

SoilGeoChem
PLS

The PLS Procedure

| | |
|---------------------------------------|-----------------------|
| <i>Data Set</i> | WORK.COMBINED |
| <i>Factor Extraction Method</i> | Partial Least Squares |
| <i>PLS Algorithm</i> | NIPALS |
| <i>Number of Response Variables</i> | 2 |
| <i>Number of Predictor Parameters</i> | 10 |
| <i>Missing Value Handling</i> | Exclude |
| <i>Number of Factors</i> | 4 |

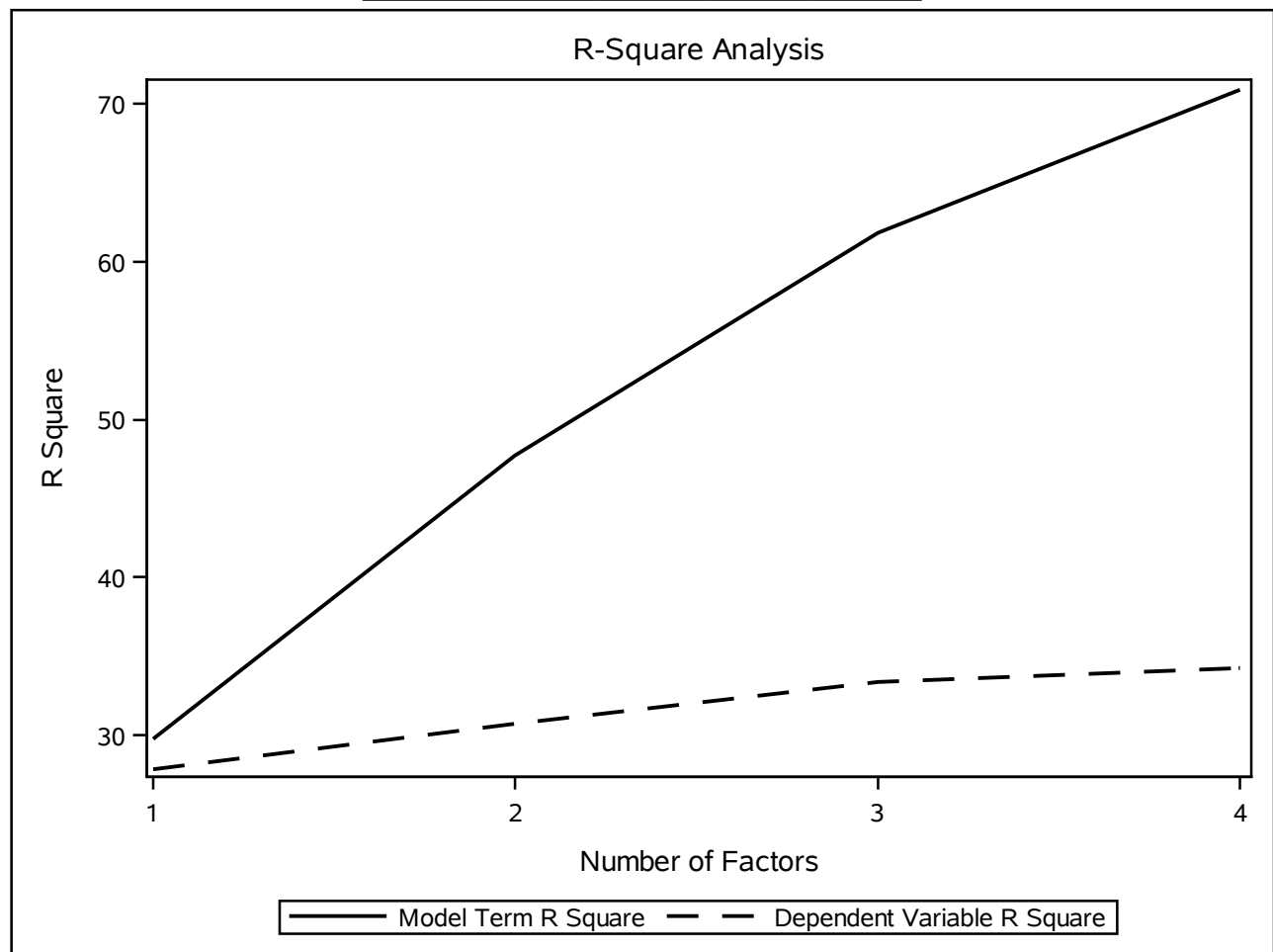
| | |
|------------------------------------|-----|
| <i>Number of Observations Read</i> | 693 |
| <i>Number of Observations Used</i> | 685 |

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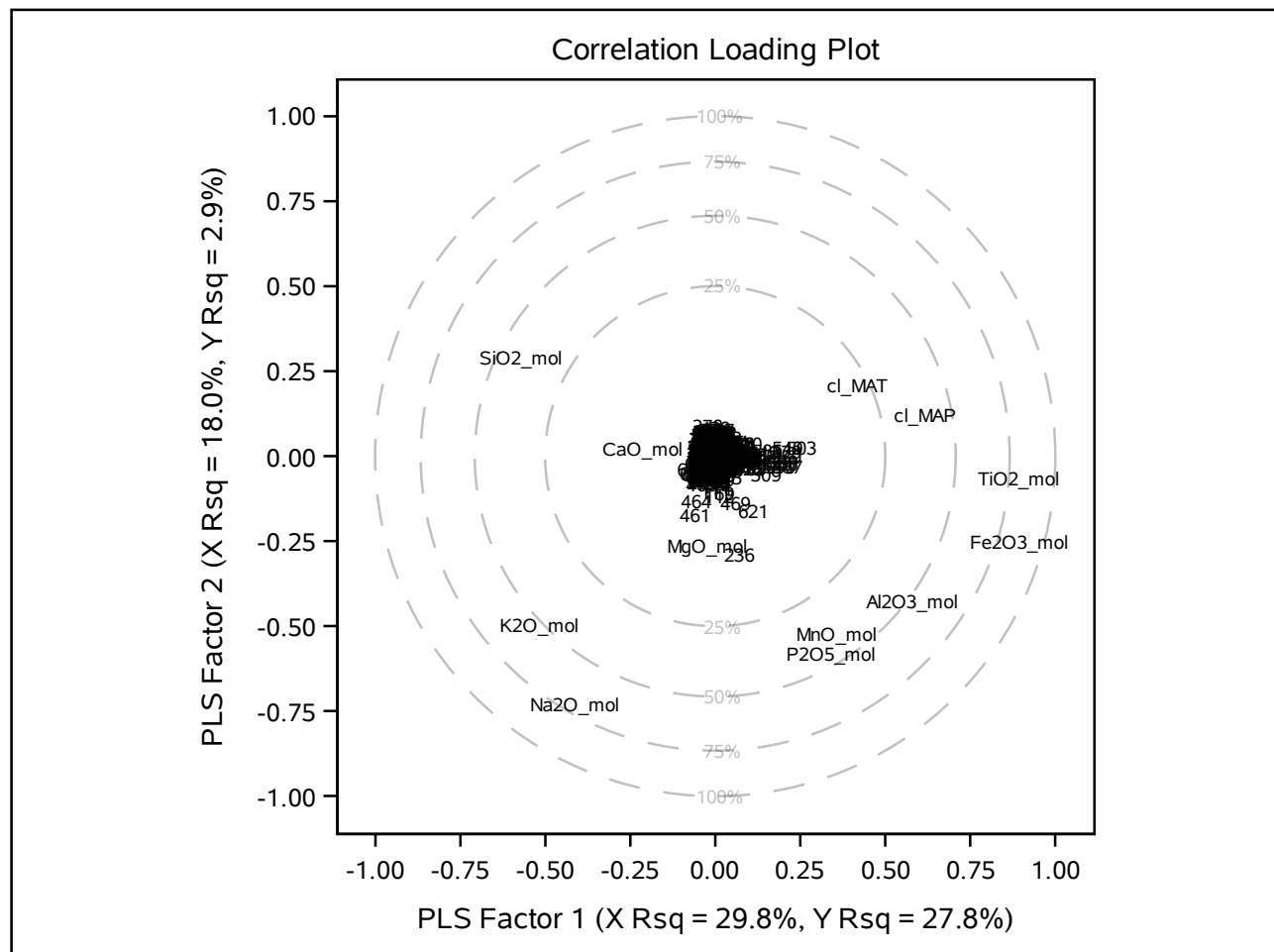
The PLS Procedure

*Percent Variation Accounted for by Partial Least
Squares Factors*

| Number of Extracted Factors | Model Effects | | Dependent Variables | |
|--------------------------------------|---------------|---------|------------------------|---------|
| | Current | Total | Current | Total |
| 1 | 29.8028 | 29.8028 | 27.8298 | 27.8298 |
| 2 | 17.9571 | 47.7600 | 2.8974 | 30.7271 |
| 3 | 14.1027 | 61.8626 | 2.6633 | 33.3904 |
| 4 | 9.0579 | 70.9206 | 0.8446 | 34.2351 |



The PLS Procedure



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The PLS Procedure

Model Effect Loadings

| <i>Number of Extracted Factors</i> | <i>Fe2O3_mol</i> | <i>MnO_mol</i> | <i>P2O5_mol</i> | <i>SiO2_mol</i> | <i>TiO2_mol</i> | <i>Al2O3_mol</i> | <i>CaO_mol</i> | <i>Na2O_mol</i> | <i>MgO_mol</i> | <i>K2O_mol</i> |
|--|------------------|----------------|-----------------|-----------------|-----------------|------------------|----------------|-----------------|----------------|----------------|
| 1 | 0.517257 | 0.207034 | 0.196333 | -0.332081 | 0.516332 | 0.334853 | -0.123742 | -0.238796 | -0.014547 | -0.299141 |
| 2 | -0.188710 | -0.390547 | -0.433103 | 0.216004 | -0.047297 | -0.319937 | 0.016215 | -0.545173 | -0.196125 | -0.370253 |
| 3 | 0.069326 | -0.036216 | -0.173525 | 0.520338 | 0.142402 | 0.064495 | -0.761554 | 0.089256 | -0.175730 | 0.223090 |
| 4 | 0.168569 | -0.188061 | -0.130718 | -0.277608 | 0.141768 | -0.420981 | 0.215877 | 0.228959 | 0.723497 | -0.149223 |

Model Effect Weights

| <i>Number of Extracted Factors</i> | <i>Fe2O3_mol</i> | <i>MnO_mol</i> | <i>P2O5_mol</i> | <i>SiO2_mol</i> | <i>TiO2_mol</i> | <i>Al2O3_mol</i> | <i>CaO_mol</i> | <i>Na2O_mol</i> | <i>MgO_mol</i> | <i>K2O_mol</i> |
|--|------------------|----------------|-----------------|-----------------|-----------------|------------------|----------------|-----------------|----------------|----------------|
| 1 | 0.508639 | 0.112711 | 0.075167 | -0.281305 | 0.561863 | 0.271392 | -0.184478 | -0.373076 | -0.039804 | -0.374119 |
| 2 | -0.223508 | -0.402073 | -0.487537 | 0.154120 | -0.034848 | -0.278859 | 0.053123 | -0.586933 | -0.132973 | -0.320220 |
| 3 | 0.161972 | -0.155551 | -0.229232 | 0.440829 | 0.282944 | -0.232453 | -0.830213 | 0.228430 | 0.080724 | 0.225133 |
| 4 | 0.142613 | -0.217871 | -0.044469 | -0.398567 | 0.215293 | -0.595279 | 0.207450 | 0.224650 | 0.593514 | -0.078948 |

Model Effect Weights

| <i>Number of Extracted Factors</i> | <i>Inner Regression Coefficients</i> |
|--|--|
| 1 | 0.432157 |
| 2 | 0.179638 |
| 3 | 0.194345 |
| 4 | 0.136564 |

Dependent Variable Weights

| <i>Number of Extracted Factors</i> | <i>cl_MAP</i> | <i>cl_MAT</i> |
|--|---------------|---------------|
| 1 | 0.826993 | 0.562212 |
| 2 | 0.502426 | 0.864620 |
| 3 | 0.834536 | -0.550953 |
| 4 | 0.880999 | -0.473118 |

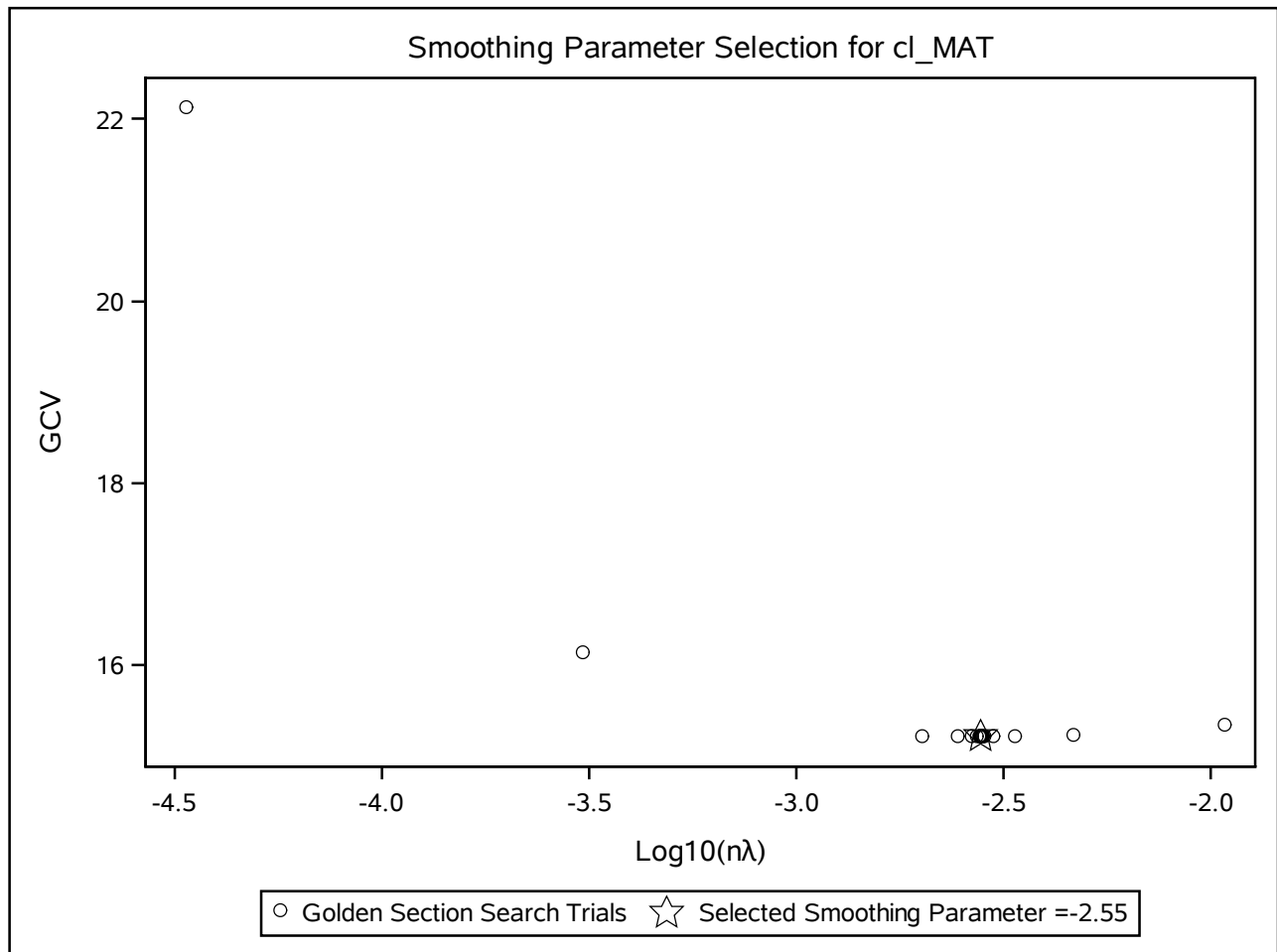
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**The TPSPLINE Procedure
Dependent Variable: *cl_MAT***

| Summary of Input Data Set | |
|------------------------------------|-----|
| Number of Non-Missing Observations | 685 |
| Number of Missing Observations | 0 |
| Unique Smoothing Design Points | 685 |

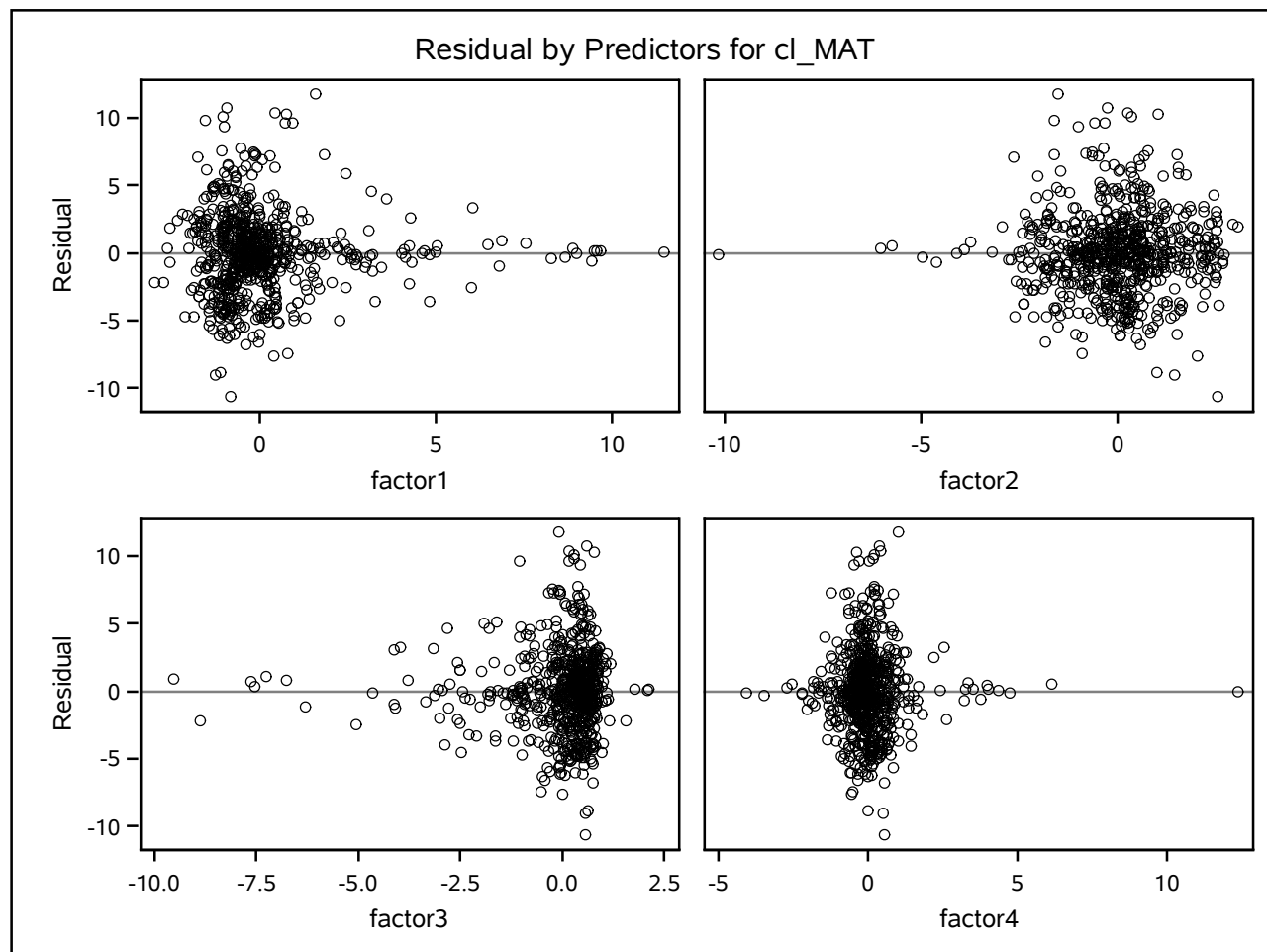
| Summary of Final Model | |
|------------------------------------|----|
| Number of Regression Variables | 0 |
| Number of Smoothing Variables | 4 |
| Order of Derivative in the Penalty | 3 |
| Dimension of Polynomial Space | 15 |

| Summary Statistics of Final Estimation | |
|--|-------------|
| $\log_{10}(n \cdot \text{Lambda})$ | -2.5542 |
| Smoothing Penalty | 450747.5928 |
| Residual SS | 6254.7979 |
| $\text{Tr}(I-A)$ | 530.7464 |
| Model DF | 154.2536 |
| Standard Deviation | 3.4329 |
| GCV | 15.2100 |

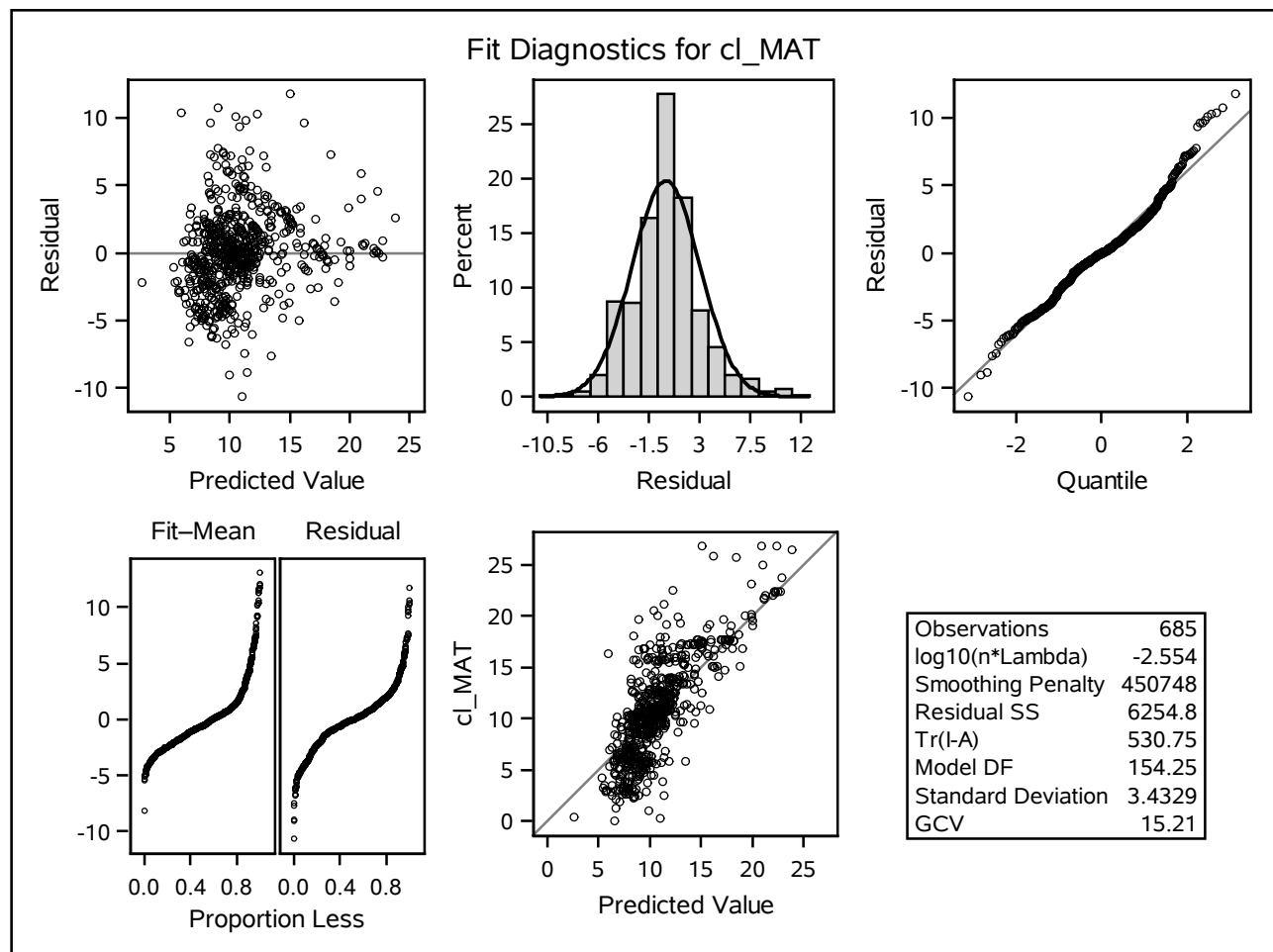


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The TPSPLINE Procedure
Dependent Variable: *cl_MAT*



The TPSPLINE Procedure
Dependent Variable: *cl_MAT*



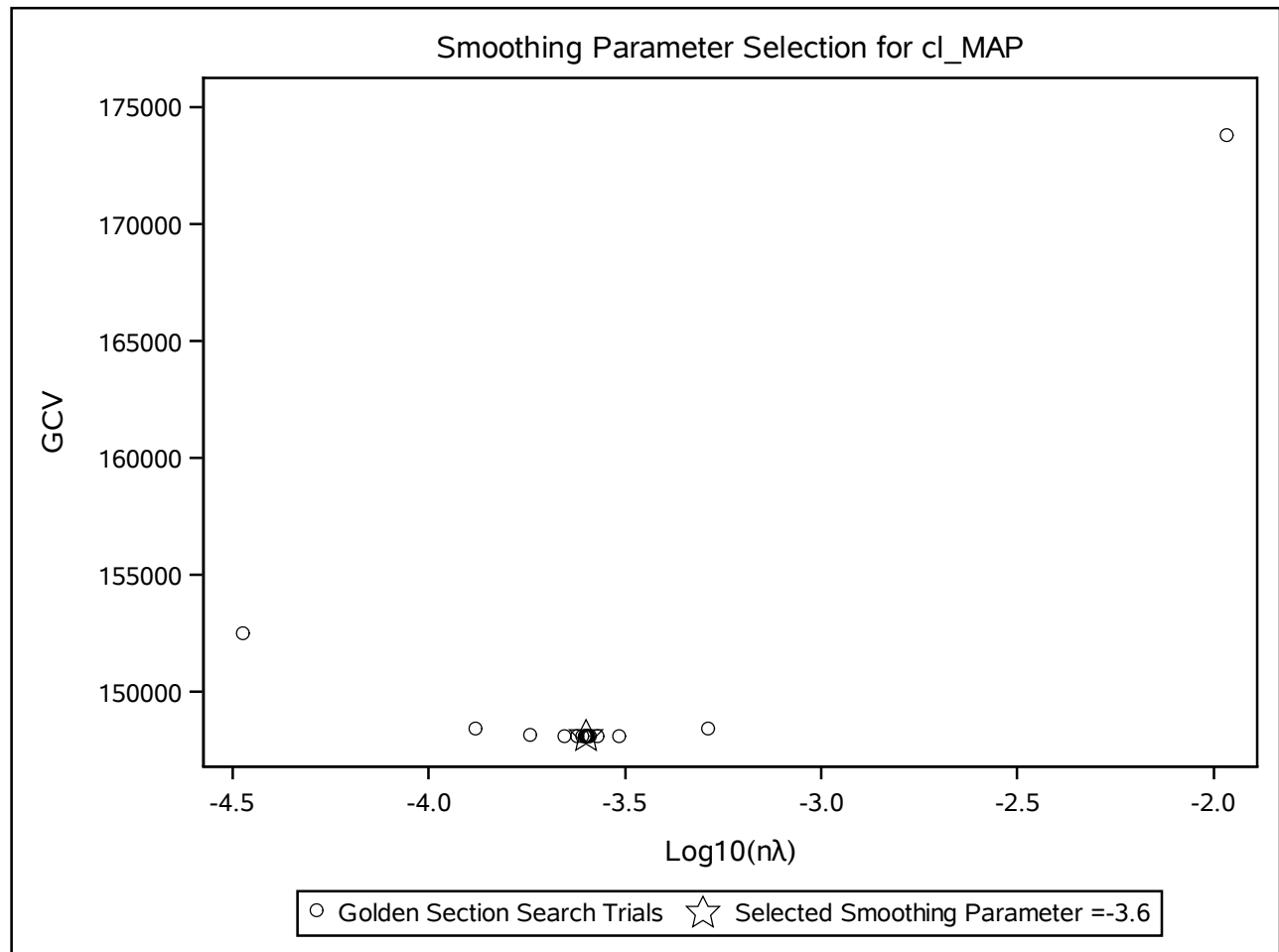
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**The TPSPLINE Procedure
Dependent Variable: *cl_MAP***

| Summary of Input Data Set | |
|------------------------------------|-----|
| Number of Non-Missing Observations | 685 |
| Number of Missing Observations | 0 |
| Unique Smoothing Design Points | 685 |

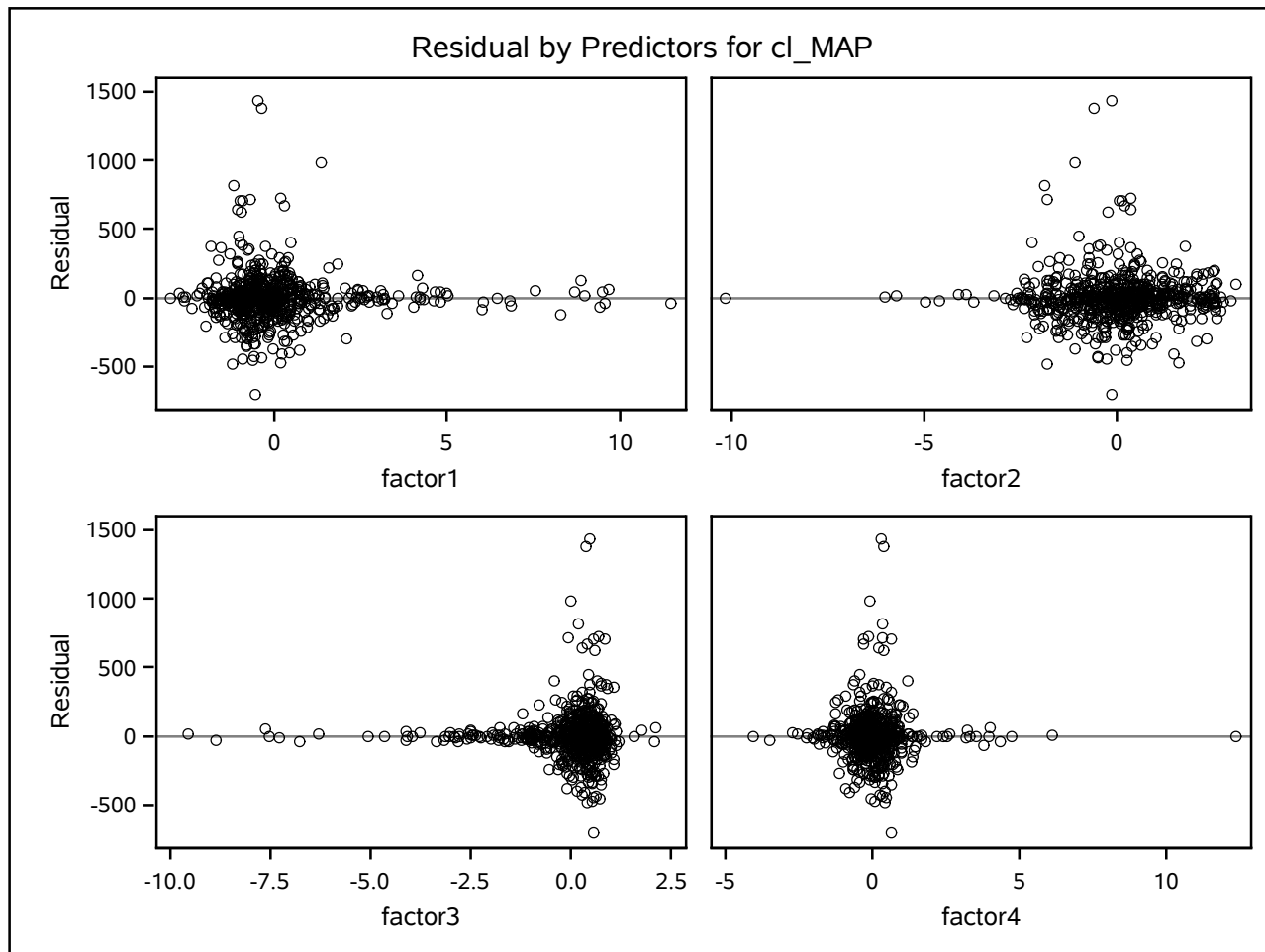
| Summary of Final Model | |
|------------------------------------|----|
| Number of Regression Variables | 0 |
| Number of Smoothing Variables | 4 |
| Order of Derivative in the Penalty | 3 |
| Dimension of Polynomial Space | 15 |

| Summary Statistics of Final Estimation | |
|--|--------------|
| $\log_{10}(n*\text{Lambda})$ | -3.5981 |
| Smoothing Penalty | 68858241180 |
| Residual SS | 20593560.193 |
| $\text{Tr}(I-A)$ | 308.6199 |
| Model DF | 376.3801 |
| Standard Deviation | 258.3174 |
| GCV | 148106.4775 |

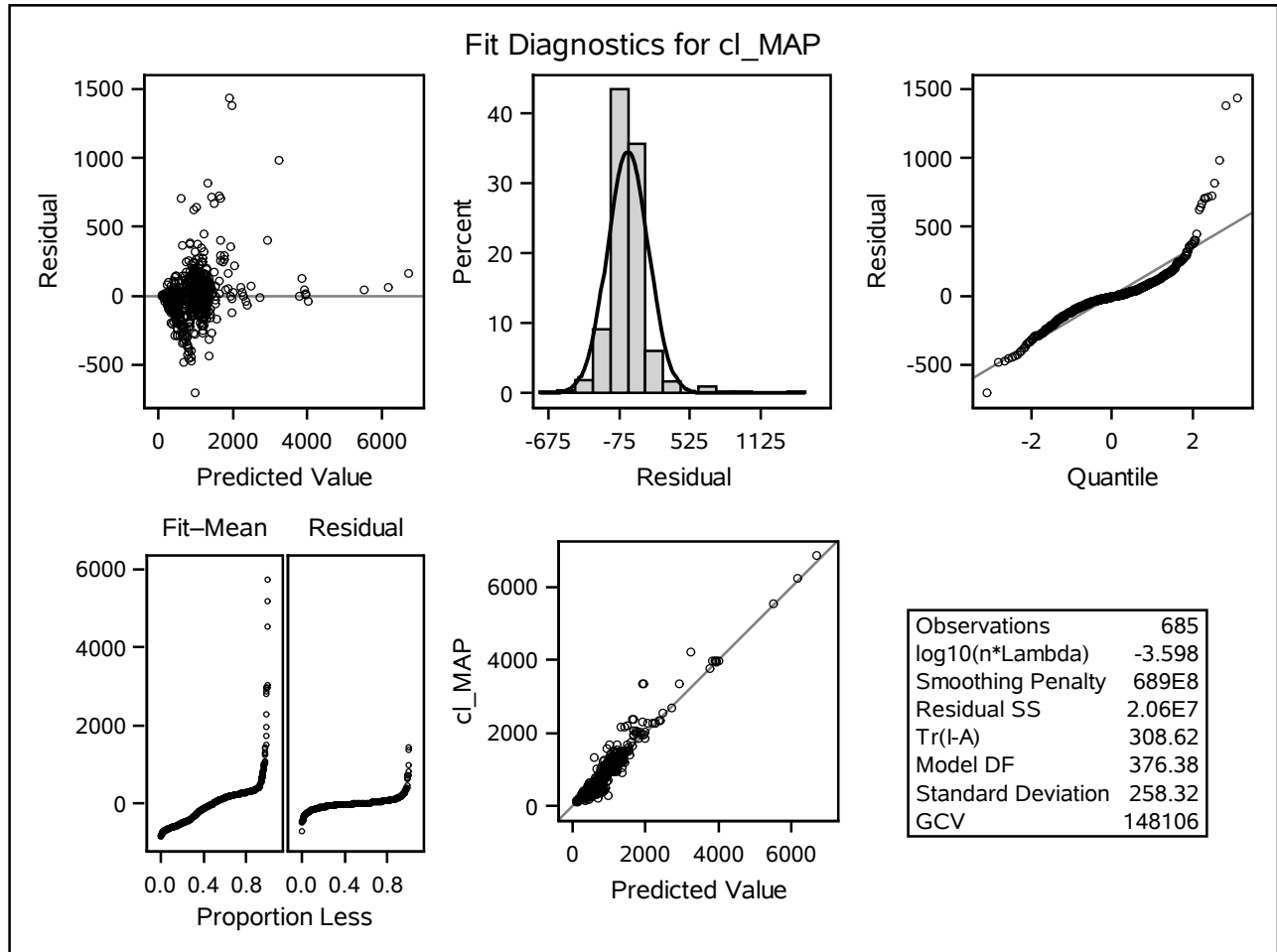


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The TPSPLINE Procedure
Dependent Variable: *cl_MAP*



The TPSPLINE Procedure
Dependent Variable: *cl_MAP*



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Predictions**

| <i>Obs</i> | <i>Pedon_ID</i> | <i>low_MAP</i> | <i>best_MAP</i> | <i>high_MAP</i> | <i>low_MAT</i> | <i>best_MAT</i> | <i>high_MAT</i> |
|------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|-----------------|
| 1 | temp1 | 915 | 1189 | 1462 | 5.1 | 7.1 | 9.1 |
| 2 | temp2 | 789 | 1079 | 1370 | 6.4 | 8.5 | 10.5 |
| 3 | temp3 | 892 | 1176 | 1459 | 6.7 | 8.8 | 10.9 |
| 4 | temp4 | 931 | 1239 | 1548 | 4.8 | 7.3 | 9.7 |
| 5 | temp5 | 453 | 750 | 1046 | 9.1 | 11.3 | 13.4 |
| 6 | temp6 | 1026 | 1402 | 1777 | 6.7 | 9.5 | 12.4 |
| 7 | temp7 | 773 | 1176 | 1579 | 4.3 | 7.4 | 10.6 |
| 8 | temp8 | 1026 | 1401 | 1776 | 6.7 | 9.5 | 12.4 |