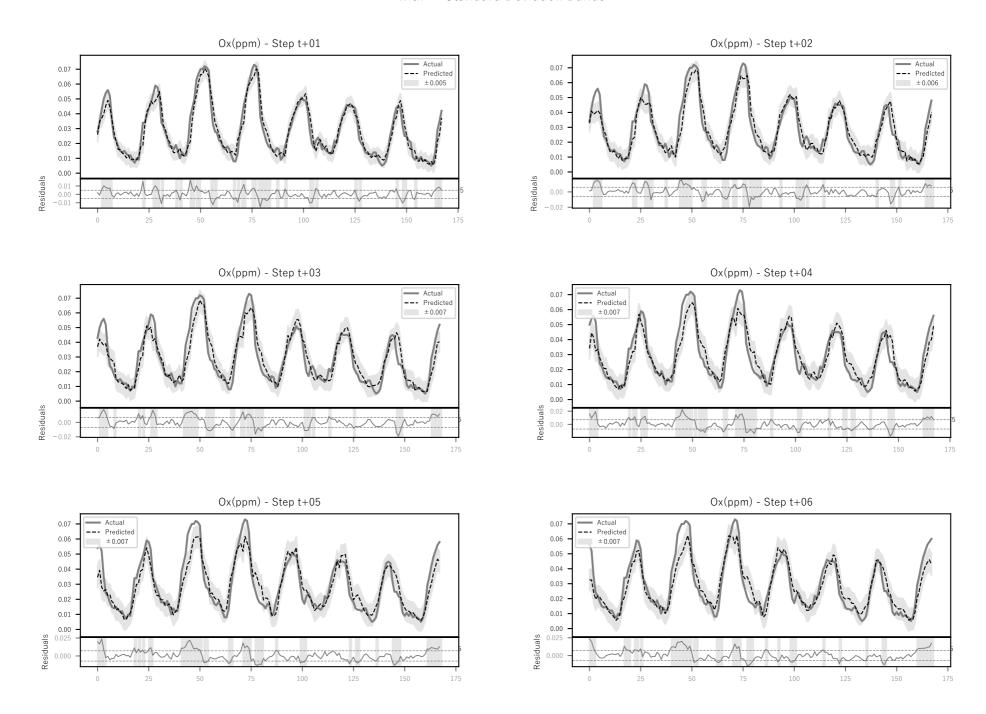
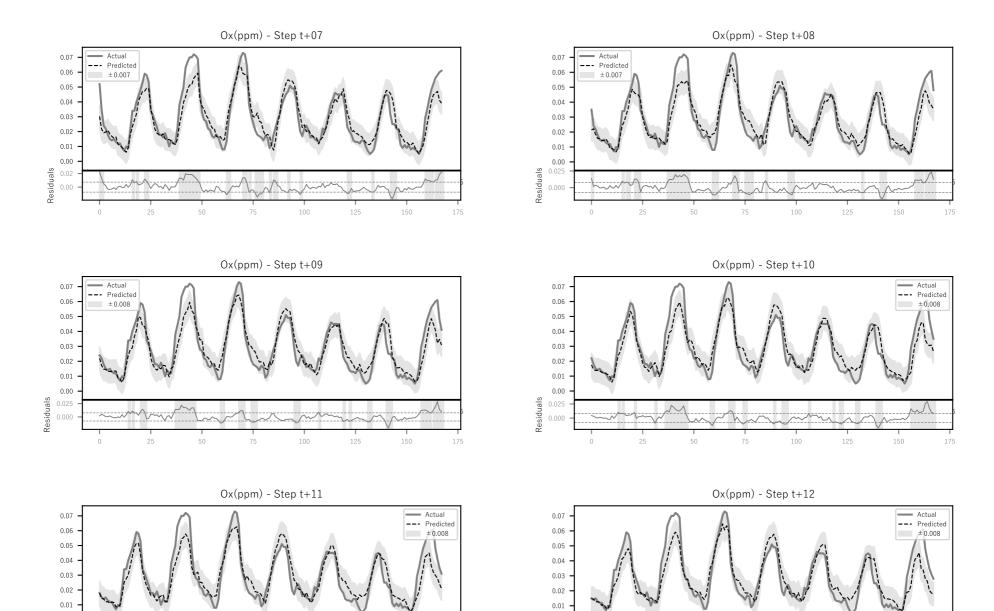
## 中村 - オキシダント予測の分析

Model Parameters: Prefecture code: 38 Station code: 38205060 Station name: 中村 Target item: Ox(ppm) Number of data points in the train set: 13682 Number of data points in the test set: 5864 Forecast horizon (hours): 24 Model: LightGBM Objective: regression Boosting type: gbdt Number of estimators: 400 Learning rate: 0.04 Elapsed time: 0 min 22 sec Number of used features: 140 Features: NO(ppm), NO2(ppm), U, V, Ox(ppm)\_lag1 Ox(ppm) lag2, Ox(ppm) lag3, Ox(ppm) lag4, Ox(ppm) lag5, Ox(ppm) lag6 Ox(ppm)\_lag7, Ox(ppm)\_lag8, Ox(ppm)\_lag9, Ox(ppm)\_lag10, Ox(ppm)\_lag11 Ox(ppm) lag12, Ox(ppm) lag13, Ox(ppm) lag14, Ox(ppm) lag15, Ox(ppm) lag16 Ox(ppm)\_lag17, Ox(ppm)\_lag18, Ox(ppm)\_lag19, Ox(ppm)\_lag20, Ox(ppm)\_lag21 Ox(ppm)\_lag22, Ox(ppm)\_lag23, NO(ppm)\_lag1, NO(ppm)\_lag2, NO(ppm)\_lag3 NO(ppm)\_lag4, NO(ppm)\_lag5, NO(ppm)\_lag6, NO(ppm)\_lag7, NO(ppm)\_lag8 NO(ppm)\_lag9, NO(ppm)\_lag10, NO(ppm)\_lag11, NO(ppm)\_lag12, NO(ppm)\_lag13 NO(ppm)\_lag14, NO(ppm)\_lag15, NO(ppm)\_lag16, NO(ppm)\_lag17, NO(ppm)\_lag18 NO(ppm)\_lag19, NO(ppm)\_lag20, NO(ppm)\_lag21, NO(ppm)\_lag22, NO(ppm)\_lag23 NO2(ppm)\_lag1, NO2(ppm)\_lag2, NO2(ppm)\_lag3, NO2(ppm)\_lag4, NO2(ppm)\_lag5 NO2(ppm) lag6, NO2(ppm) lag7, NO2(ppm) lag8, NO2(ppm) lag9, NO2(ppm) lag10 NO2(ppm)\_lag11, NO2(ppm)\_lag12, NO2(ppm)\_lag13, NO2(ppm)\_lag14, NO2(ppm)\_lag15 NO2(ppm)\_lag16, NO2(ppm)\_lag17, NO2(ppm)\_lag18, NO2(ppm)\_lag19, NO2(ppm)\_lag20 NO2(ppm)\_lag21, NO2(ppm)\_lag22, NO2(ppm)\_lag23, U\_lag1, U\_lag2 U\_lag3, U\_lag4, U\_lag5, U\_lag6, U\_lag7 U\_lag8, U\_lag9, U\_lag10, U\_lag11, U\_lag12 U\_lag13, U\_lag14, U\_lag15, U\_lag11, U\_lag12 U\_lag13, U\_lag14, U\_lag20, U\_lag20, U\_lag21 U\_lag28, U\_lag19, U\_lag20, U\_lag21, U\_lag22 U\_lag23, V\_lag1, V\_lag2, V\_lag3, V\_lag4 V\_lag5, V\_lag6, V\_lag7, V\_lag8, V\_lag9 V\_lag10, V\_lag11, V\_lag12, V\_lag13, V\_lag14 V\_lag15, V\_lag16, V\_lag17, V\_lag18, V\_lag19 V\_lag20, V\_lag21, V\_lag22, V\_lag23, Ox(ppm)\_roll\_mean\_3 Ox(ppm)\_roll\_std\_6, NO(ppm)\_roll\_mean\_3, NO(ppm)\_roll\_std\_6, NO2(ppm)\_roll\_mean\_3, NO2(ppm)\_roll\_std\_6 U\_roll\_mean\_3, U\_roll\_std\_6, V\_roll\_mean\_3, V\_roll\_std\_6, Ox(ppm)\_diff\_1
Ox(ppm)\_diff\_2, Ox(ppm)\_diff\_3, NO(ppm)\_diff\_3, NO2(ppm)\_diff\_3, U\_diff\_3 V\_diff\_3, hour\_sin, hour\_cos, dayofweek, is\_weekend Metrics per Forecast Step: Ox(ppm)\_t+01 - R2: 0.8870, MAE: 0.0038, RMSE: 0.0051 Ox(ppm)\_t+02 - R<sup>2</sup>: 0.8168, MAE: 0.0048, RMSE: 0.0065 Ox(ppm) t+03 - R<sup>2</sup>: 0.7551, MAE: 0.0057, RMSE: 0.0075 Ox(ppm)\_t+04 - R<sup>2</sup>: 0.7020, MAE: 0.0063, RMSE: 0.0083 Ox(ppm)\_t+05 - R<sup>2</sup>: 0.6560, MAE: 0.0067, RMSE: 0.0089 Ox(ppm) t+06 - R<sup>2</sup>: 0.6097, MAE: 0.0072, RMSE: 0.0095 Ox(ppm)\_t+07 - R<sup>2</sup>: 0.5709, MAE: 0.0075, RMSE: 0.0100 Ox(ppm) t+08 - R<sup>2</sup>: 0.5487, MAE: 0.0078, RMSE: 0.0102 Ox(ppm)\_t+09 - R<sup>2</sup>: 0.5332, MAE: 0.0079, RMSE: 0.0104 Ox(ppm)\_t+10 - R<sup>2</sup>: 0.5117, MAE: 0.0081, RMSE: 0.0106 Ox(ppm)\_t+11 - R<sup>2</sup>: 0.4976, MAE: 0.0082, RMSE: 0.0108 Ox(ppm) t+12 - R<sup>2</sup>: 0.4830, MAE: 0.0083, RMSE: 0.0110 Ox(ppm) t+13 - R<sup>2</sup>: 0.4560, MAE: 0.0085, RMSE: 0.0112 Ox(ppm)\_t+14 - R<sup>2</sup>: 0.4441, MAE: 0.0086, RMSE: 0.0114 Ox(ppm) t+15 - R<sup>2</sup>: 0.4379, MAE: 0.0087, RMSE: 0.0114 Ox(ppm)\_t+16 - R<sup>2</sup>: 0.4391, MAE: 0.0087, RMSE: 0.0114 Ox(ppm)\_t+17 - R<sup>2</sup>: 0.4278, MAE: 0.0088, RMSE: 0.0115 Ox(ppm)\_t+18 - R<sup>2</sup>: 0.4151, MAE: 0.0088, RMSE: 0.0117 Ox(ppm)\_t+19 - R<sup>2</sup>: 0.4123, MAE: 0.0088, RMSE: 0.0117 Ox(ppm) t+20 - R2: 0.4113, MAE: 0.0088, RMSE: 0.0117 Ox(ppm)\_t+21 - R<sup>2</sup>: 0.4008, MAE: 0.0089, RMSE: 0.0118 Ox(ppm)\_t+22 - R<sup>2</sup>: 0.4066, MAE: 0.0089, RMSE: 0.0117 Ox(ppm) t+23 - R<sup>2</sup>: 0.3994, MAE: 0.0089, RMSE: 0.0118

Ox(ppm)\_t+24 - R<sup>2</sup>: 0.3955, MAE: 0.0091, RMSE: 0.0119





0.00

100

125

150

175

Residuals

100

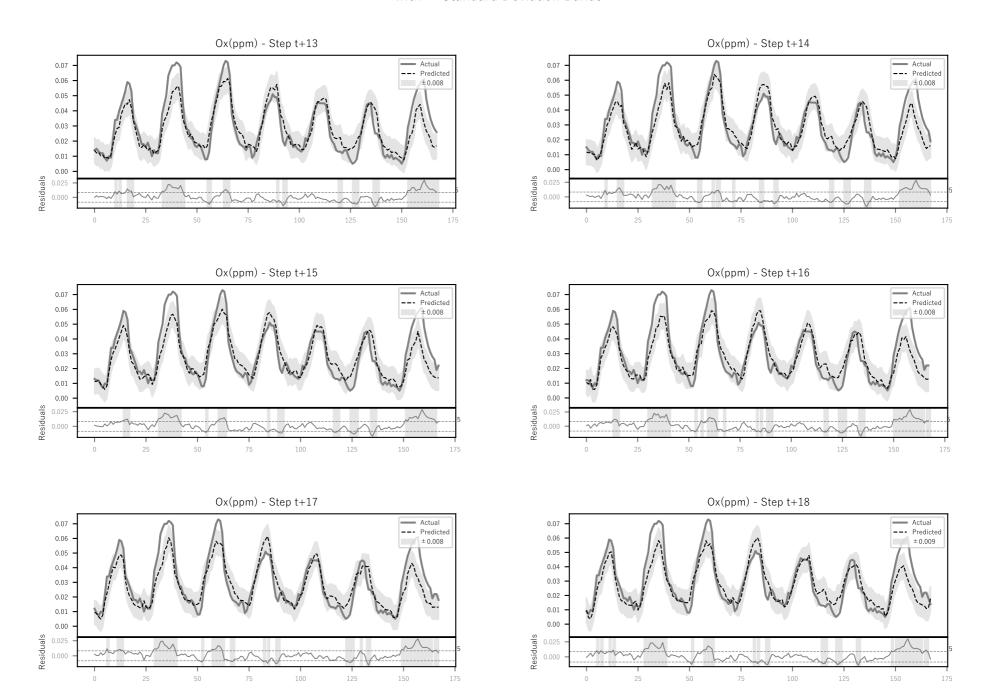
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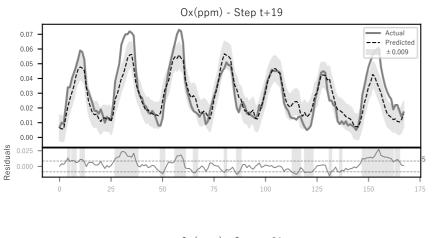
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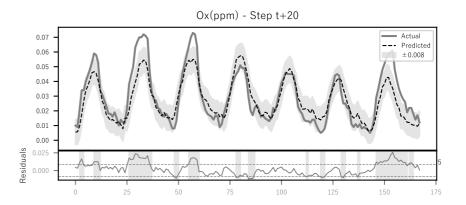
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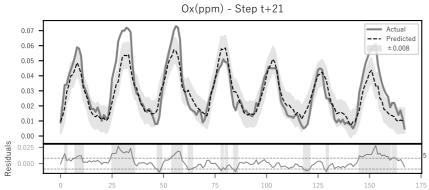
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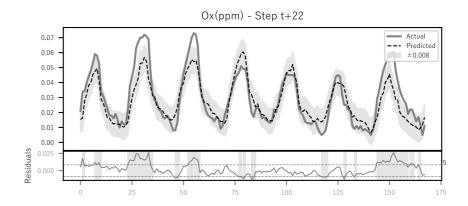
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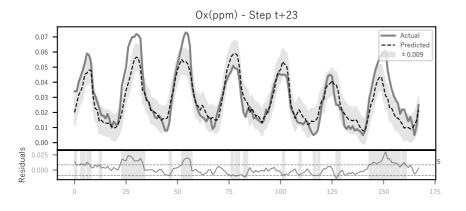


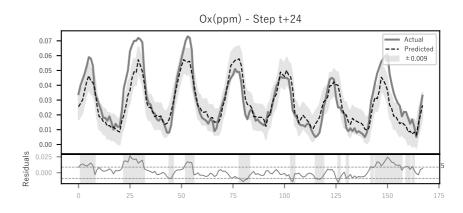


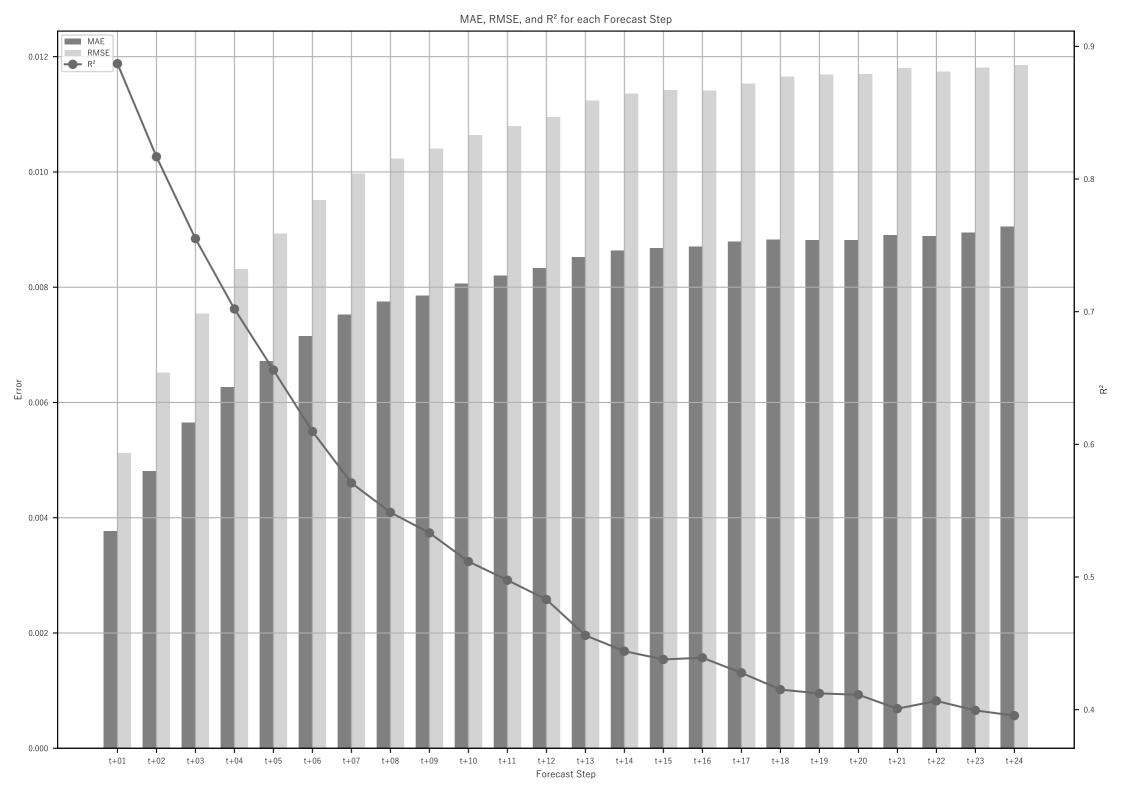












	Normalized Feature Importance (per feature)															1.0												
	Ox(ppm)_lag1 -	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.96	0.60	0.36	0.53	0.31	0.07	0.00	0.00	0.00	0.09	0.08	0.57	1.00		- 1.0	
Feature	dayofweek -	0.00	0.00	0.01	0.08	0.11	0.14	0.17	0.24	0.19	0.76	1.00	0.63	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98			99. 89. 89. (per feature)
	U_roll_std_6 -	0.19	0.22	0.20	0.22	0.28	0.30	0.39	0.28	0.36	0.79	0.57	0.77	0.75	0.53	0.89	0.83	0.61	0.57	0.48	0.34	0.47	0.44	0.50	0.70			
	hour_sin <b>–</b>	0.03	0.09	0.20	0.44	0.59	0.58	0.61	0.52	0.69	0.91	0.86	1.00	0.61	0.00	0.00	0.00	0.00	0.18	0.29	0.28	0.59	0.51	0.43	0.48		- 0.6	
	V_roll_std_6 <b>-</b>	0.08	0.14	0.10	0.12	0.20	0.29	0.31	0.38	0.50	0.55	0.66	0.67	0.65	0.45	0.76	0.65	0.66	0.39	0.44	0.39	0.45	0.46	0.51	0.61		0.0	tance (
	Ox(ppm)_roll_std_6 -	0.29	0.32	0.18	0.27	0.28	0.35	0.33	0.22	0.23	0.24	0.21	0.64	0.80	0.75	0.93	0.97	0.57	0.37	0.21	0.08	0.38	0.22	0.17	0.19		- 0.4 - 0.2	Normalized Importance (per feature)
	U <b>-</b>	0.57	0.45	0.26	0.28	0.34	0.24	0.24	0.00	0.03	0.05	0.14	0.55	0.11	0.13	0.68	0.47	0.12	0.01	0.09	0.07	0.00	0.00	0.00	0.00			
	Ox(ppm)_roll_mean_3 -	0.05	0.00	0.03	0.12	0.22	0.18	0.33	0.24	0.19	0.45	0.39	0.14	0.03	0.12	0.52	0.51	0.23	0.11	0.21	0.17	0.48	0.88	0.44	0.34			
	Ox(ppm)_lag23 <b>–</b>	0.15	0.10	0.09	0.07	0.00	0.00	0.00	0.05	0.03	0.00	0.00	0.30	0.48	0.47	0.69	0.53	0.11	0.19	0.08	0.17	0.44	0.50	0.53	0.58			
	NO(ppm)_roll_std_6 -	0.02	0.02	0.00	0.00	0.00	0.12	0.16	0.07	0.00	0.00	0.06	0.00	0.00	0.16	0.70	0.68	0.25	0.13	0.29	0.34	0.64	0.71	0.53	0.46	_	- 0.0	0.0
		Ox(ppm)_t+01	Ox(ppm)_t+02	0x(ppm)_t+03	0x(ppm)_t+04	Ox(ppm)_t+05	0x(ppm)_t+06	Ox(ppm)_t+07	0x(ppm)_t+08	Ox(ppm)_t+09	Ox(ppm)_t+10	Ох(ppm)_t+11	Ox(ppm)_t+12	Ox(ppm)_t+13	0x(ppm)_t+14	0x(ppm)_t+15	Ox(ppm)_t+16	0x(ppm)_t+17	Ох(ppm)_t+18	0x(ppm)_t+19	0x(ppm)_t+20	0x(ppm)_t+21	0x(ppm)_t+22	0x(ppm)_t+23	0x(ppm)_t+24			
		ф)хО	ох(рр	да)хО	dd)x(0	да)хО	)х(р	да)хО	да)хО	и)хО	dd)x(	dd)x(	-		dd)х(	и)хО	dd)x(0	dd)х(	dd)х(О	dd)х(О	ф)хО	ф)хО	dd)х(	dd)х(О	<sup>ј</sup> d)хО			
Forecast Step  Normalized Feature Importance (per step)																												
	Ox(ppm)_lag1 -	1.00	0.83	0.94	0.84	0.70	0.70	0.57	0.58	0.48	0.33	0.30	0.25	0.19	0.14	0.07	0.00	0.03	0.03	0.02	0.02	0.00	0.04	0.23	0.40		1.0	
	dayofweek <b>–</b>	0.00	0.13	0.18	0.26	0.35	0.39	0.42	0.55	0.52	0.73	0.80	0.58	0.72	0.82	0.73	0.74	0.82	0.88	0.84	0.94	0.95	0.98	1.00	0.94			
	U_roll_std_6 <b>-</b>	0.00	0.30	0.34	0.31	0.53	0.57	0.71	0.60	0.71	1.00	0.64	0.68	0.70	0.55	0.74	0.65	0.60	0.70	0.46	0.35	0.43	0.54	0.60	0.95		- 0.8	
	hour_sin <b>–</b>	0.11	0.31	0.55	0.88	1.00	0.97	0.89	0.84	0.90	0.83	0.77	0.73	0.62	0.35	0.00	0.06	0.30	0.44	0.48	0.50	0.66	0.66	0.57	0.58			(per st
Feature	V_roll_std_6 -	0.00	0.33	0.29	0.29	0.51	0.73	0.67	0.90	1.00	0.81	0.84	0.74	0.75	0.65	0.66	0.55	0.80	0.63	0.62	0.65	0.62	0.74	0.75	0.84		- 0.6	ed Importance (per step)
Fea	Ox(ppm)_roll_std_6 -	0.68	0.80	0.38	0.65	0.64	0.85	0.67	0.55	0.58	0.44	0.35	0.68	0.84	0.95	0.91	1.00	0.66	0.51	0.20	0.05	0.38	0.24	0.03	0.00		- 0.4	od III po
	U <b>–</b>	1.00	0.68	0.46	0.42	0.48	0.36	0.32	0.17	0.24	0.24	0.26	0.39	0.26	0.21	0.32	0.19	0.17	0.14	0.17	0.16	0.01	0.09	0.03	0.00		- 0.4	Normalize
	Ox(ppm)_roll_mean_3 -	0.00	0.03	0.13	0.28	0.49	0.43	0.59	0.56	0.52	0.61	0.54	0.40	0.36	0.33	0.32	0.36	0.36	0.33	0.37	0.37	0.56	1.00	0.56	0.42		<b>-</b> 0.2	Nor
	Ox(ppm)_lag23 <b>-</b>	0.23	0.22	0.27	0.09	0.00	0.01	0.09	0.42	0.47	0.42	0.38	0.64	0.81	0.83	0.68	0.46	0.28	0.49	0.29	0.46	0.75	1.00	1.00	1.00		0.2	
	NO(ppm)_roll_std_6 -	0.00	0.18	0.16	0.13	0.23	0.45	0.50	0.49	0.47	0.47	0.48	0.46	0.47	0.48	0.62	0.64	0.49	0.46	0.56	0.64	0.86	1.00	0.80	0.67		- 0.0	
		Ox(ppm)_t+01 -	0x(ppm)_t+02 -	Ox(ppm)_t+03 -	0x(ppm)_t+04 -	Ox(ppm)_t+05 -	Ox(ppm)_t+06 -	Ox(ppm)_t+07 -	Ox(ppm)_t+08 -	Ox(ppm)_t+09 -	Ox(ppm)_t+10 -	Ox(ppm)_t+11 -	Ox(ppm)_t+12 -	Ox(ppm)_t+13 -	Ox(ppm)_t+14 -	Ox(ppm)_t+15 -	Ox(ppm)_t+16 -	Ox(ppm)_t+17 -	Ox(ppm)_t+18 -	Ox(ppm)_t+19 -	0x(ppm)_t+20 -	Ox(ppm)_t+21 -	0x(ppm)_t+22 -	Ox(ppm)_t+23 -	Ox(ppm)_t+24 -		0.0	

Target