.
5. Production rules are adjusted where the client's own models show persistent conditional improvement or deterioration.

Operational outcome. PulseAtlas provides a forward volatility regime lens for strategy evaluation, allowing clients to understand when internal models benefit from or suffer under expected ATR expansion or contraction.

2.8 Use Case 5: Options and Execution Workflow Support

Options and execution teams use PulseAtlas as a forward ATR reference. The dataset helps identify when volatility may expand enough to affect option premium behavior, stop placement, order urgency, and execution schedules.

Workflow.

1. The desk reviews PulseAtlas forecasts before executing option trades or large underlying orders.
2. High-conviction expansion forecasts can support closer review of long-volatility exposure, gamma demand, wider execution bands, or increased urgency.
3. Contraction forecasts can support lower-urgency execution windows, premium-sale review, or tighter expected-range assumptions.
4. Prediction-band fields frame uncertainty around the forecast magnitude and help prevent false precision in downstream decisions.
5. Realized outcome fields are used in post-trade review to compare forecast ATR pressure with actual volatility behavior.

Operational outcome. The desk receives a structured volatility forecast feed that can support options timing, execution scheduling, ATR stop calibration, and post-trade risk review.

2.9 Validation Framework

PulseAtlas is evaluated as a volatility forecasting dataset. The principal question is whether forecast ATR expansion or contraction improves on a naive random-walk assumption that ATR remains unchanged.

The validation framework can include:

- **R-squared versus random walk:** whether the model improves on assuming no future ATR change.
- **Directional accuracy:** the percentage of forecasts correctly identifying expansion or contraction.
- **AUC:** ranking quality for separating future expansion from future contraction states.
- **Prediction interval calibration:** empirical coverage of the 80% prediction band.
- **Conviction lift:** whether high-conviction forecasts perform better than the broader forecast population.
- **Per-asset stability:** whether results are concentrated in one instrument or distributed across the covered universe.
- **Horizon robustness:** whether forecast quality remains useful across different holding periods.
- **Execution-delay robustness:** whether the forecast remains informative when acted on after a delay.
- **Chronological stability:** whether performance remains consistent across time rather than depending on a narrow sample.

PulseAtlas beat its stated benchmarks and passed all stress tests included in the supplied evaluation framework.

2.10 Universe and Coverage

PulseAtlas is designed for global asset coverage, subject to source availability, data quality, and client requirements. Coverage can include:

- Public equities and exchange-traded funds.
- Equity and macro indices.
- Foreign exchange instruments.
- Commodities and commodity-linked instruments.
- Cryptocurrency assets.
- Selected rates and fixed-income proxies where sufficient OHLC history is available.

The dataset can be configured around a focused instrument list, asset-class package, regional universe, or broader multi-asset coverage. Forecasts are timestamped and delivered at the agreed cadence for each selected universe.

2.11 Integration Patterns

- **Cadence:** Regular timestamped delivery, typically daily for end-of-day workflows, with configurable horizons depending on the client universe.
- **Default delivery:** R2 object storage for regular production files.
- **Alternative delivery:** S3, API, SFTP, email, workbook, and other agreed methods are available according to

the client workflow.

- **Core fields:** Timestamp, asset, forecast direction, forecast ATR change, prediction band, conviction tier, horizon, and realized outcome tracking.
- **Conviction structure:** High conviction identifies the top decile of absolute forecast magnitude by asset.
- **Research outputs:** Benchmark comparison, conviction analysis, calibration, per-asset verdicts, horizon tests, entry-delay tests, stability analysis, and forecast-driver analysis.
- **Universe customization:** Coverage can be configured by instrument list, asset class, region, cadence, and identifier-mapping requirements.

2.12 Why PulseAtlas

- Focuses specifically on volatility expansion and contraction rather than price direction.
- Converts ATR pressure into structured, timestamped, ticker-mapped forecasts.
- Includes forecast magnitude, prediction band, conviction tier, horizon, and realized outcome tracking.
- Supports risk management, options workflows, execution planning, volatility targeting, and portfolio construction.
- Uses conviction labeling to distinguish high-magnitude forecasts from the broader forecast population.
- Provides validation against a random-walk volatility baseline rather than relying only on raw directional accuracy.
- Beat its stated benchmarks and passed all stress tests included in the supplied evaluation framework.
- Can be consumed as a feature, overlay, risk input, or dashboard feed without requiring clients to trade it directly.

3 Conclusion

PulseAtlas is designed to fit into institutional workflows without requiring risk teams, portfolio managers, volatility desks, execution functions, or systematic researchers to abandon their existing models or discretionary processes. It can be consumed as a volatility feature set, sizing overlay, options workflow input, execution-planning feed, forward regime indicator, or portfolio risk construction layer.

Its role is narrowly defined: to quantify expected ATR expansion and contraction through a structured, timestamped, and auditable framework. Forecast direction, magnitude, uncertainty, conviction, horizon, and realized outcomes can be logged and evaluated against the consuming firm's own process from research through production use.

This document is intended for institutional product evaluation and research workflow discussion. It does not constitute investment advice or a recommendation to trade any financial instrument.