ARIMA parameter selection Report - 西条

ARIMA(p, d, q) :

$$(1 - \sum_{i=1}^{p} \phi_i L^i)(1 - L)^d y_t = c + (1 + \sum_{i=1}^{q} \theta_i L^i)\varepsilon_t$$

$$\hat{y}_t = c + \sum_{i=1}^{p} \phi_i y_{t-i} + \sum_{j=1}^{q} \theta_j \varepsilon_{t-j}$$

y_t: observed value at time t

$\hat{y}_t$: predicted (fitted) value at time t

ϕ_i: autoregressive (AR) coefficients, capturing dependence on past values

θ_j: moving average (MA) coefficients, capturing dependence on past errors

d: differencing order for stationarity (number of times data are differenced)

L: lag operator ($Ly_t = y_{t-1}$)

ε_t: white noise (random shock) at time t

c: constant or drift term

Model objective = minimize residual variance σ_ε^2 to fit observed series.

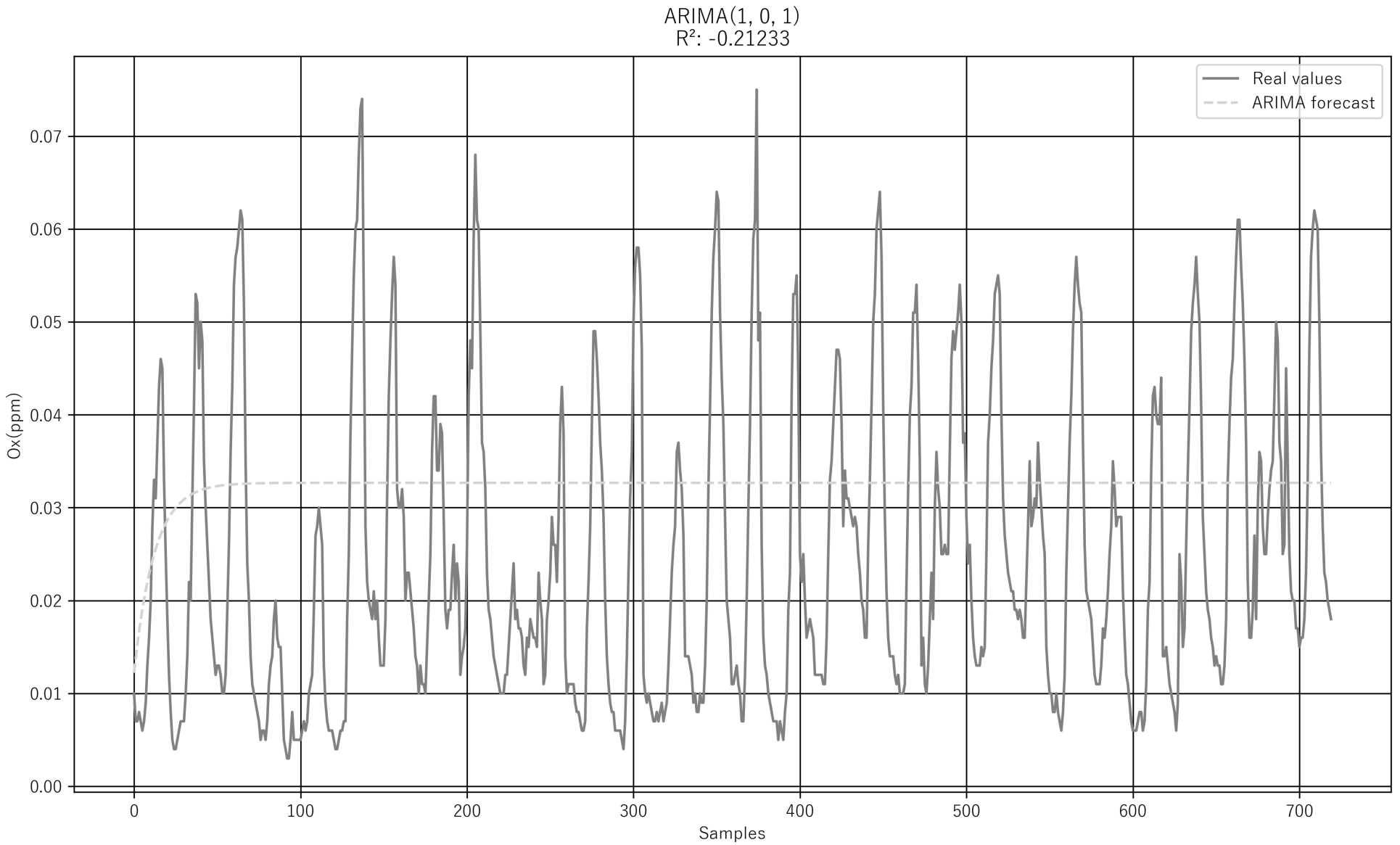
Prefecture code	38
Station code	38206050
Station name	西条
Target item	Ox(ppm)
Number of training samples	8760
Number of testing samples	720
Model	ARIMA
ARIMA order	(1, 0, 1)
Parameter Grid (tested) p	[0, 1, 2]
Parameter Grid (tested) d	[0, 1, 2]
Parameter Grid (tested) q	[1, 2, 3]
Best Parameters (found)	p=1, d=0, q=1
Predictions mean	0.03231042252207946
Predictions std	0.0019354250868405425
Real mean	0.02472777777777778
Real std	0.016101356242239538
Ljung-Box residuals autocorrelation, Prob(Q)	7.316784858687175e-138
Residuals skew	0.8080506945569366
Residuals kurtosis	2.688304328532534

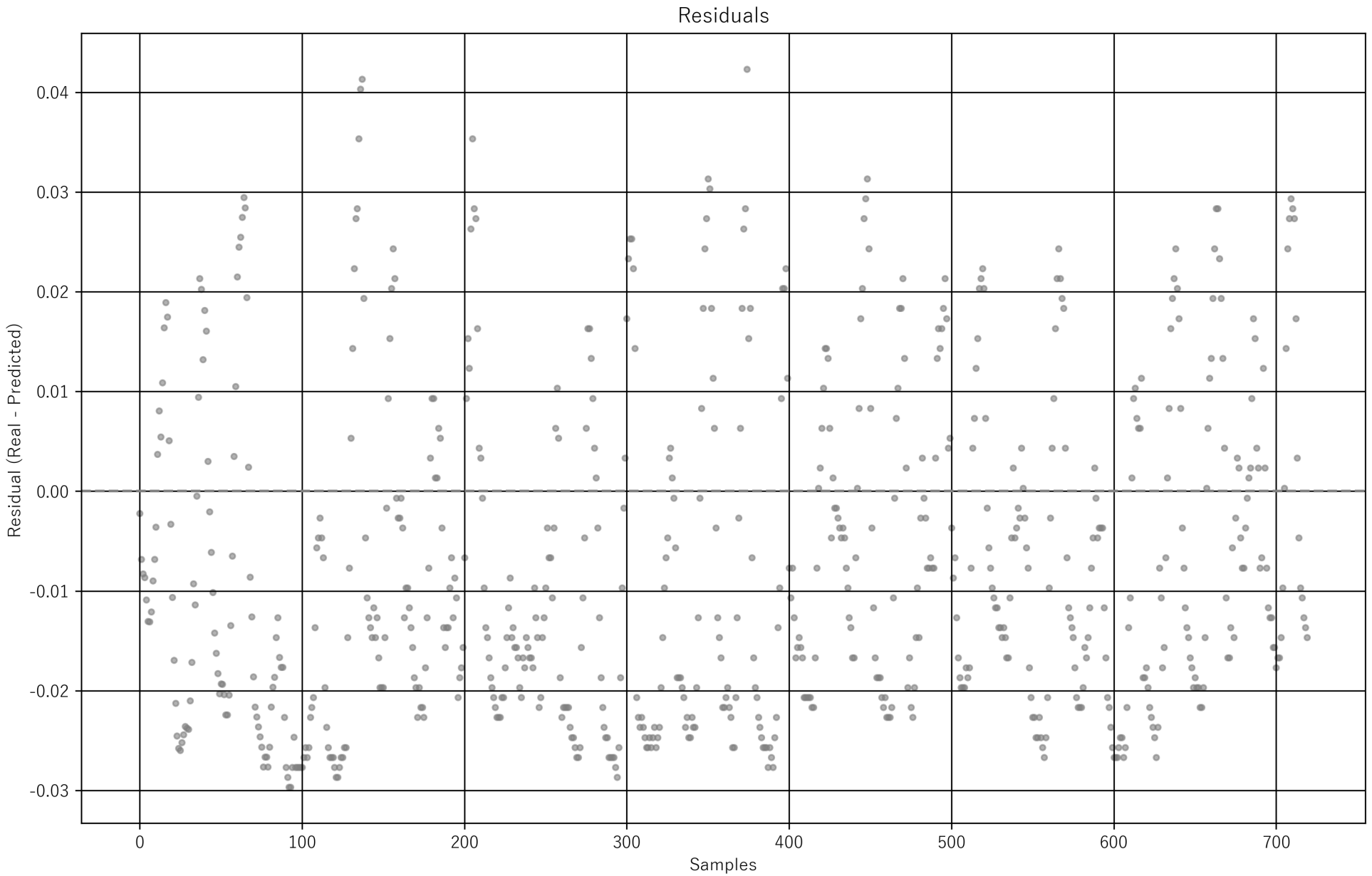
Features used for prediction

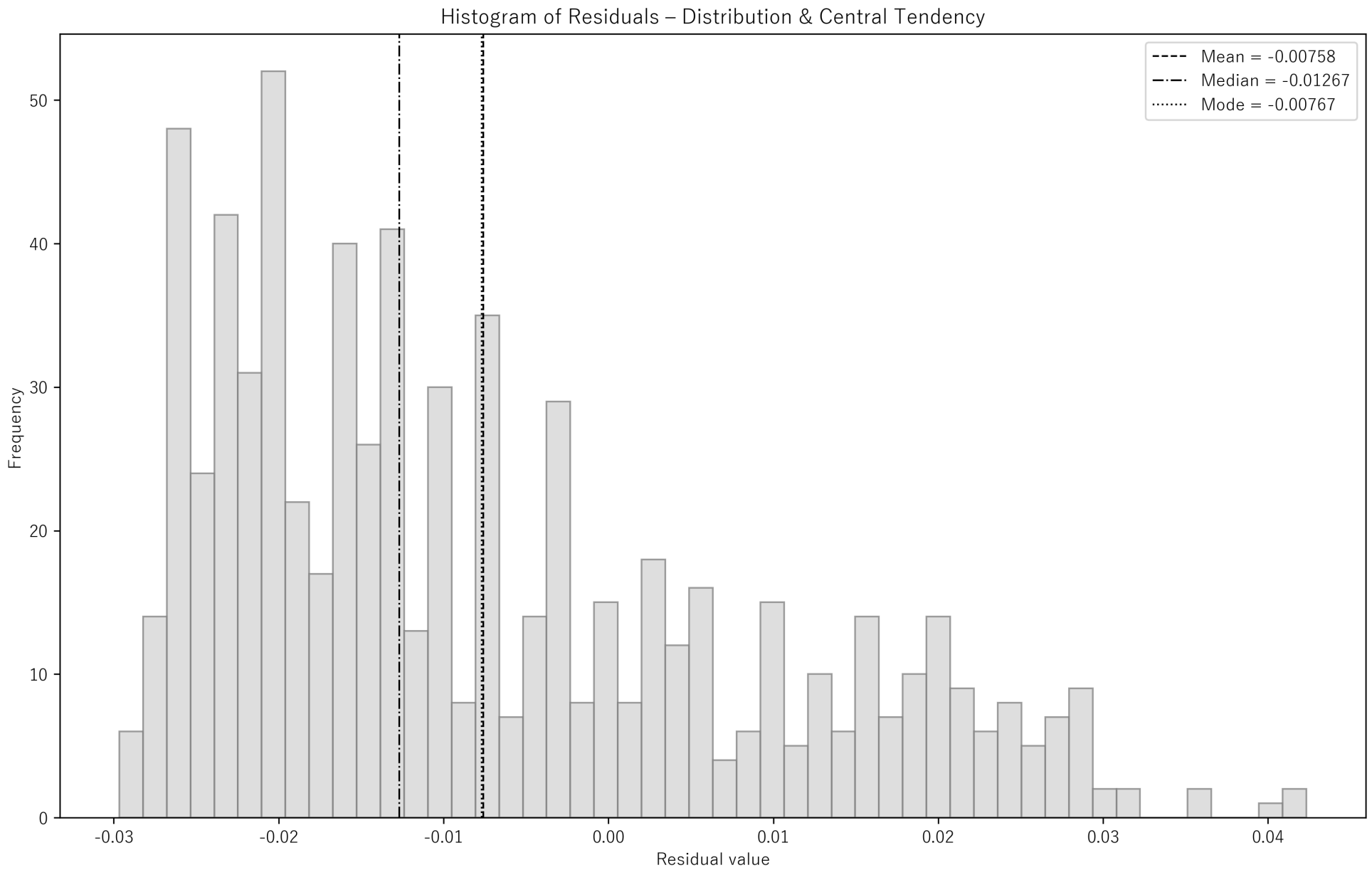
Ox(ppm)

Model accuracy

Target	R^2	MAE	RMSE
Ox(ppm)	-0.2123	0.0157	0.0177


ARIMA(1, 0, 1)
R²: -0.21233
Real values
ARIMA forecast
Ox(ppm)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0
100
200
300
400
500
600
700
Samples


Residuals
Residual (Real - Predicted)
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02
-0.03
0
100
200
300
400
500
600
700
Samples


Histogram of Residuals – Distribution & Central Tendency
Mean = -0.00758
Median = -0.01267
Mode = -0.00767
Frequency
Residual value
0
10
20
30
40
50
-0.03
-0.02
-0.01
0.00
0.01
0.02
0.03
0.04