STL Decomposition Report - 西条

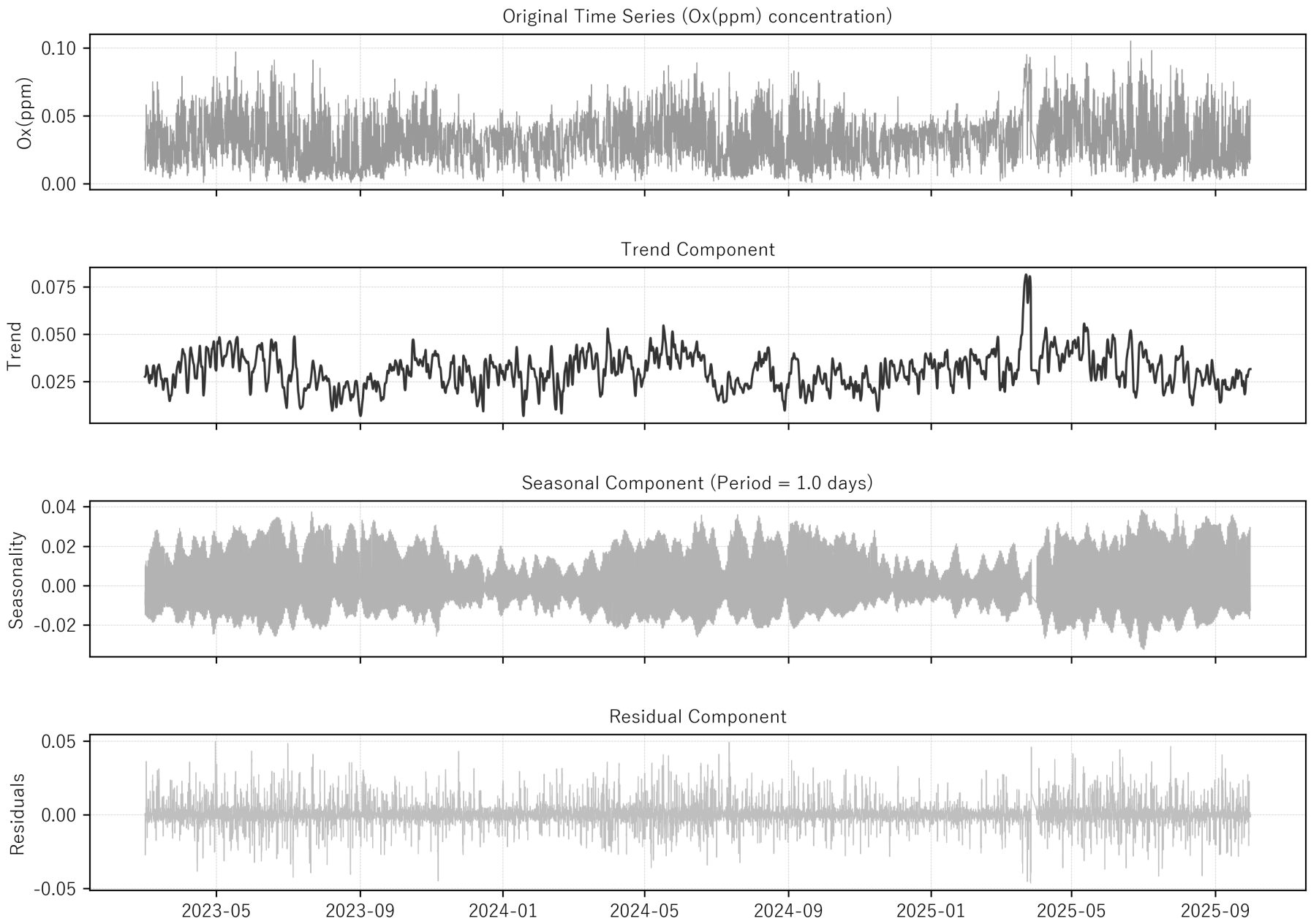
$$X_t = T_t + S_t + R_t$$

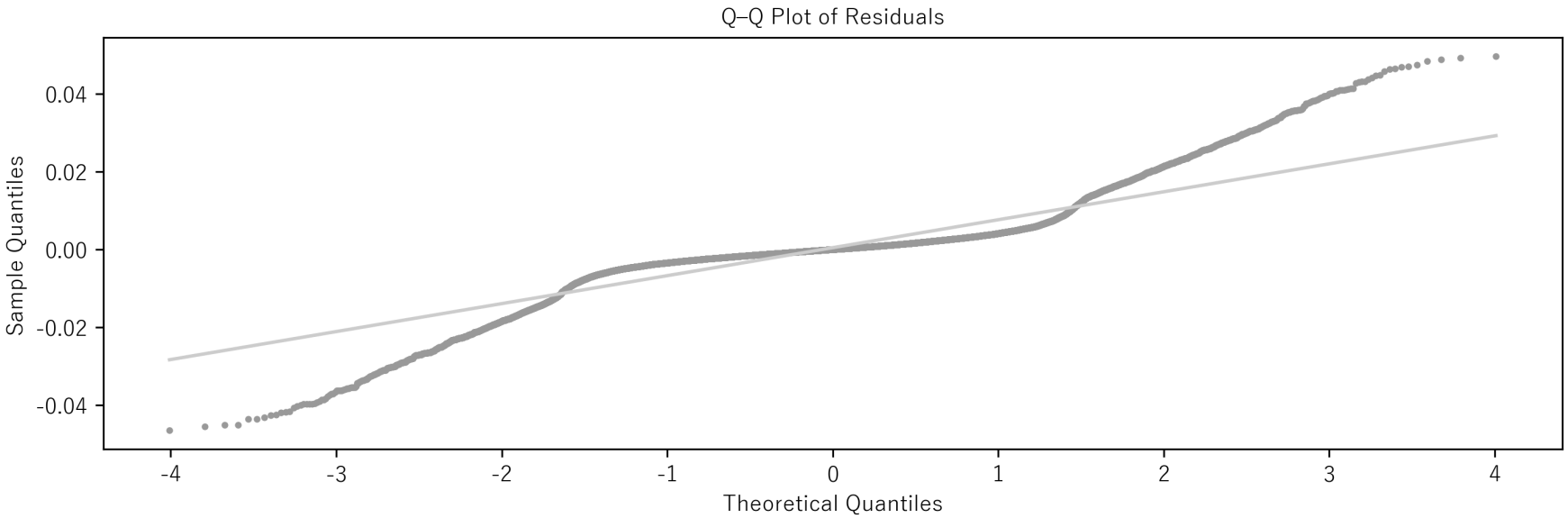
X_t: observed value of the time series at time t
T_t: trend component (long-term progression of the series)
S_t: seasonal component (repeating short-term pattern)
R_t: residual component (random noise or irregular fluctuations)

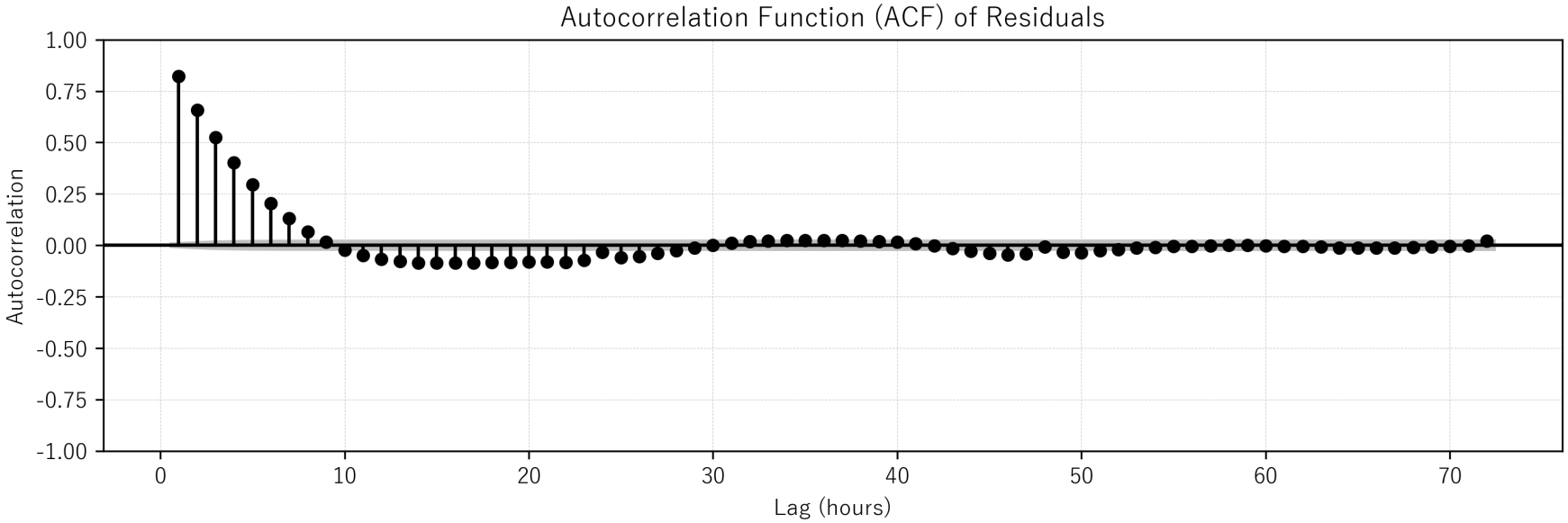
In the additive model, the series is assumed to be the sum of these components.
For multiplicative models, the relationship becomes $X_t = T_t \times S_t \times R_t$.

The seasonal decomposition separates the time series into four components:
1. **Original series** — the observed Ox concentration over time.
2. **Trend component** — shows the long-term direction of variation.
3. **Seasonal component** — highlights repeating periodic patterns, such as daily or monthly cycles.
4. **Residual component** — contains random fluctuations not explained by the trend or seasonality.
By examining these components, we can better understand whether variations in measurement levels are due to systematic seasonal patterns, long-term environmental changes, or random noise.

Prefecture code	38
Station code	38206050
Station name	西条
Model type	Additive decomposition
Period	1.0 days (24 hours)
Data points	22526
Start date	2023-03-01 01:00:00
End date	2025-10-01 00:00:00


Original Time Series (Ox(ppm) concentration)
Ox(ppm)
0.10
0.05
0.00
Trend Component
Trend
0.075
0.050
0.025
Seasonal Component (Period = 1.0 days)
Seasonality
0.04
0.02
0.00
-0.02
Residual Component
Residuals
0.05
0.00
-0.05
2023-05
2023-09
2024-01
2024-05
2024-09
2025-01
2025-05
2025-09


Q–Q Plot of Residuals
Sample Quantiles
0.04
0.02
0.00
-0.02
-0.04
-4
-3
-2
-1
0
1
2
3
4
Theoretical Quantiles


Autocorrelation Function (ACF) of Residuals
Autocorrelation
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
0
10
20
30
40
50
60
70
Lag (hours)