Progress Report on AGCHEM Sensitivity Analysis

Richard Tian, Guido Yactayo, Gary Shenk, Lewis Linker, Ping Wang, Gopal Bhatt, Amanda Pruzinsky

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Why we do AGCHEM Sensitivity Analysis

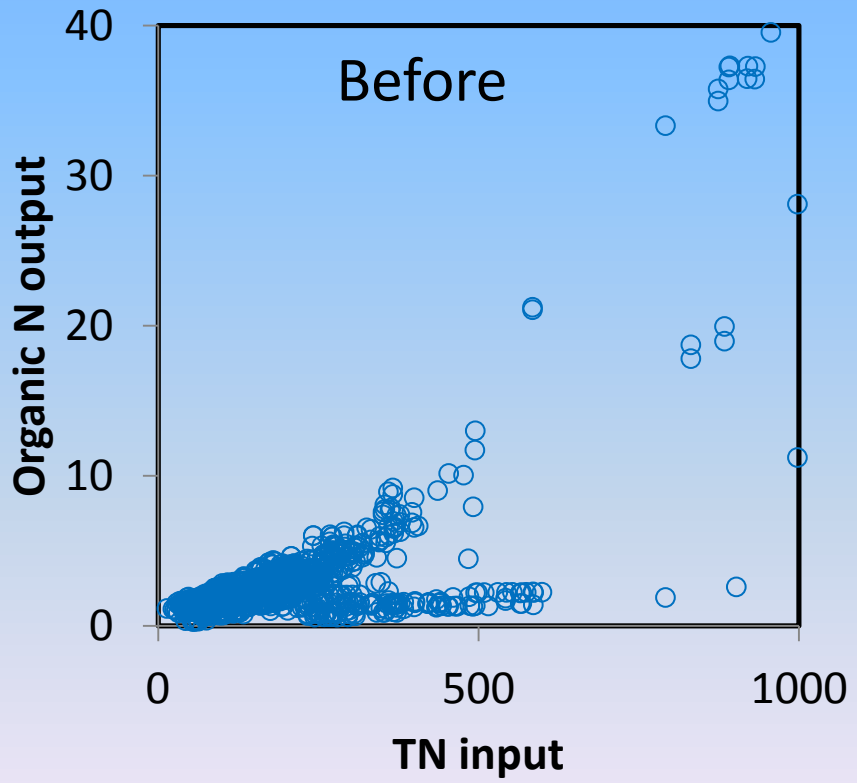
To Know
what we have done with AGCHEM

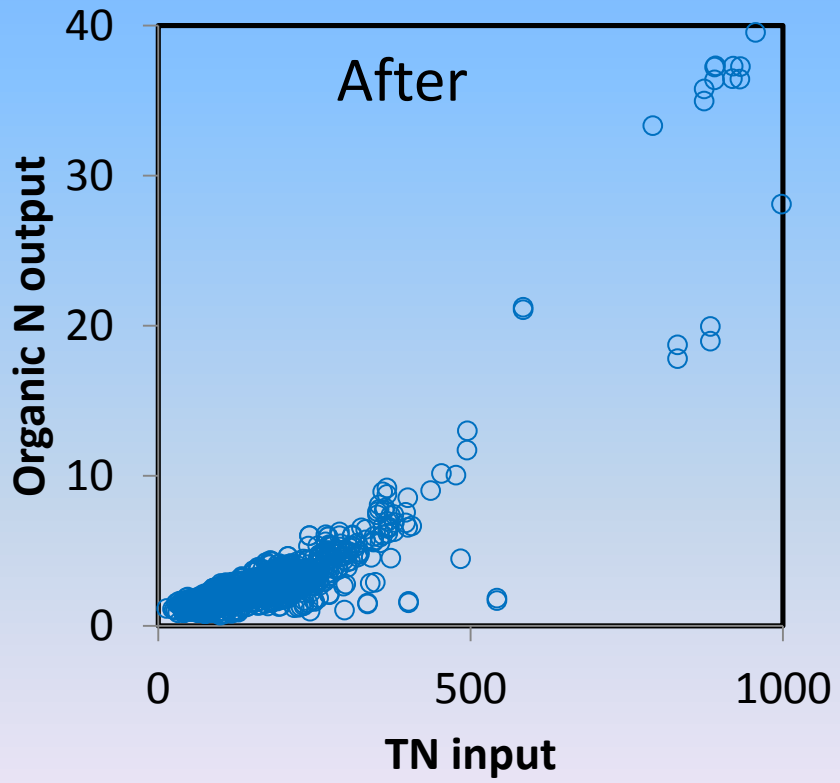
and
what we should do with PQUAL

Sensitivity =
Change in output / Change in Input = Slope

Forest was done; Today pasture and cropland

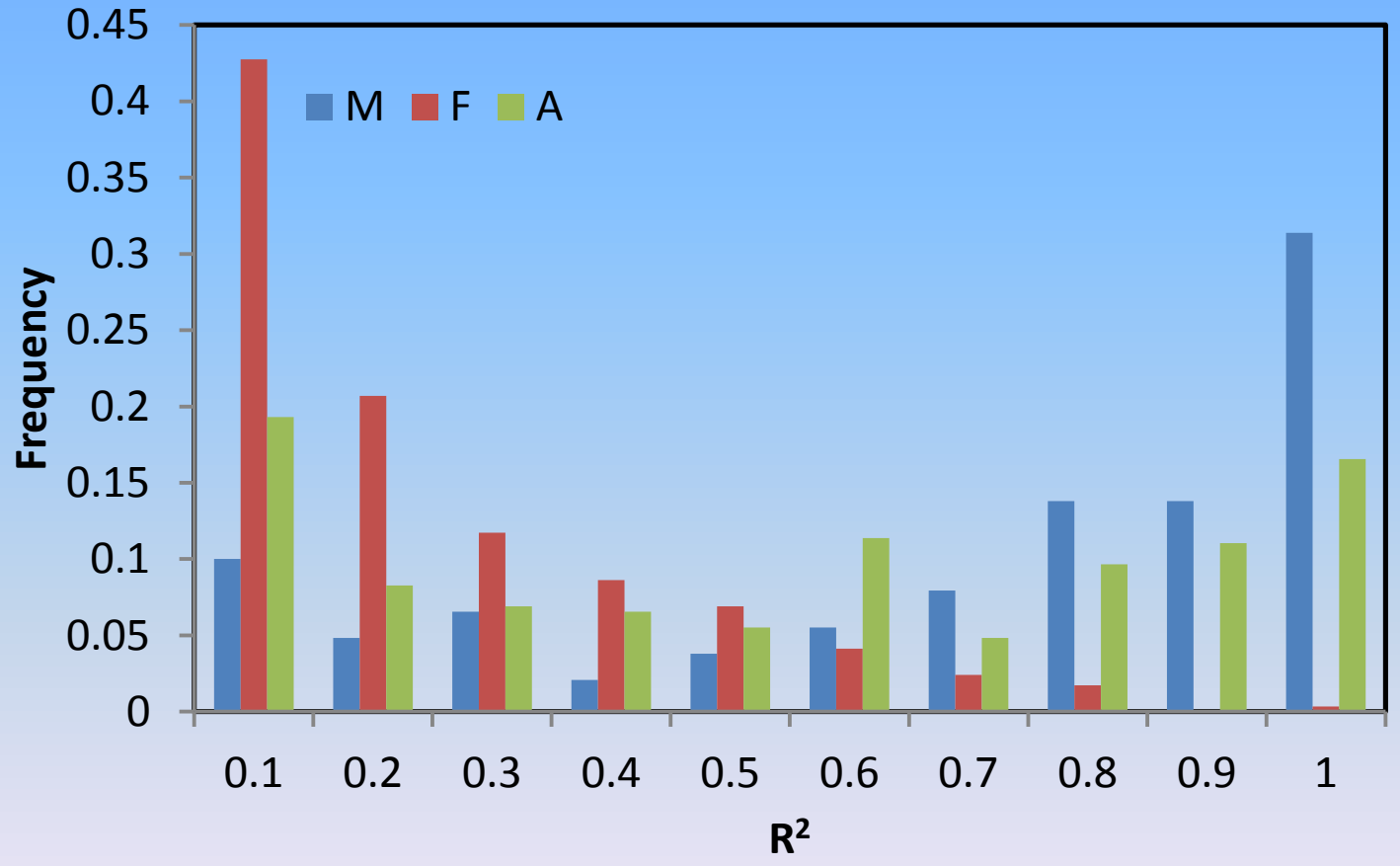
Organic N on pasture: 18 segments were removed before analysis



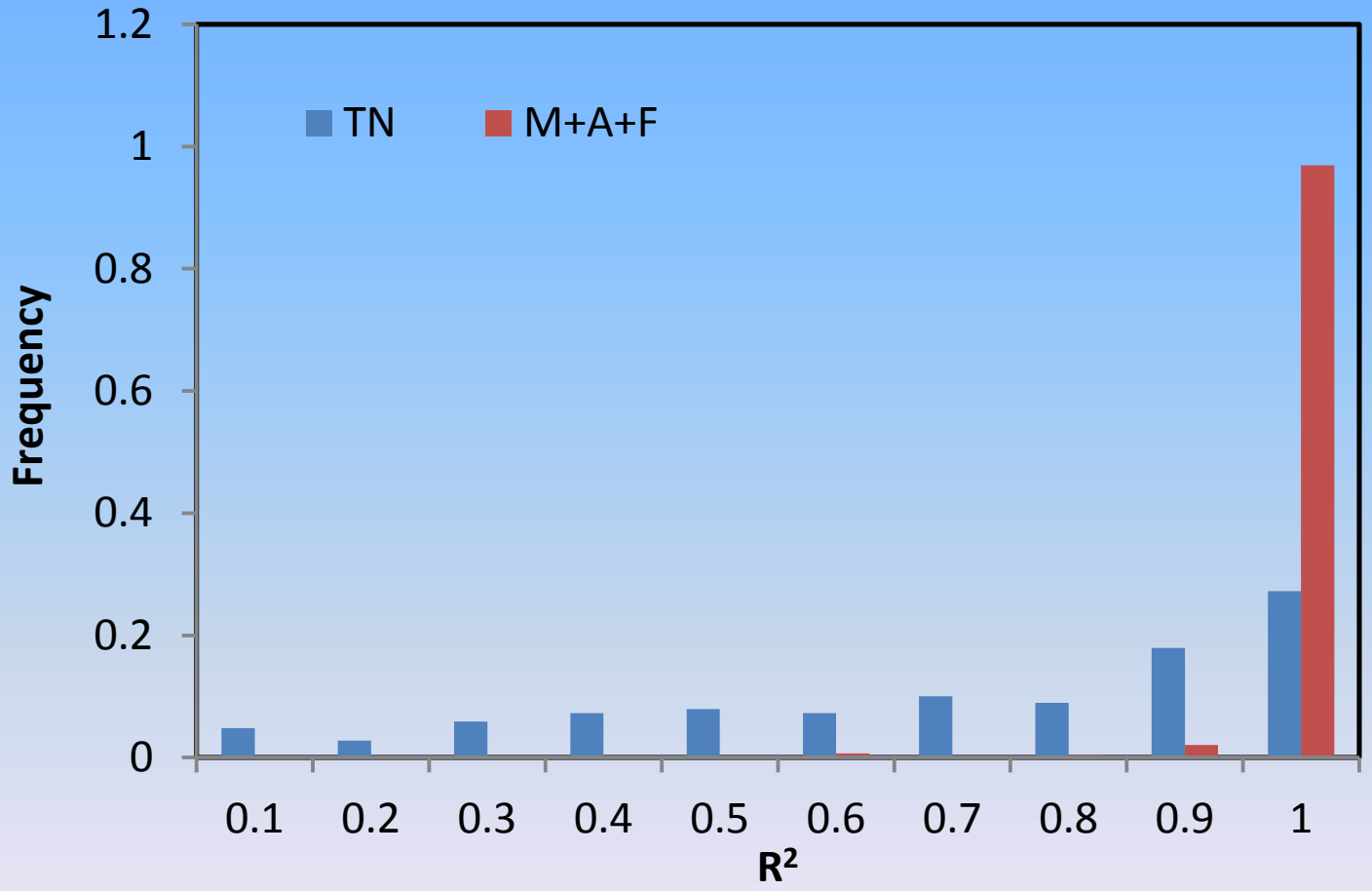


Total N on pasture

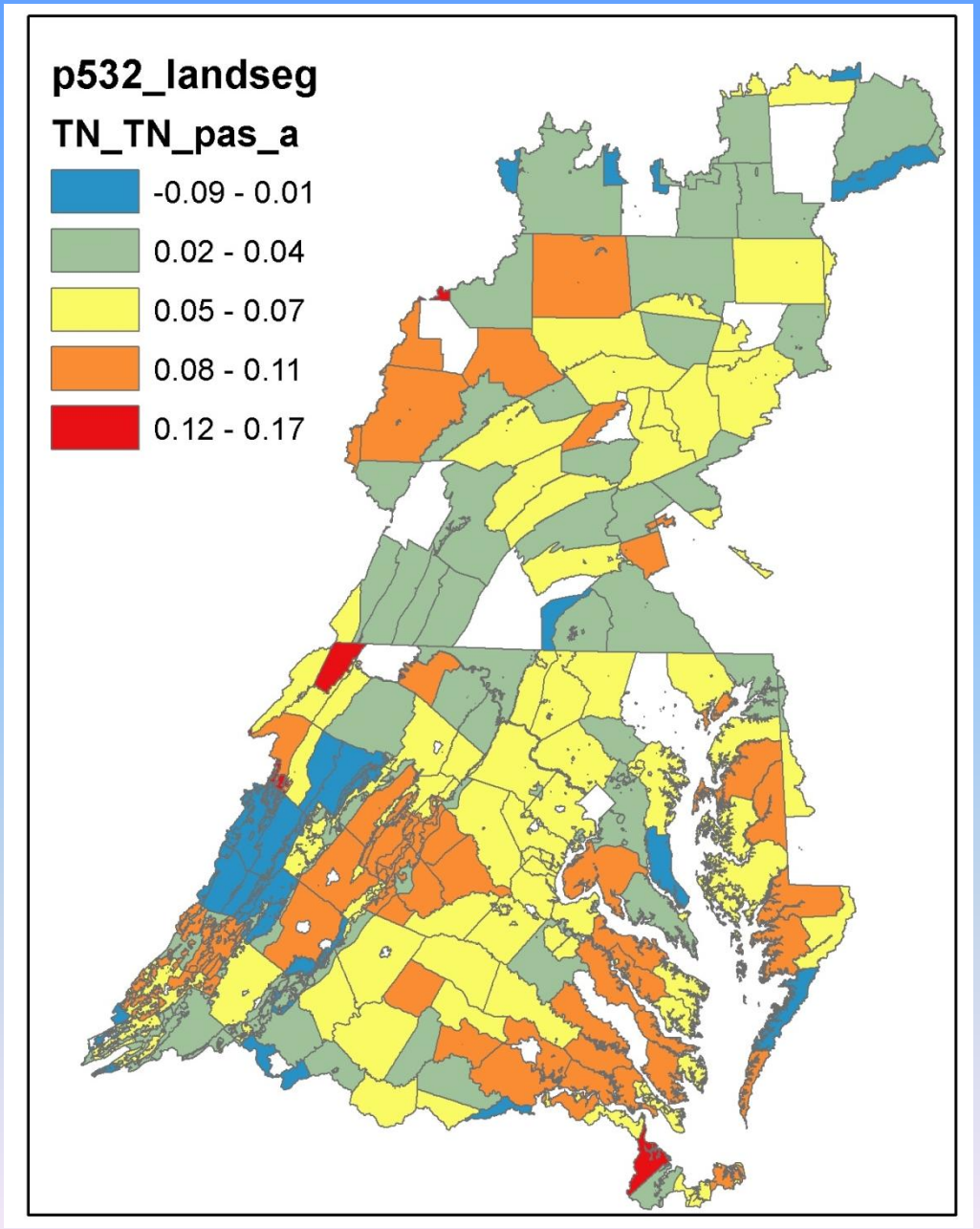
R^2 frequency of regression between total N output and inputs



R^2 frequency of regression between Total-N output and total input and multi-variates

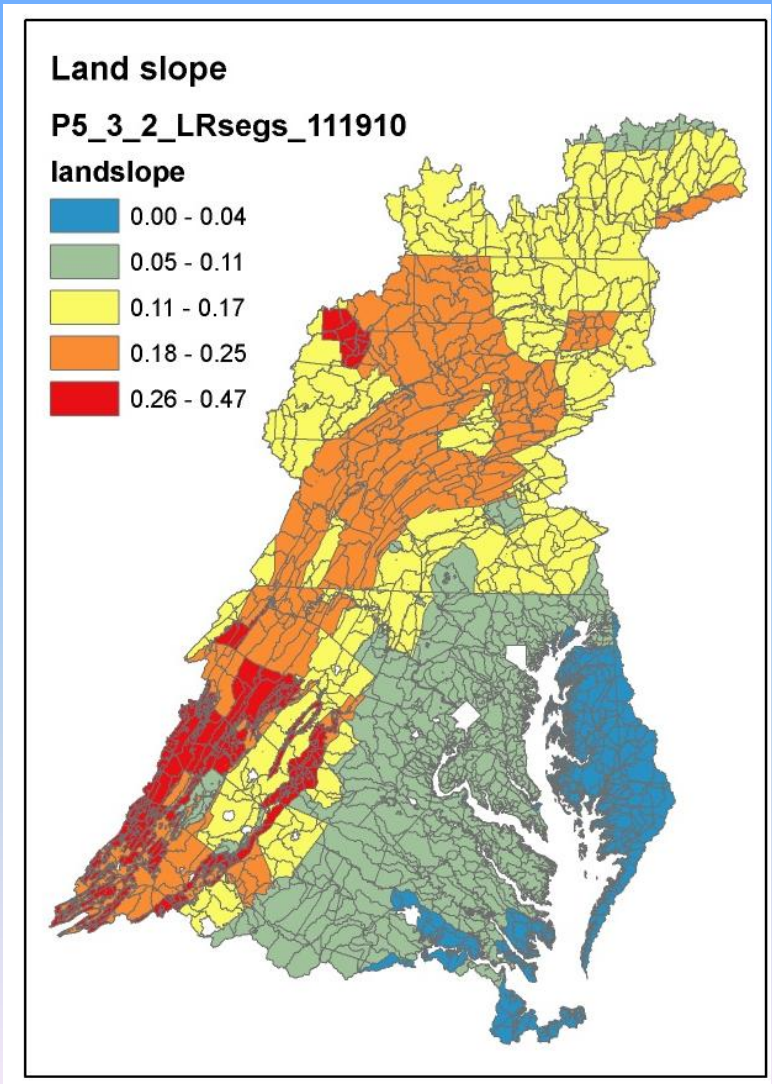


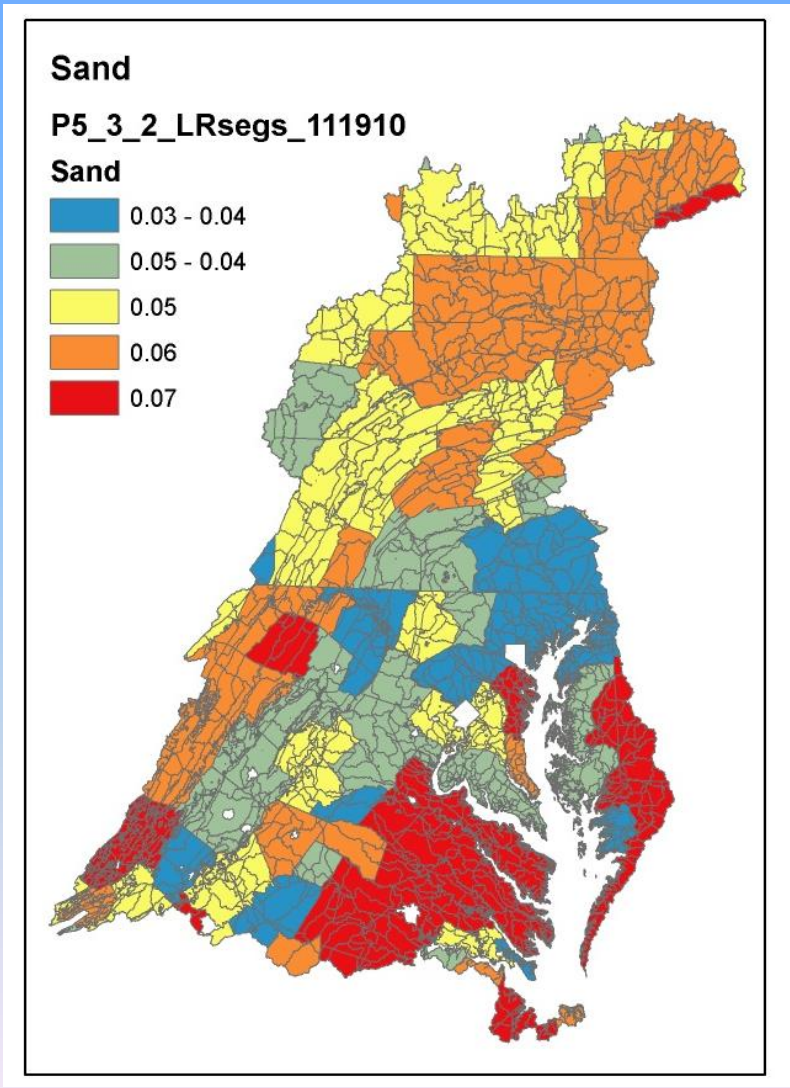
Slope:
Total nitrogen output versus total input regression



Mean=0.067
cv=0.66

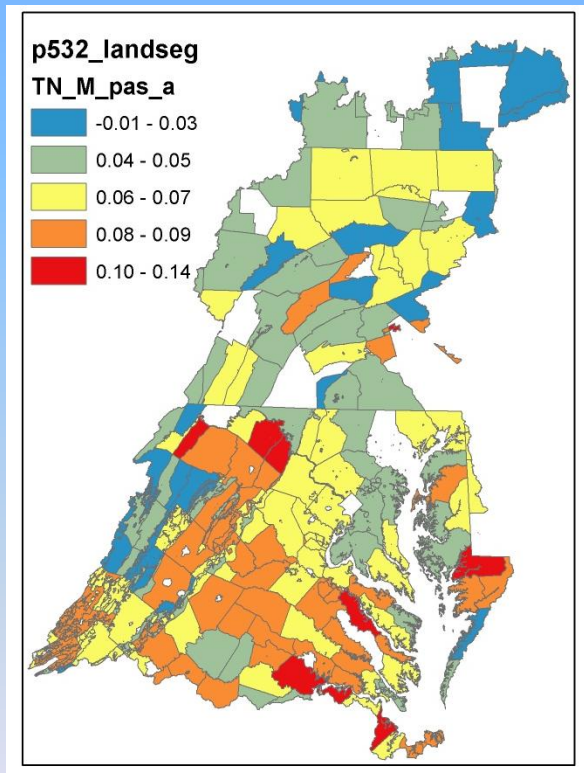
Land slope and clay content





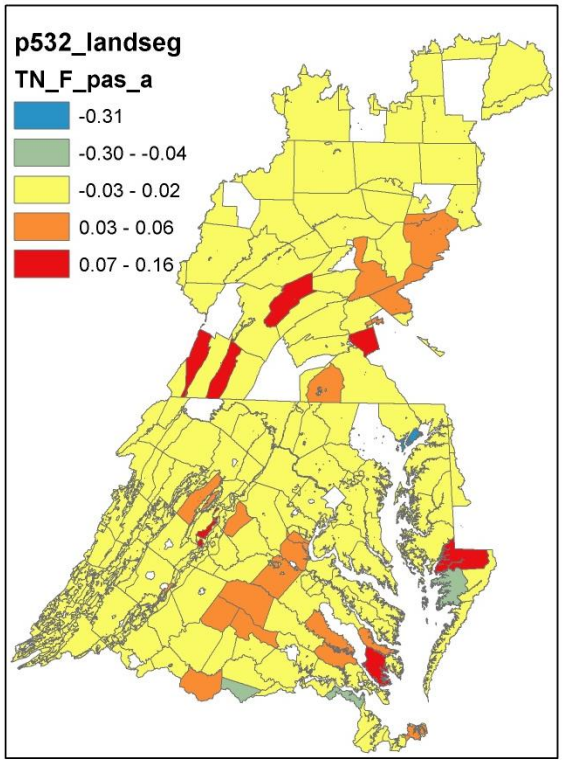
Slope of regression between Total N output and manure+fertilizer+atmos. Dep.

Manure



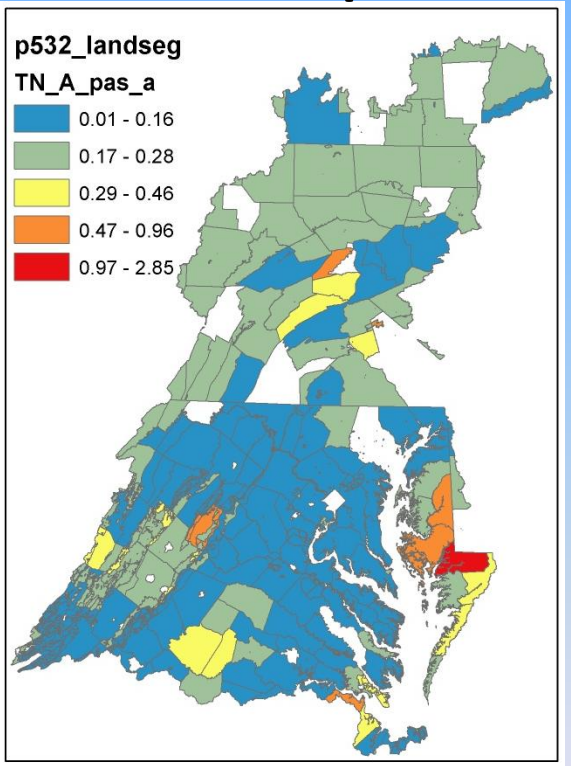
Mean=0.054
cv=0.38

Fertilizer



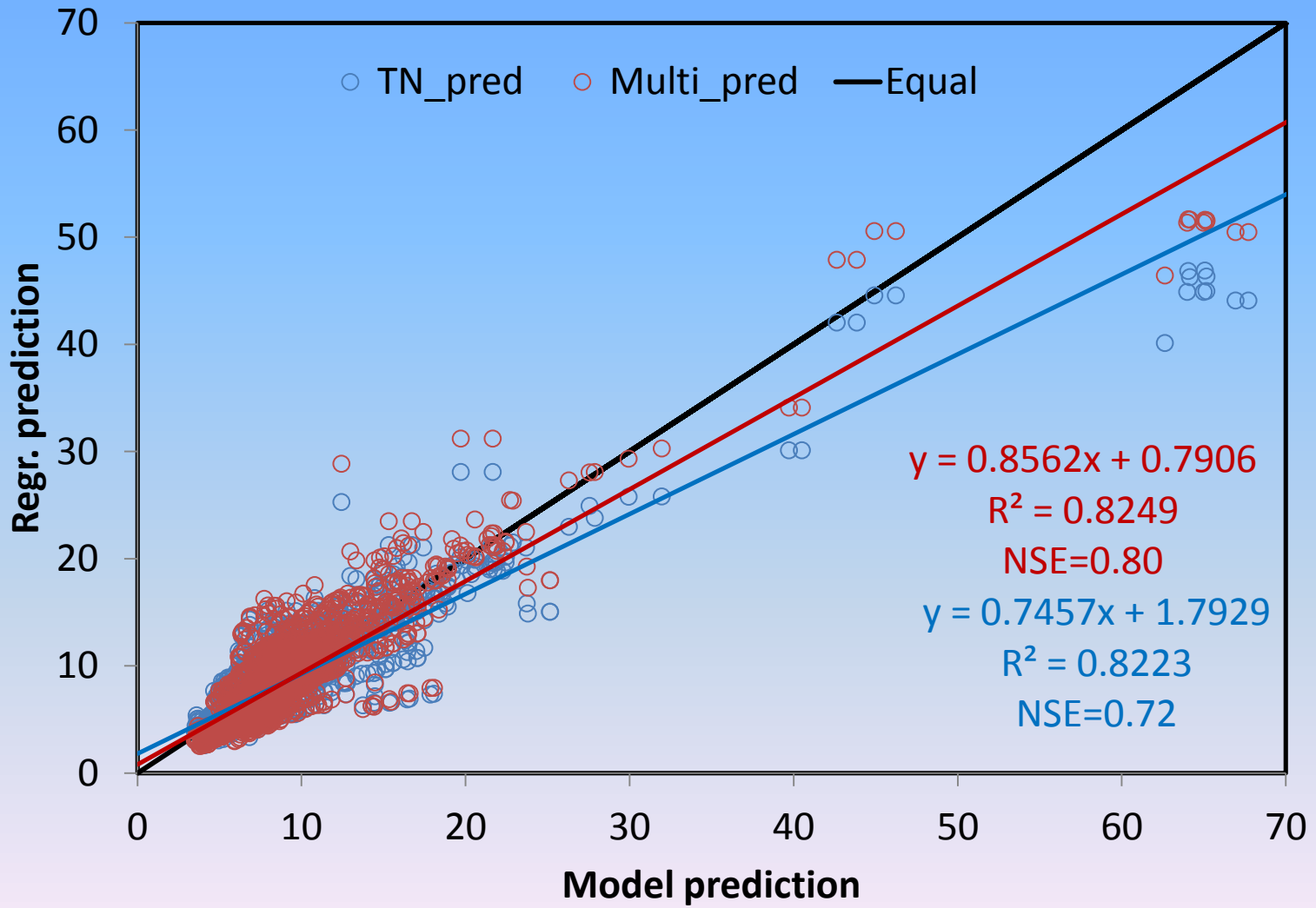
mean=0.006
cv=5.2

Atdep

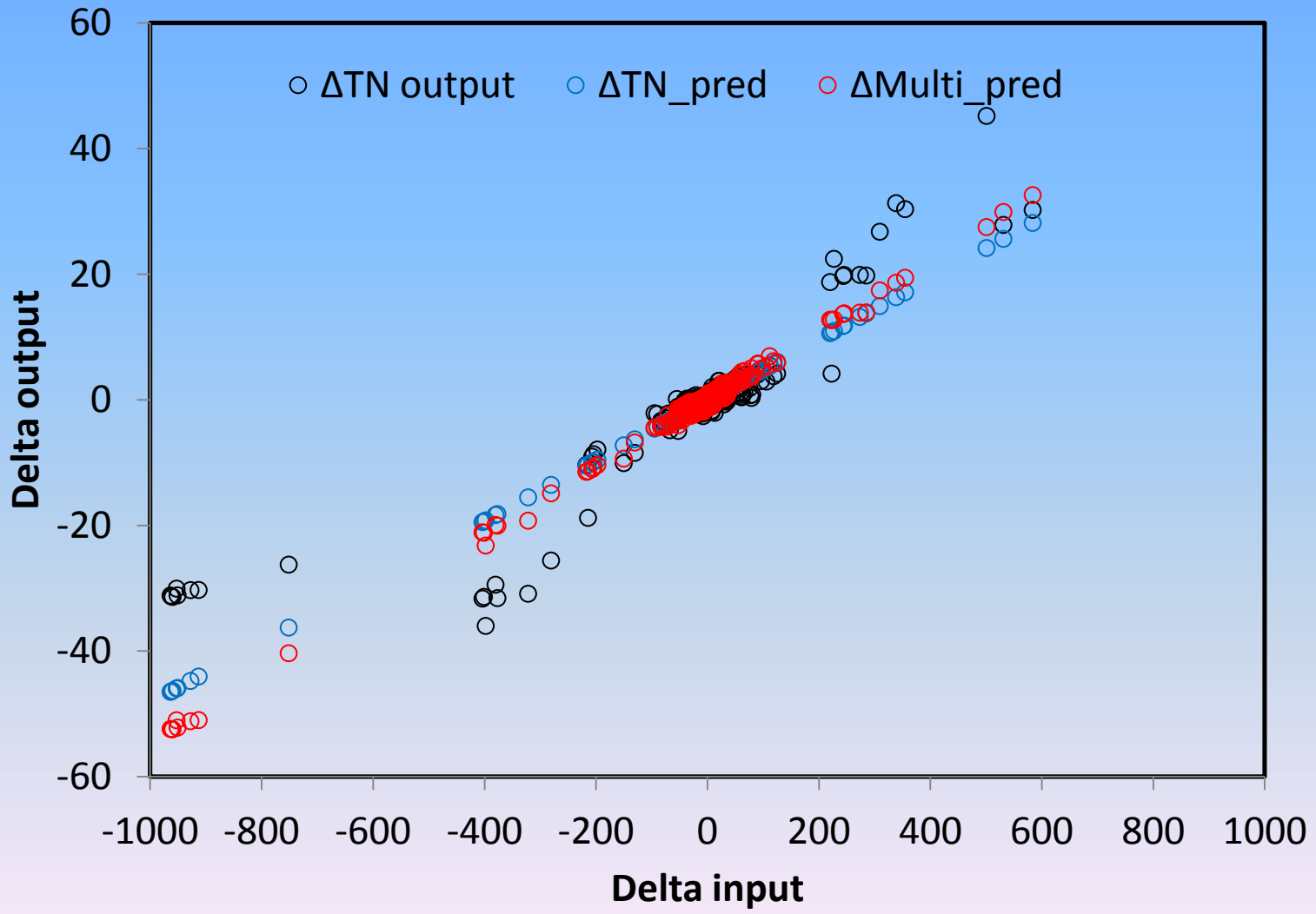


mean=0.202
cv=1.1

Total nitrogen output versus regression prediction using average slope and interception

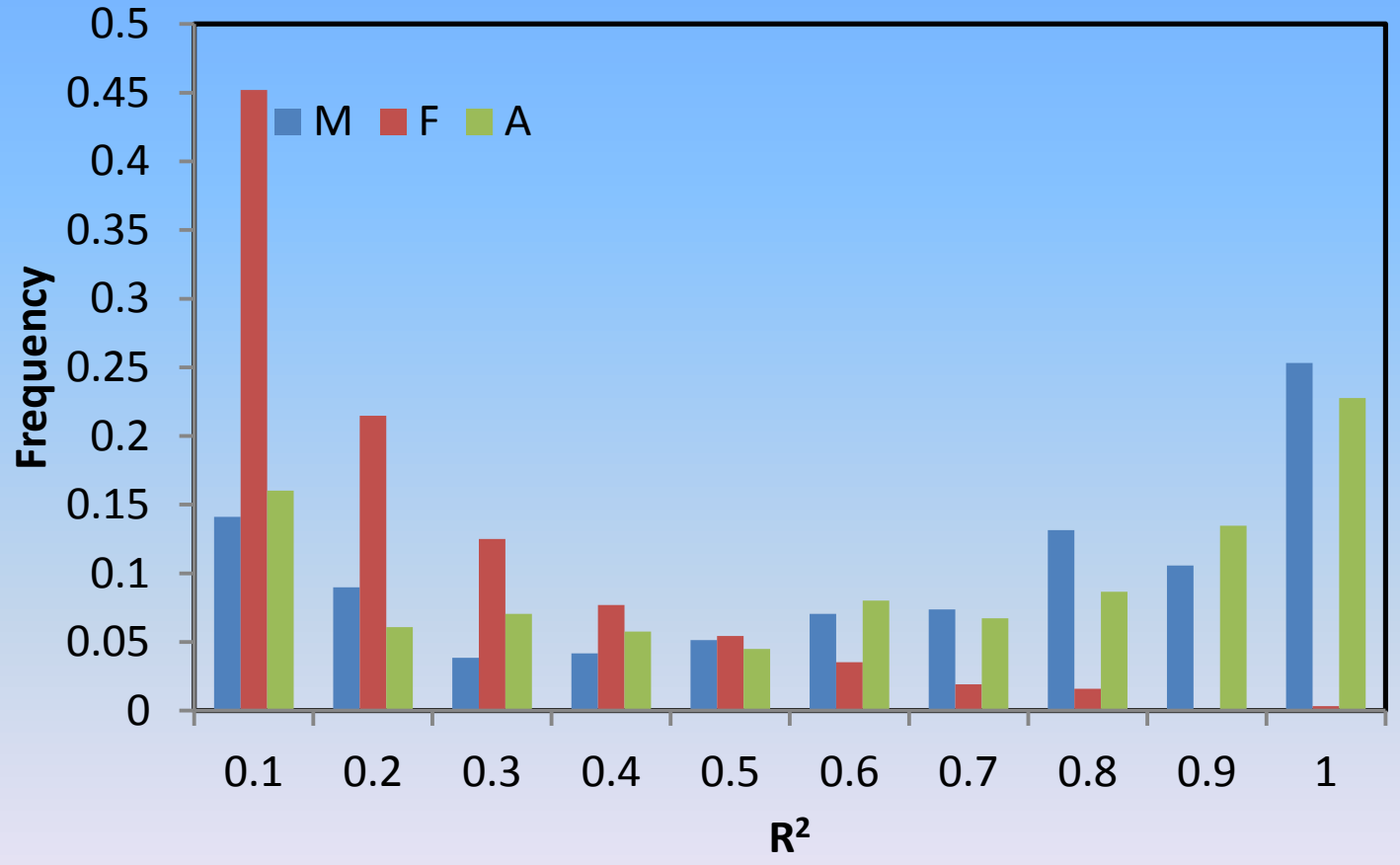


Demeaned total loading versus model total N output and regression prediction

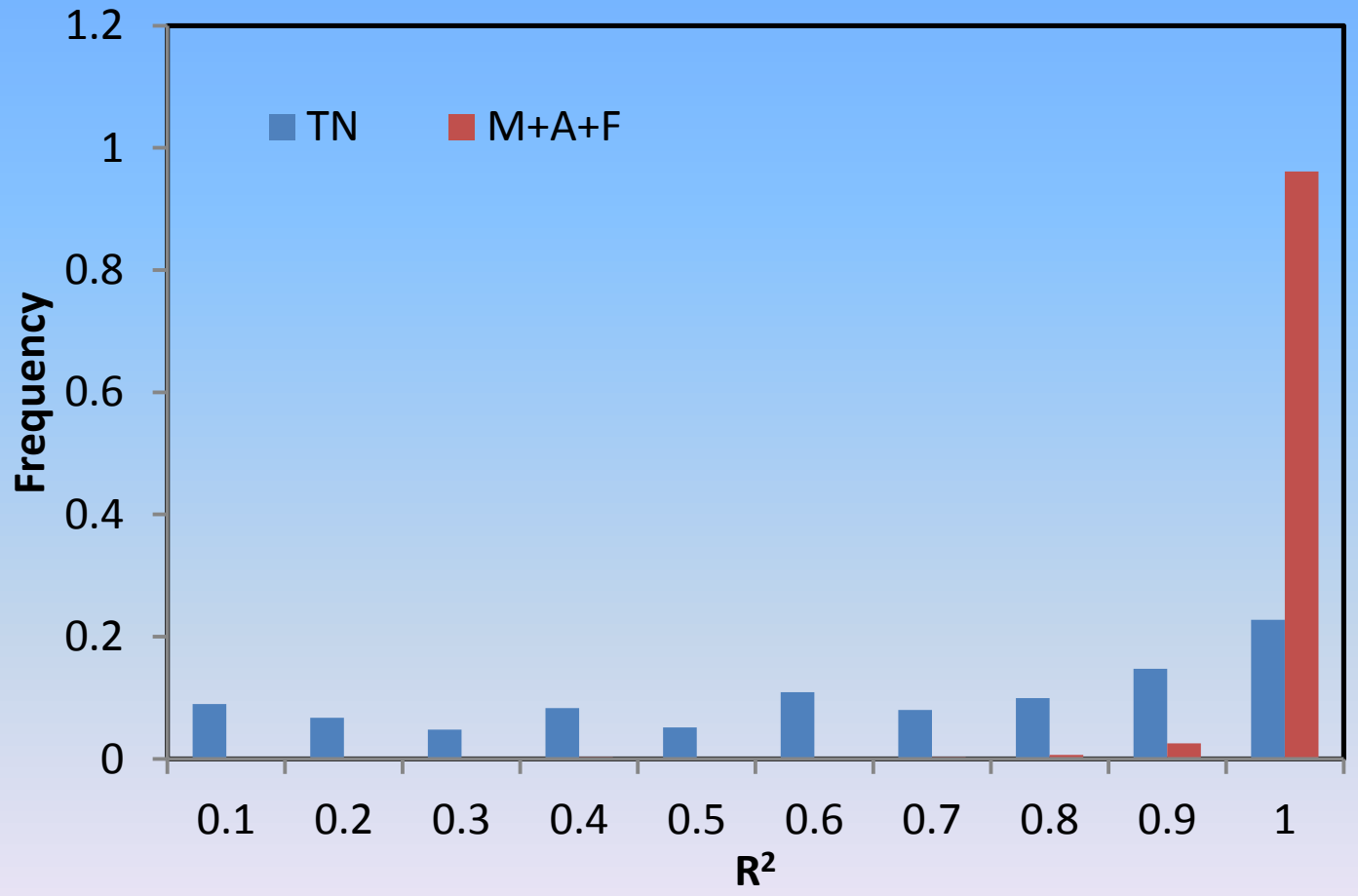


DIN on pasture

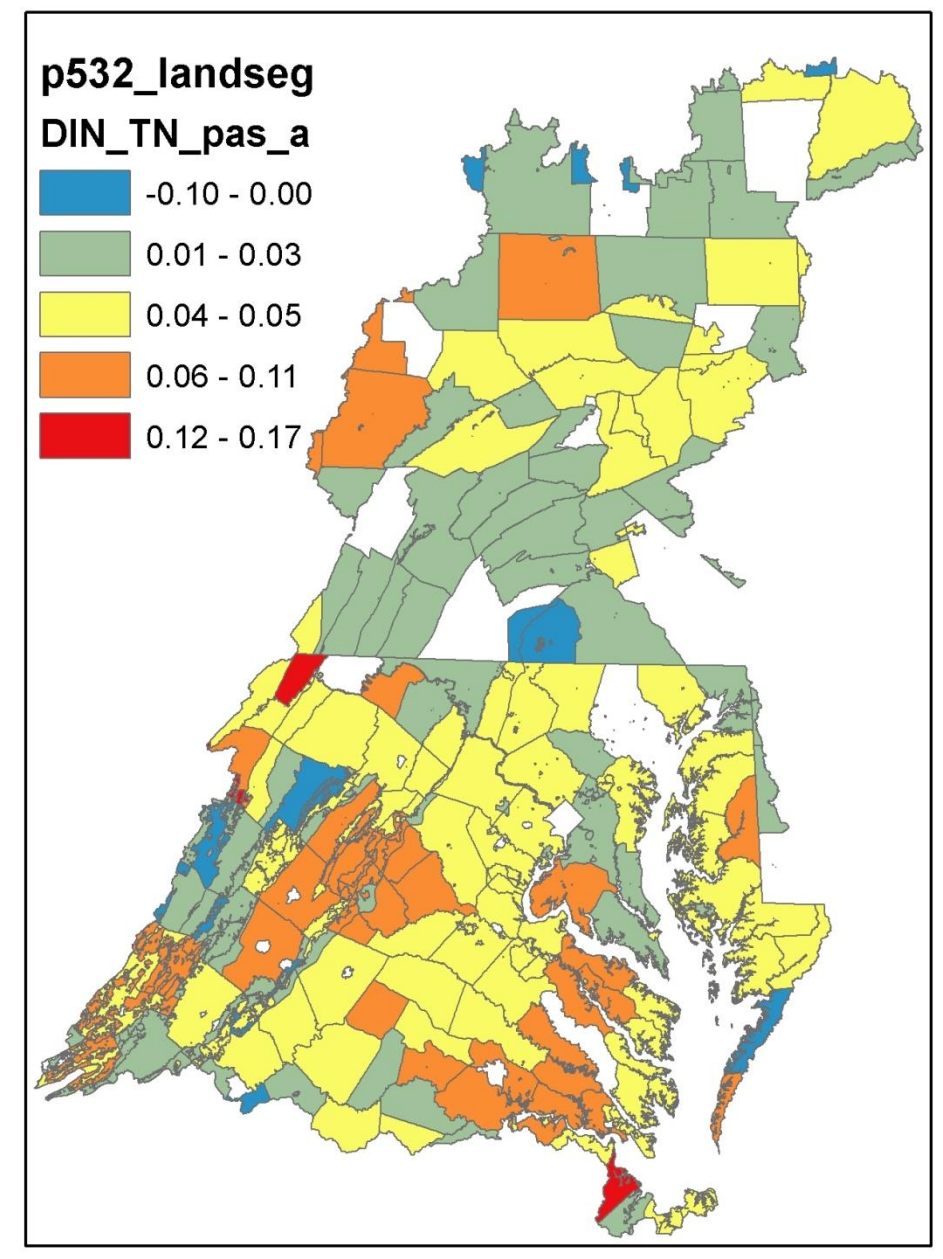
R^2 frequency of regression between DIN output and inputs



R^2 frequency of regression between DIN output and total input and multi-variates



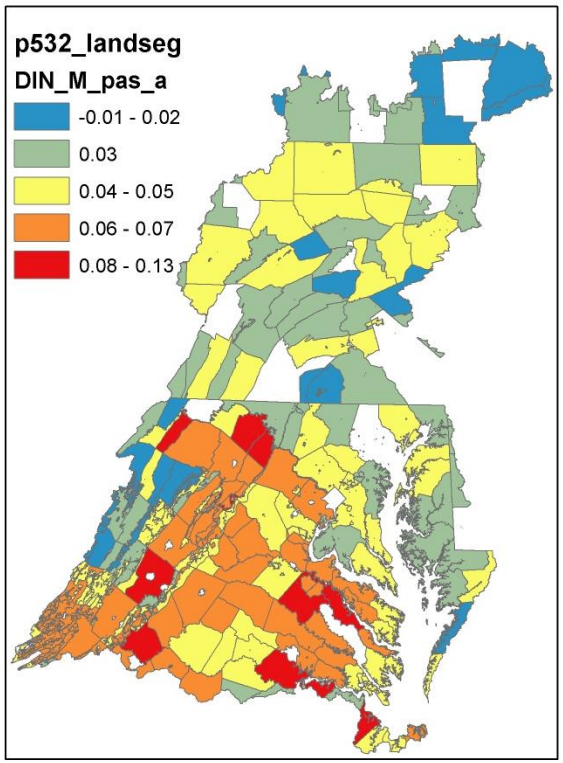
Slope:
DIN output versus total input regression



Mean=0.036
cv=0.81

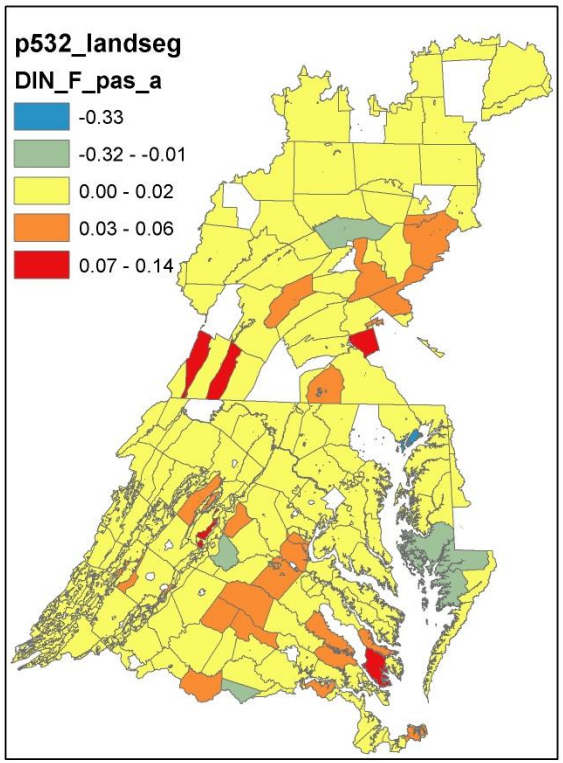
Slope of regression between DIN output and manure+fertilizer+atmos. Dep.

Manure



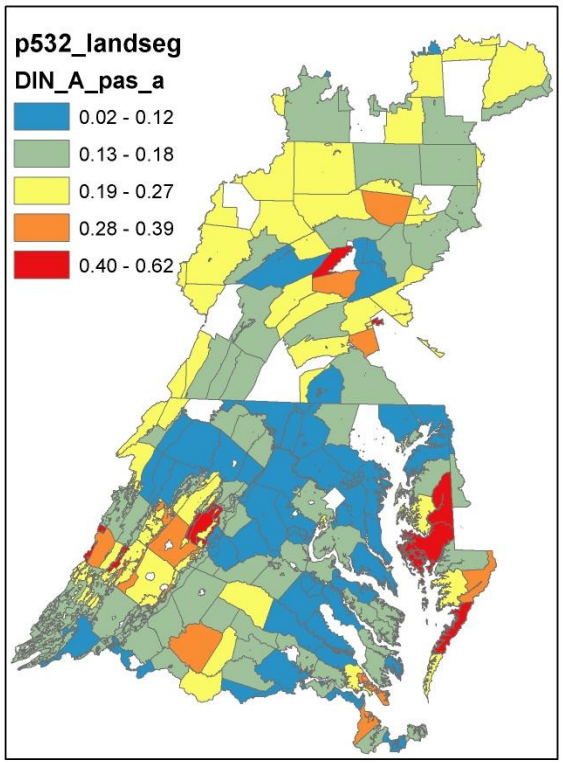
Mean=0.04
cv=0.5

Fertilizer



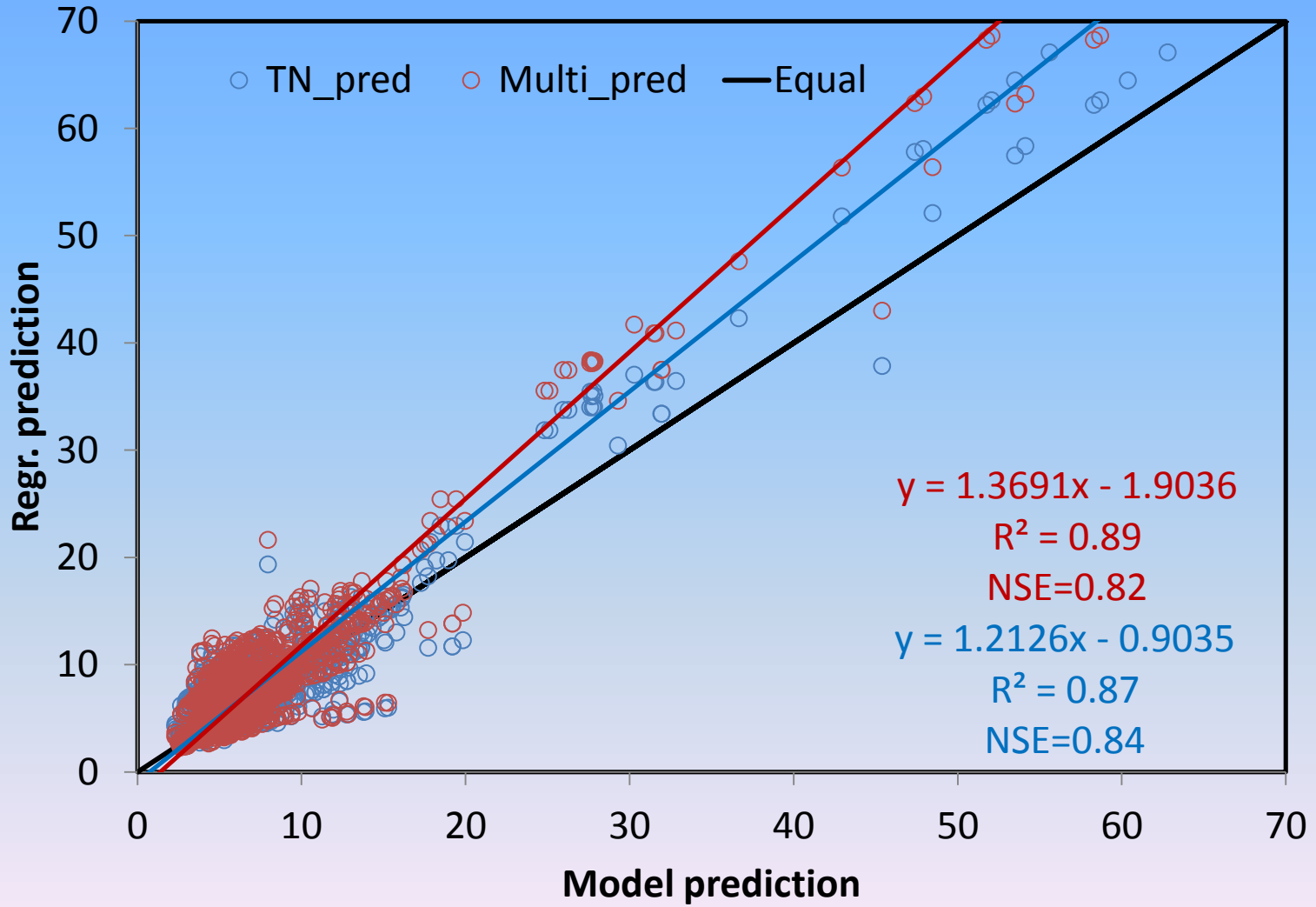
mean=0.005
cv=6.0

Atdep

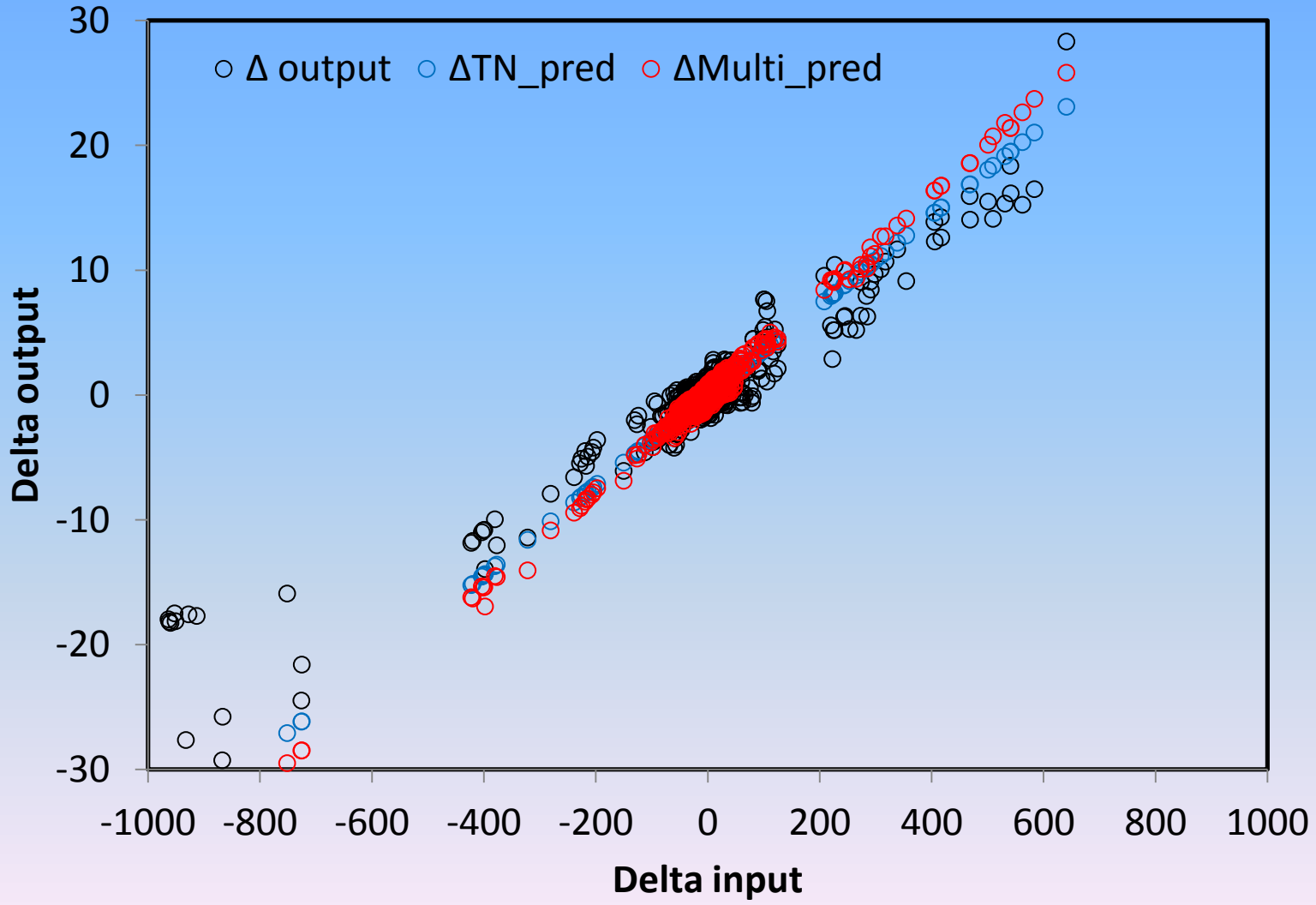


mean=0.17
cv=0.1

DIN output versus regression prediction using average slope and interception

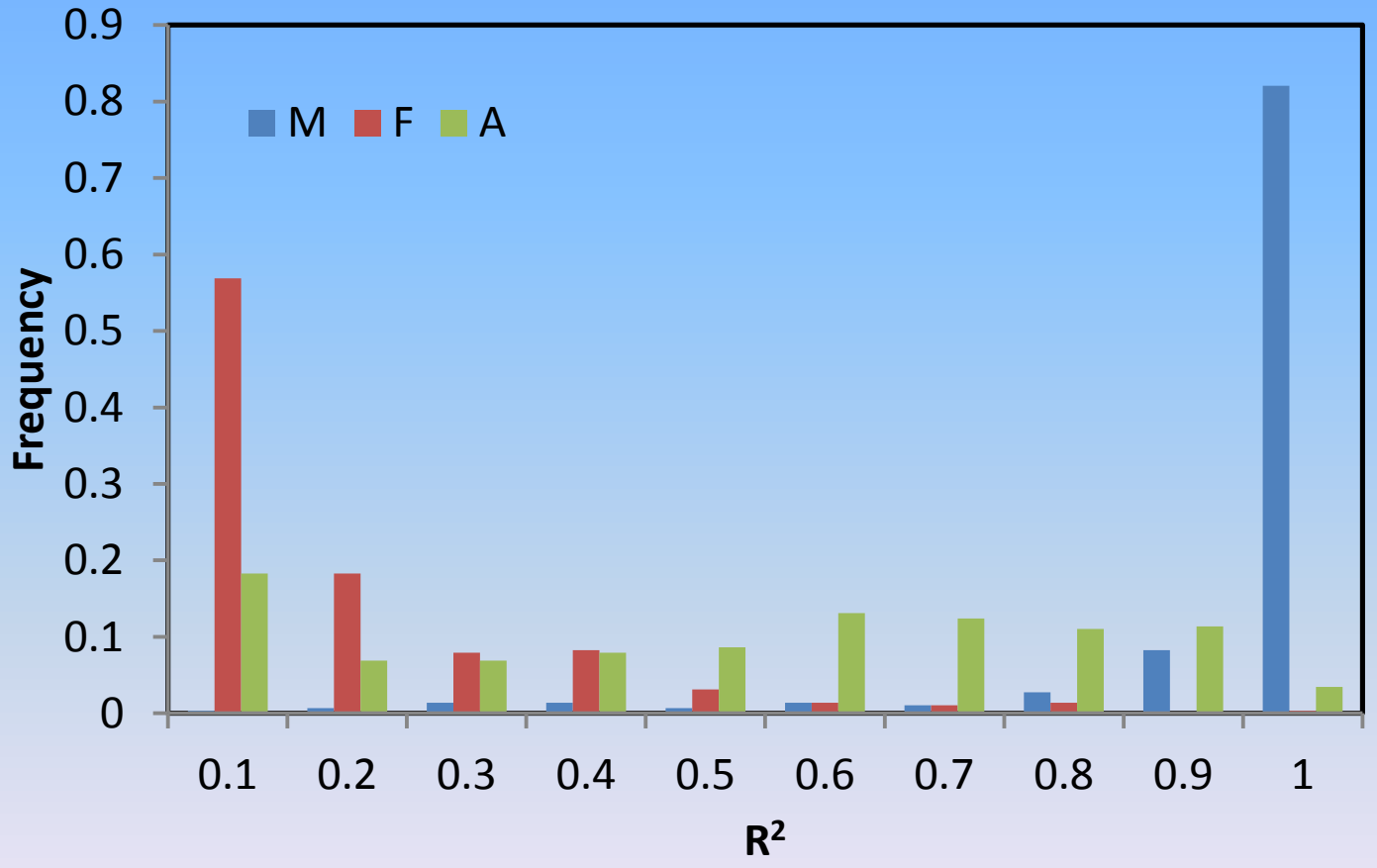


Demeaned total loading versus model DIN output and regression prediction

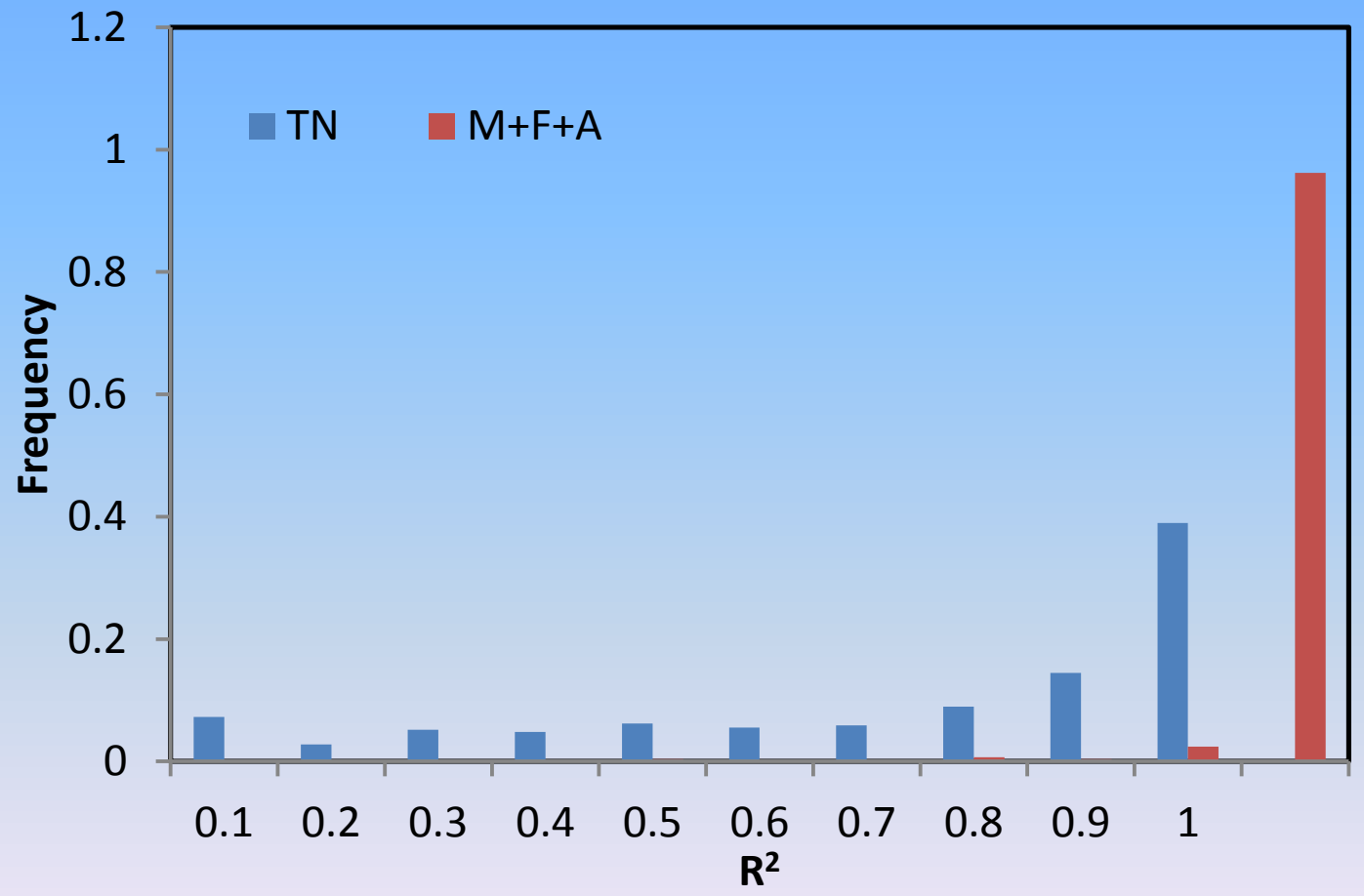


Organic N on pasture

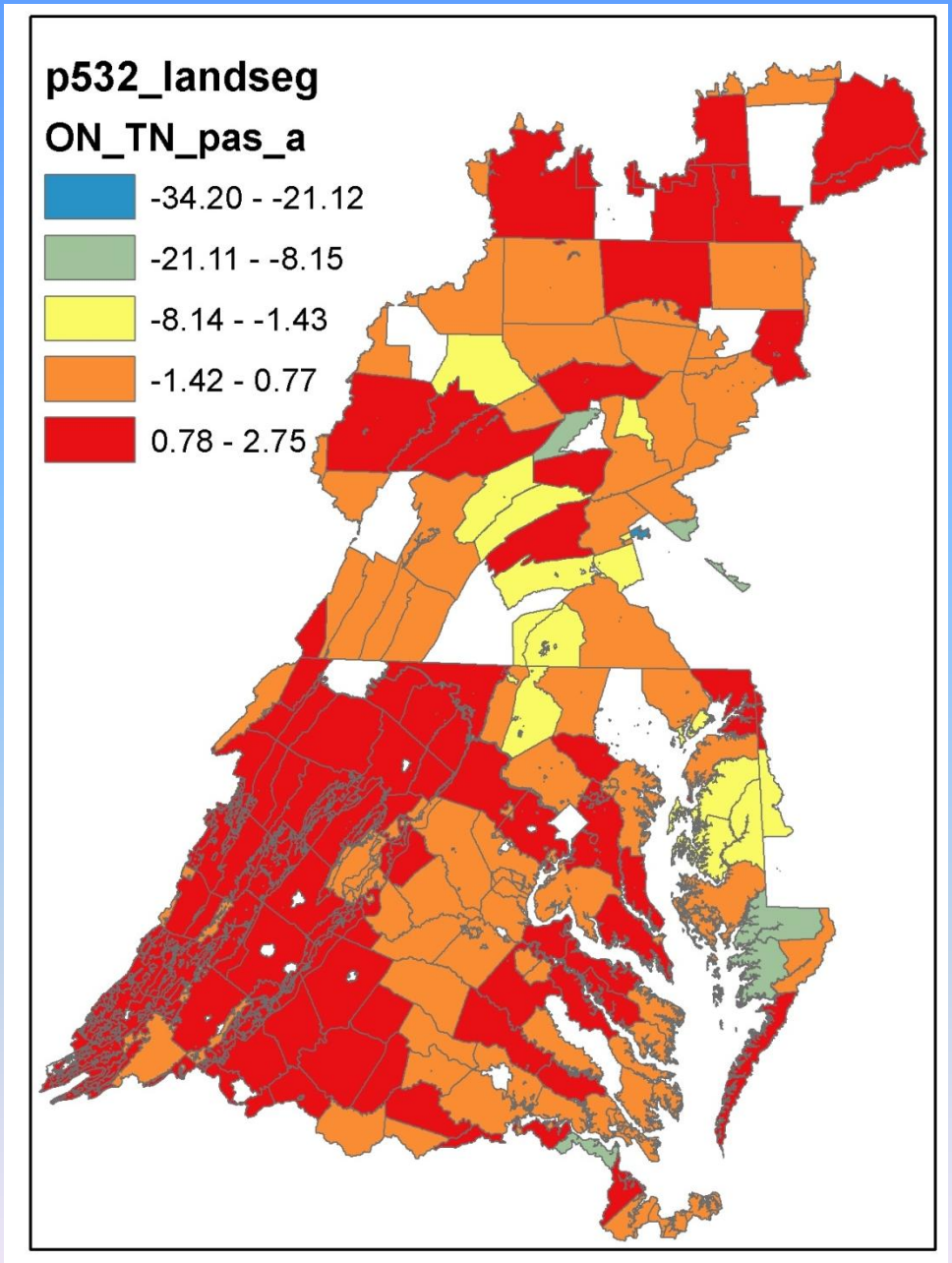
R^2 frequency of regression between organic N output and inputs



R^2 frequency of regression between Organic N output and total input and multi-variates



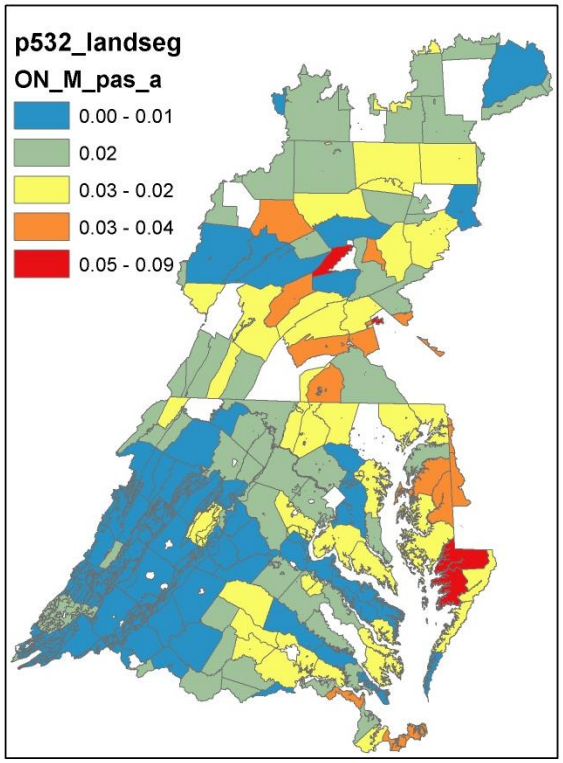
Slope: Organic N output versus total input regression



Mean=0.012
cv=0.94

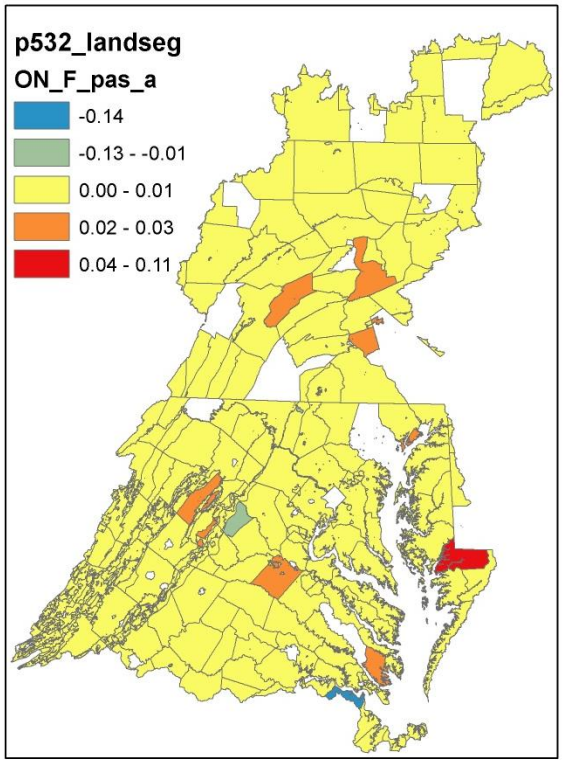
Slope of regression between Organic N output and manure+fertilizer+atmos. Dep.

Manure



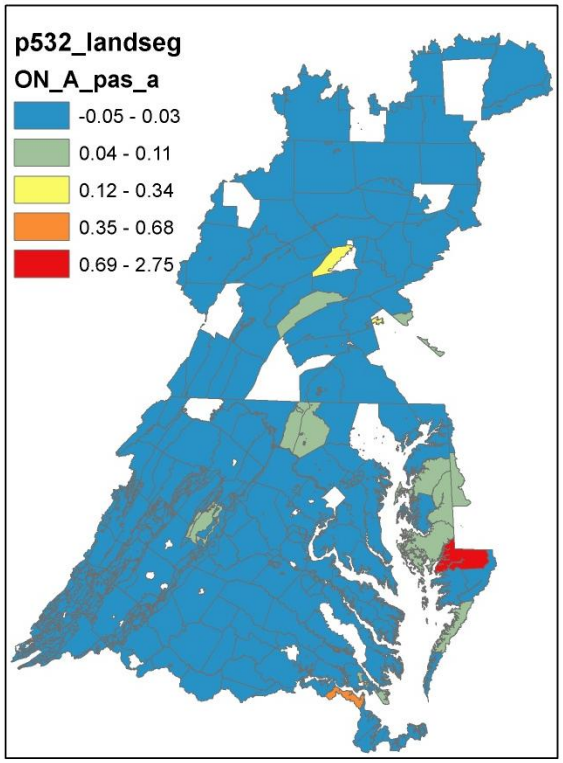
Mean=0.015
cv=0.75

Fertilizer



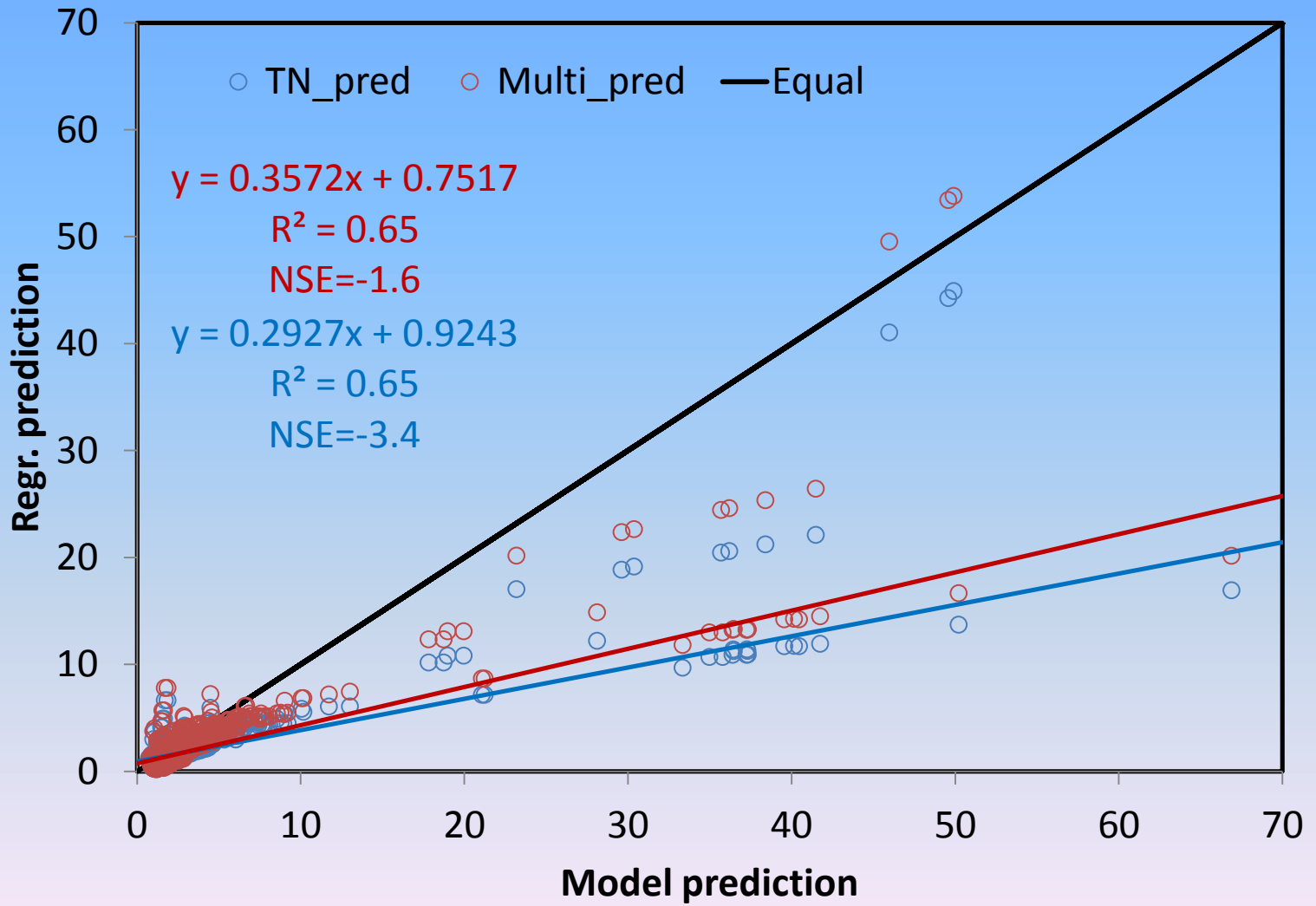
mean=0.001
cv=9

Atdep

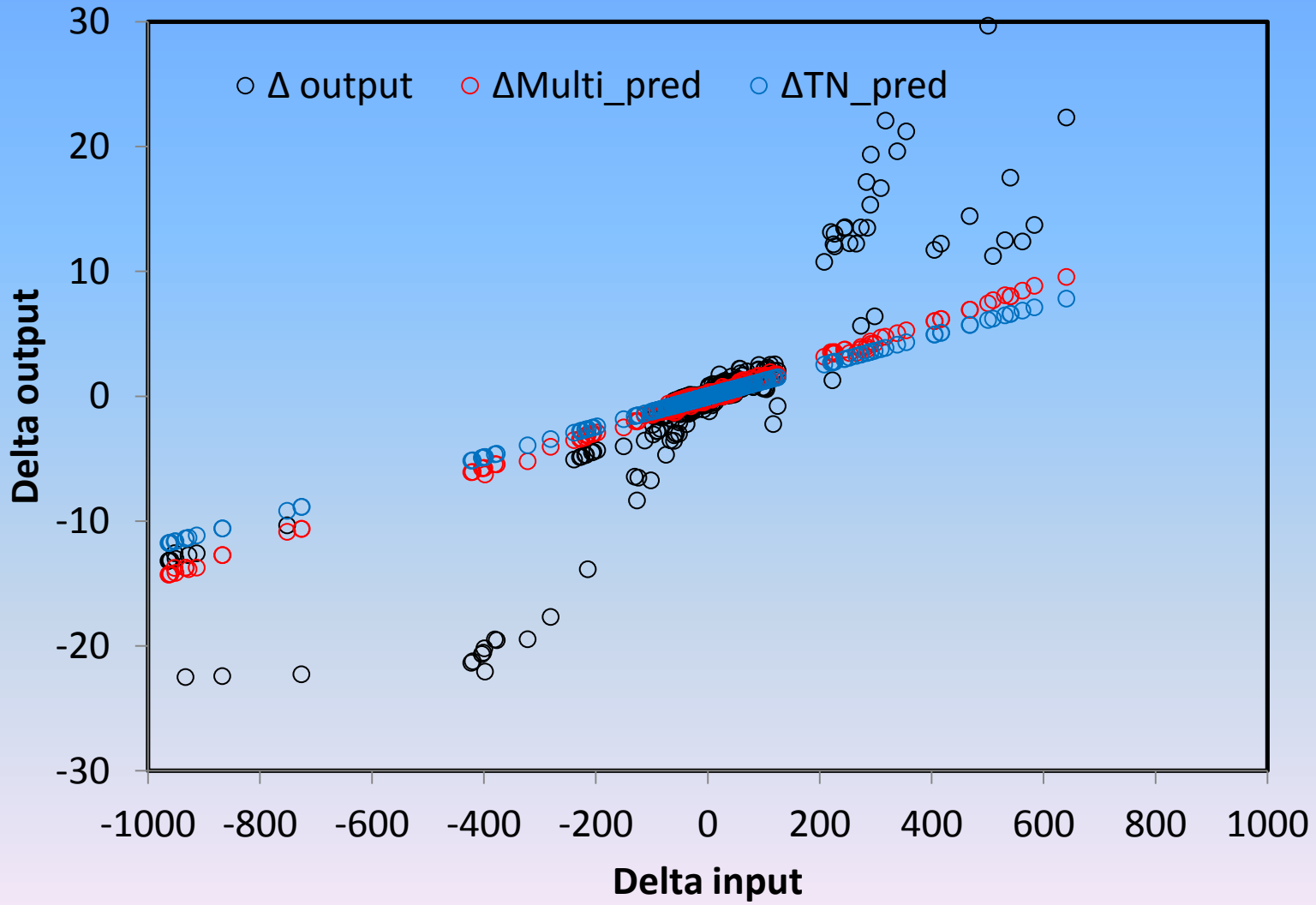


mean=0.027
cv=7

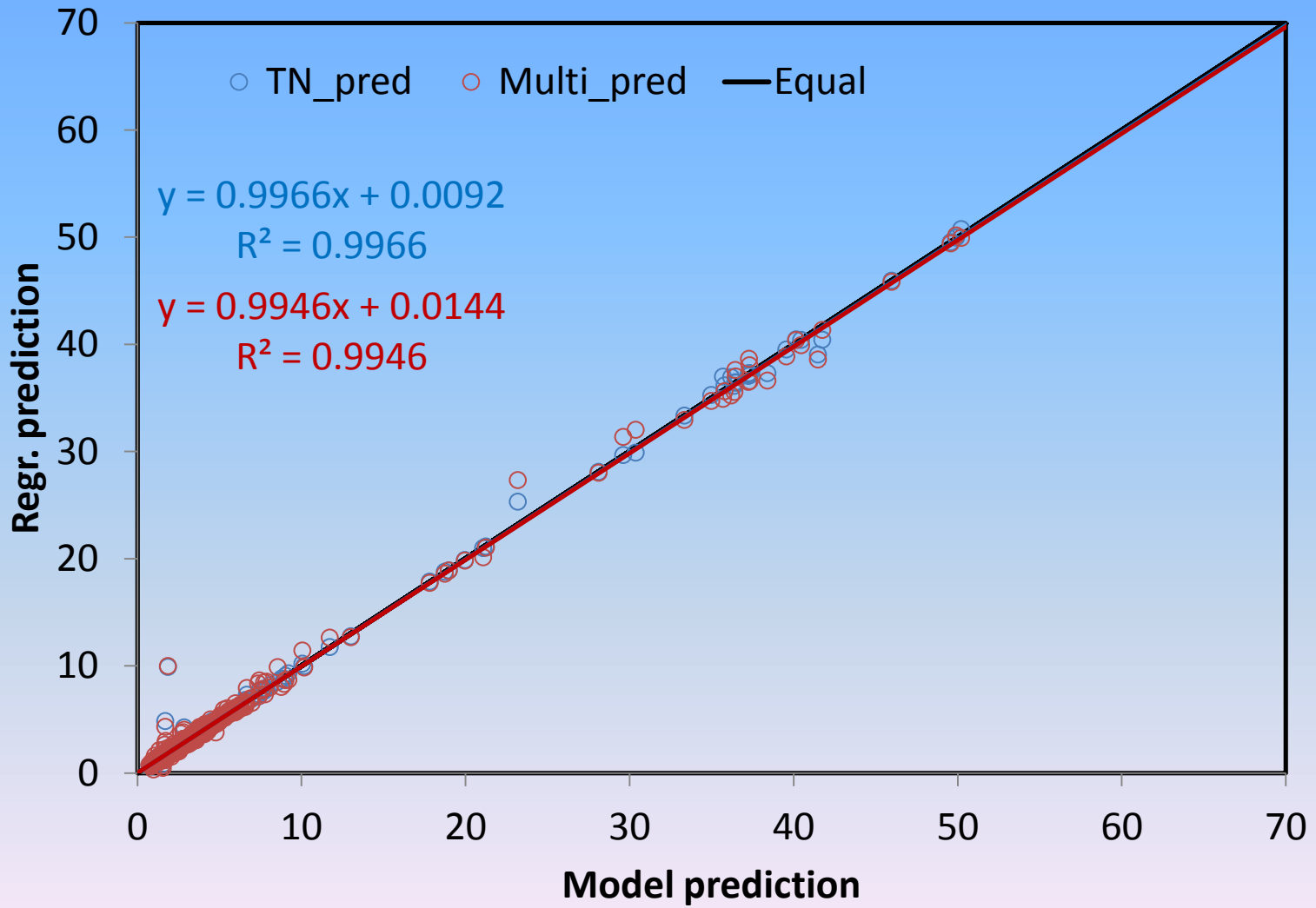
Organic N output versus regression prediction using average slope and interception



Demeaned total loading versus model Organic N output and regression prediction



Organic N output versus regression prediction segment by segment

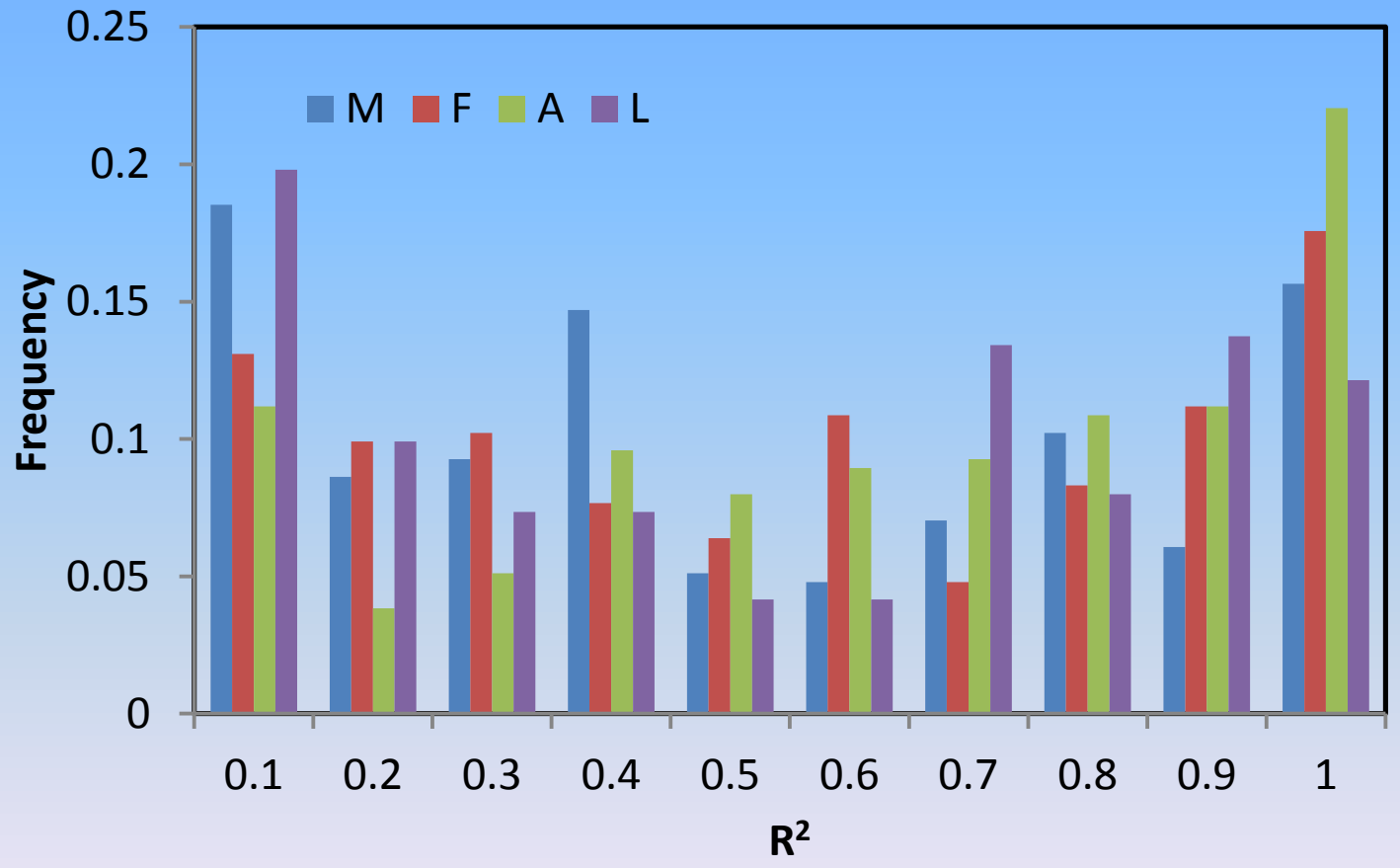


Summary of pasture

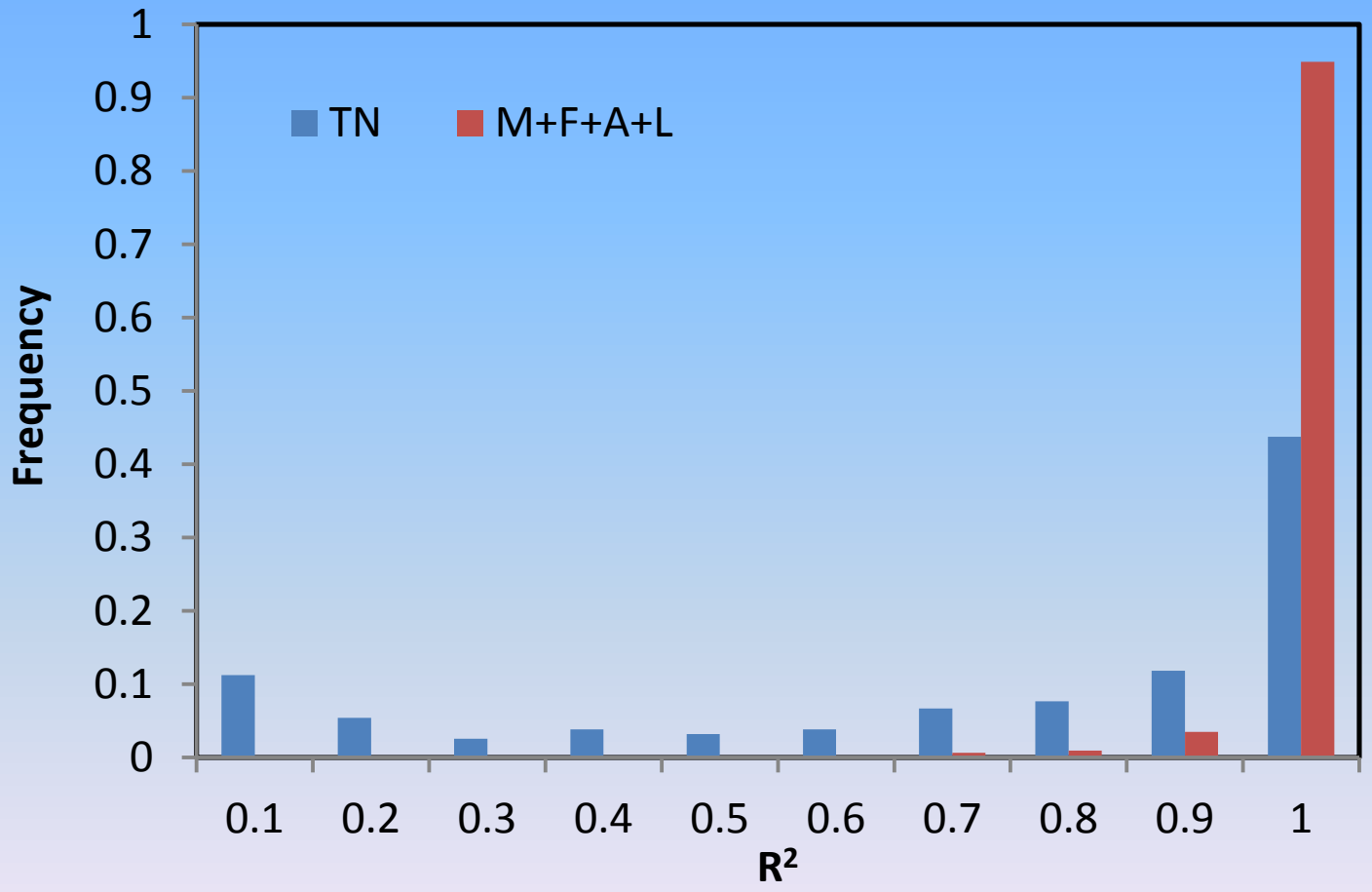
Constituent	Total input R2	Multi-V R2	Total input NSE	Multi-V NSE
Total N	0.82	0.82	0.72	0.80
DIN	0.87	0.89	0.84	0.82
Organic N	0.65	0.65	-3.4	-1.6

Total nitrogen on high-tillage cropland with manure

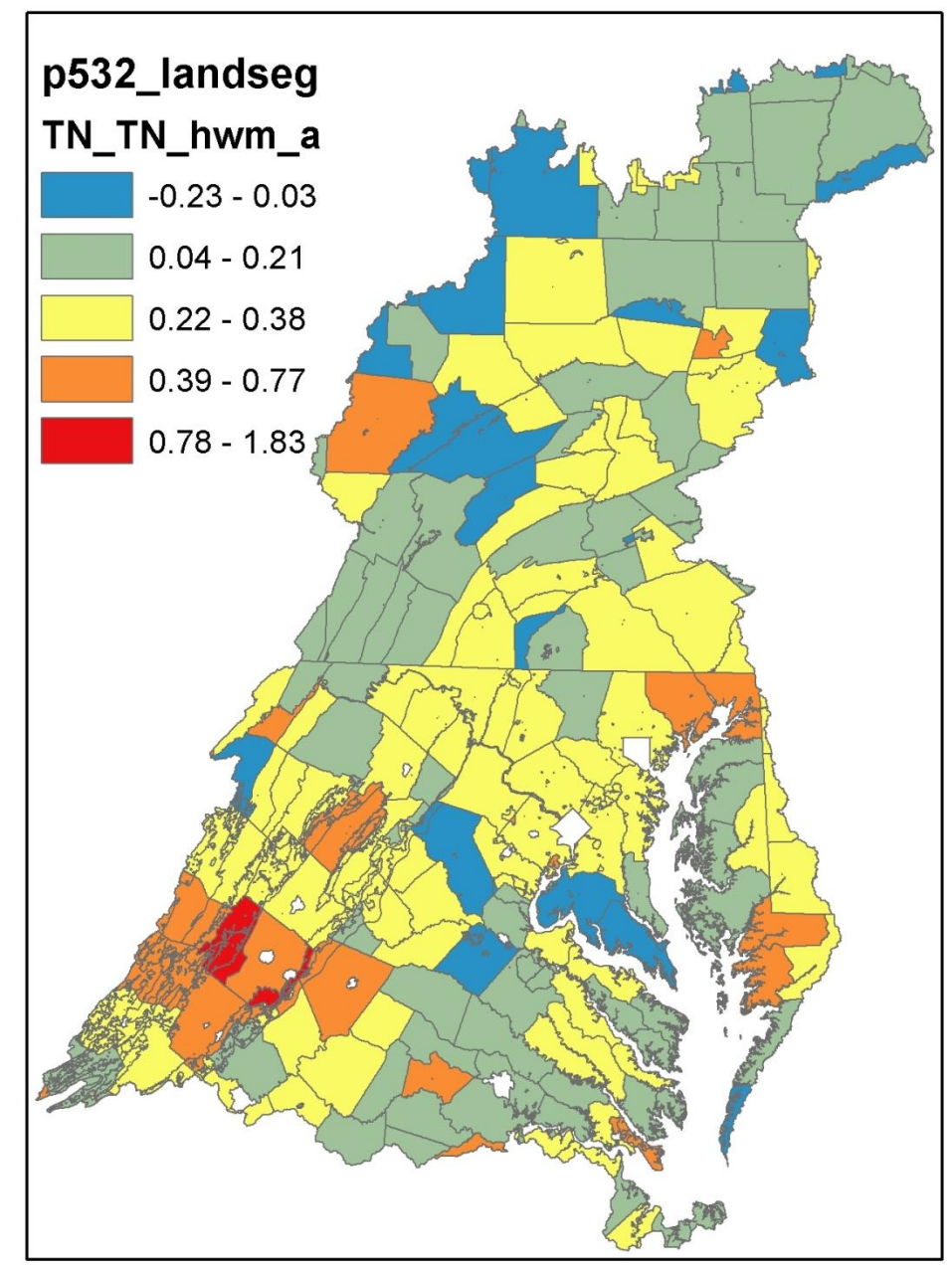
R^2 frequency of regression between total N output and inputs



R^2 frequency of regression between Total-N output and total input and multi-variates



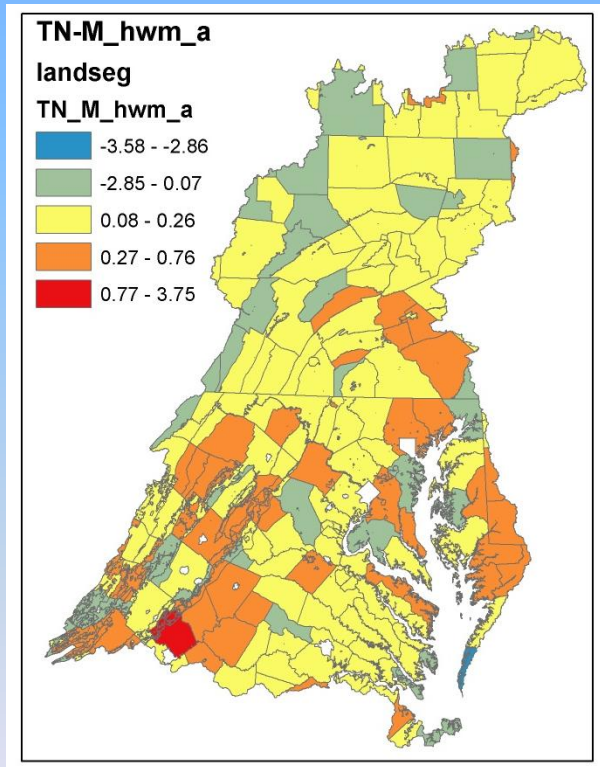
Slope:
Total nitrogen output versus total input regression



Mean=0.23
cv=0.95

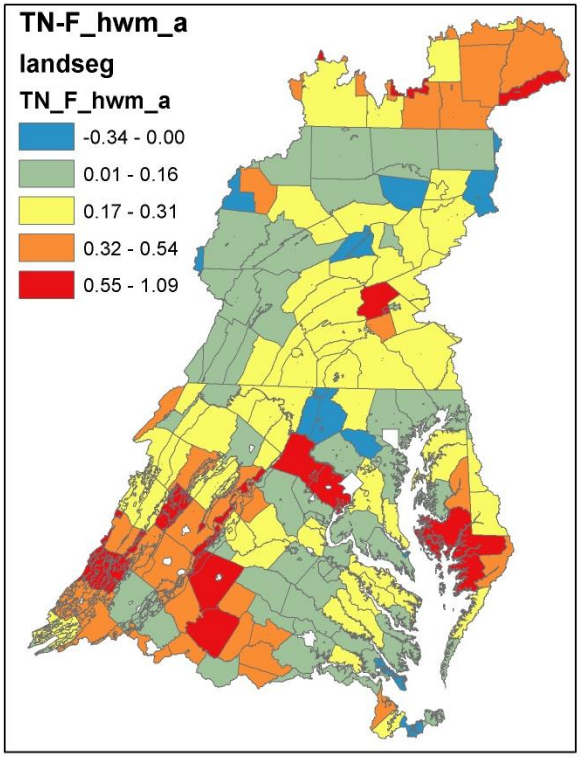
Slope of regression between Total-N output and manure+fertilizer+atmos. Dep.+legume

TN



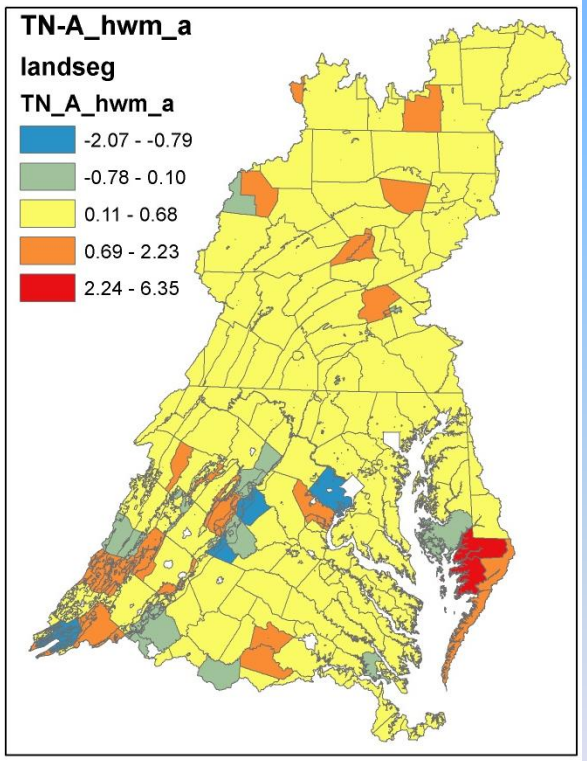
Mean=0.166
cv=2.93

Manure



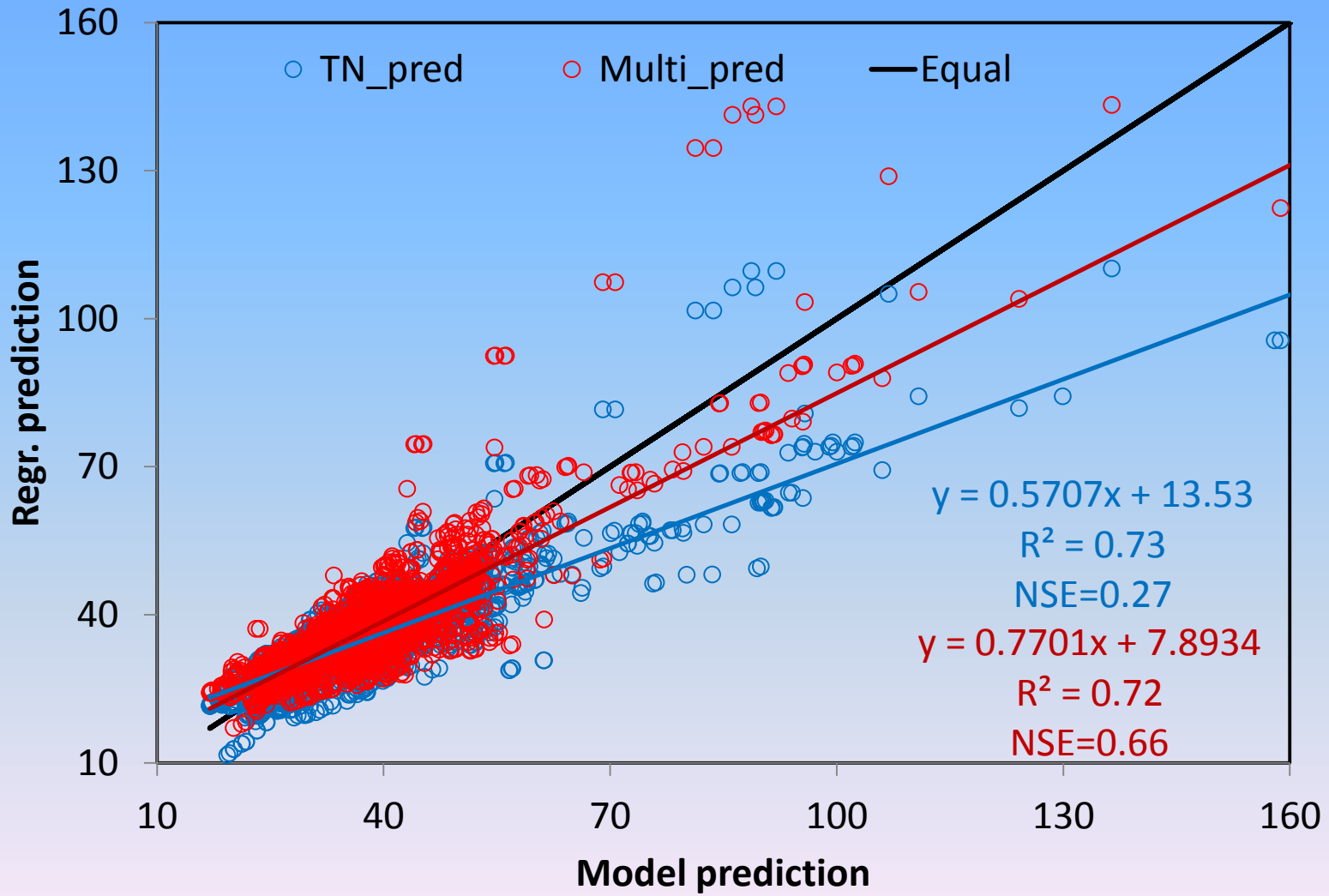
mean=0.246
cv=0.83

Fertilizer

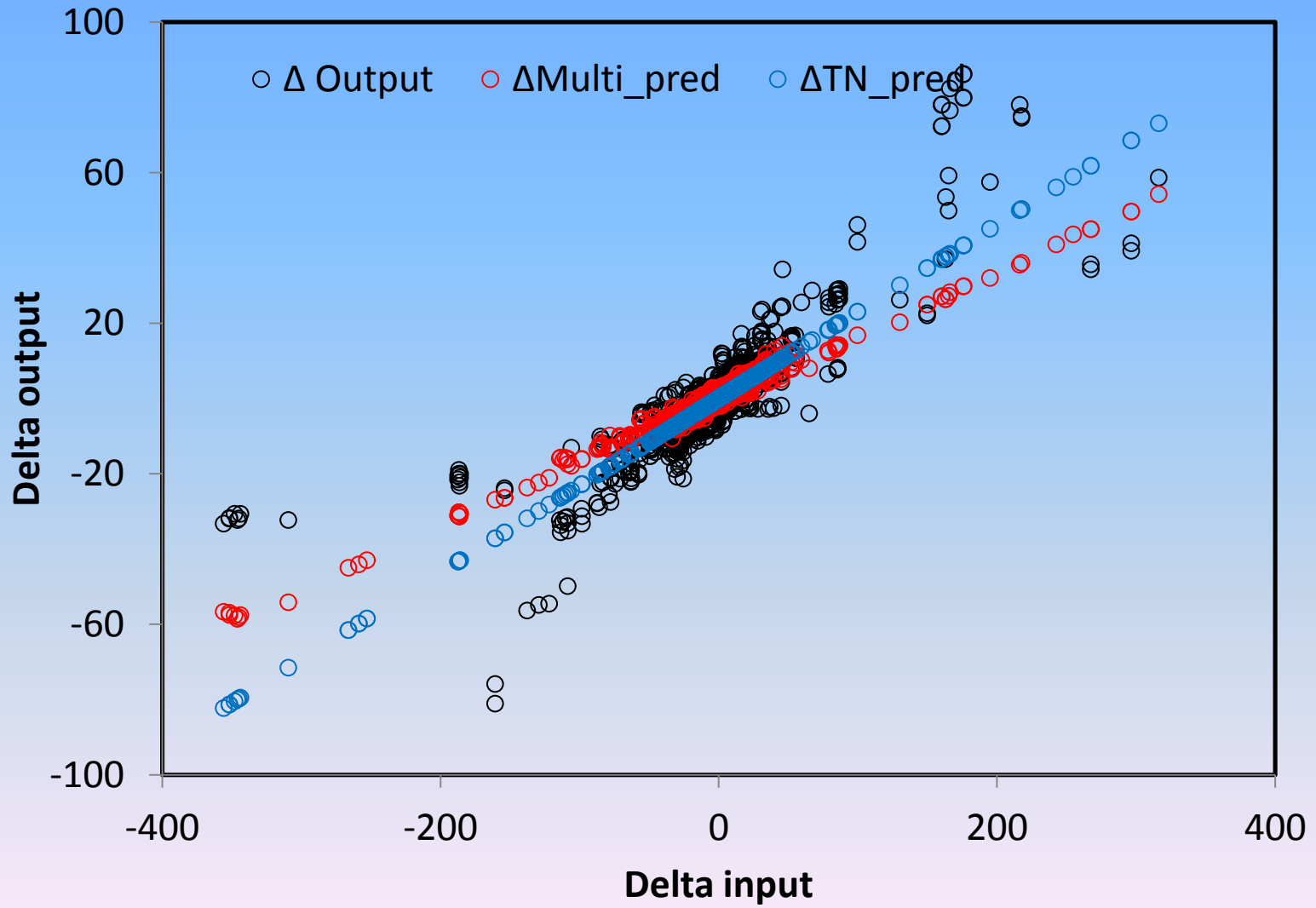


mean=0.41
cv=1.59

Total nitrogen output versus regression prediction using average slope and interception

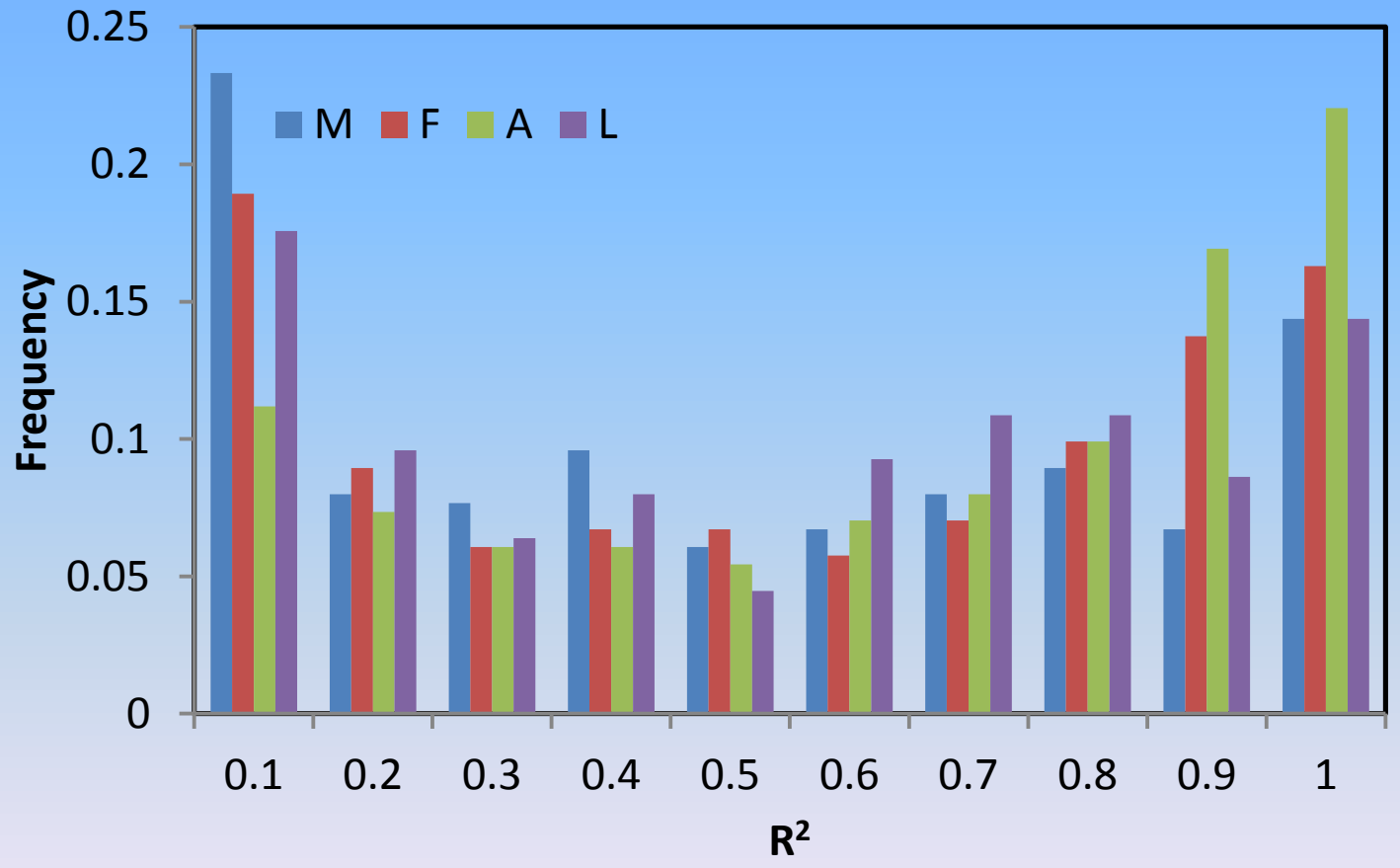


Demeaned total loading versus model Total N output and regression prediction

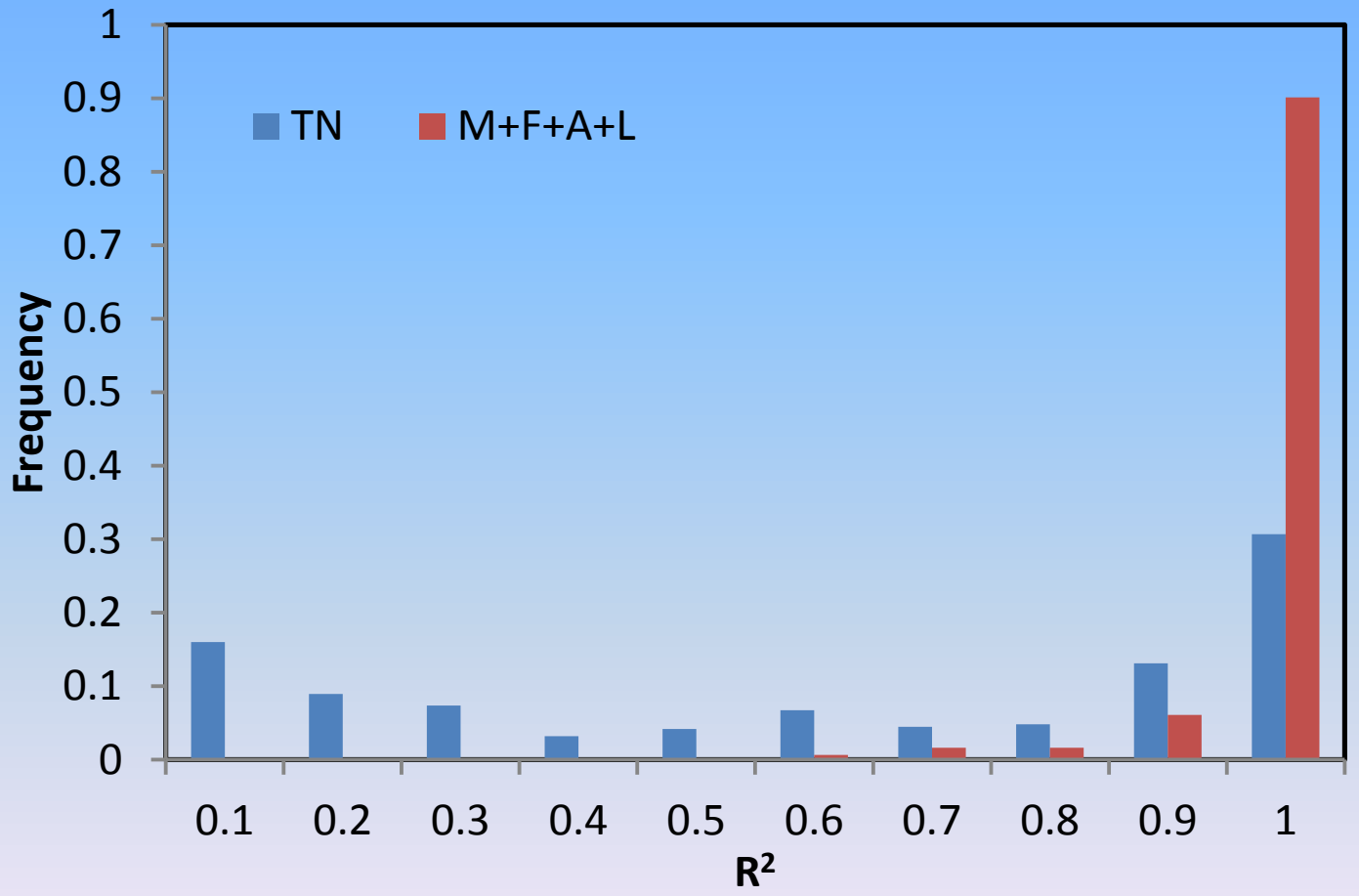


DIN on high-tillage cropland with manure

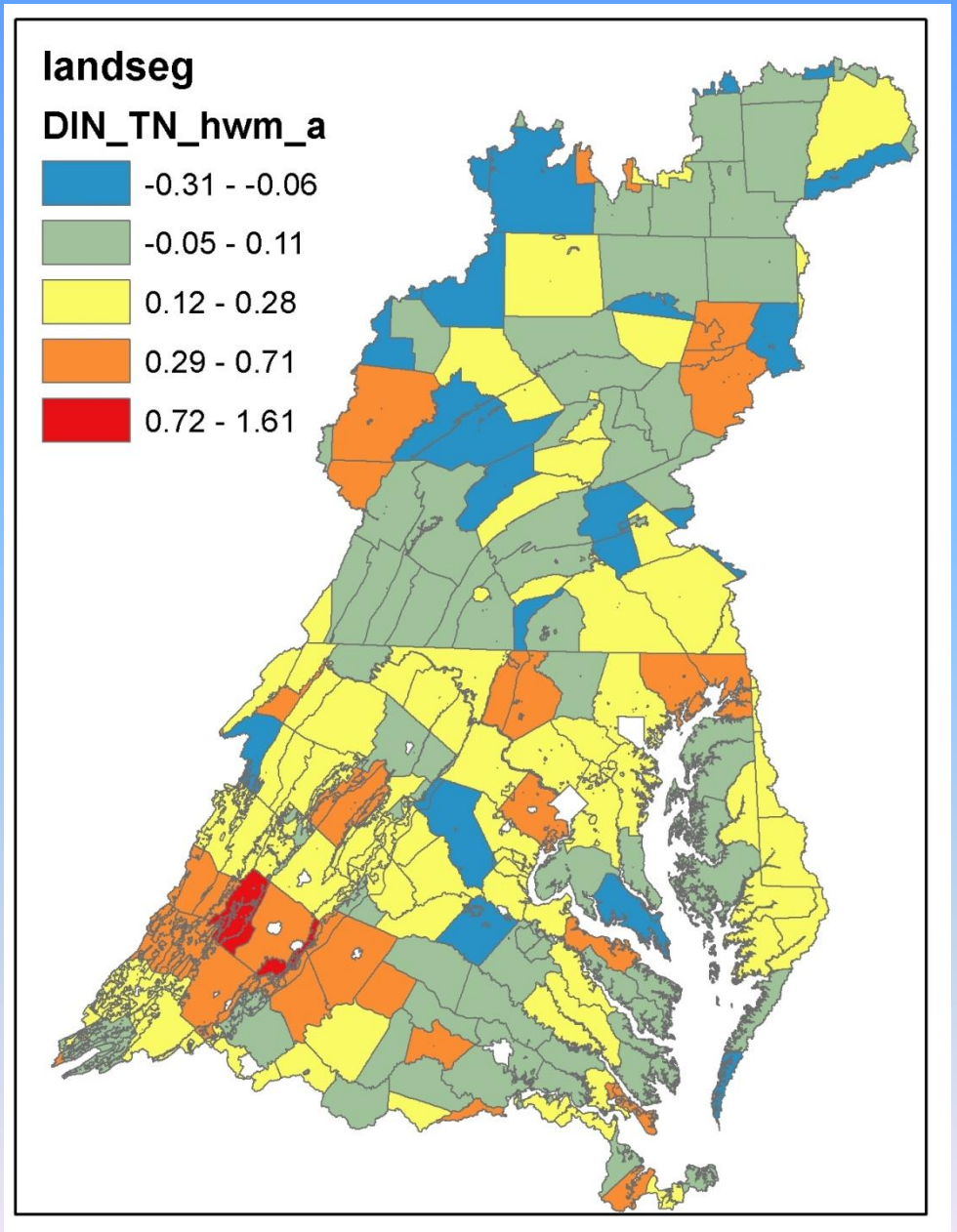
R^2 frequency of regression between DIN output and inputs



R^2 frequency of regression between DIN output and total input and multi-variates



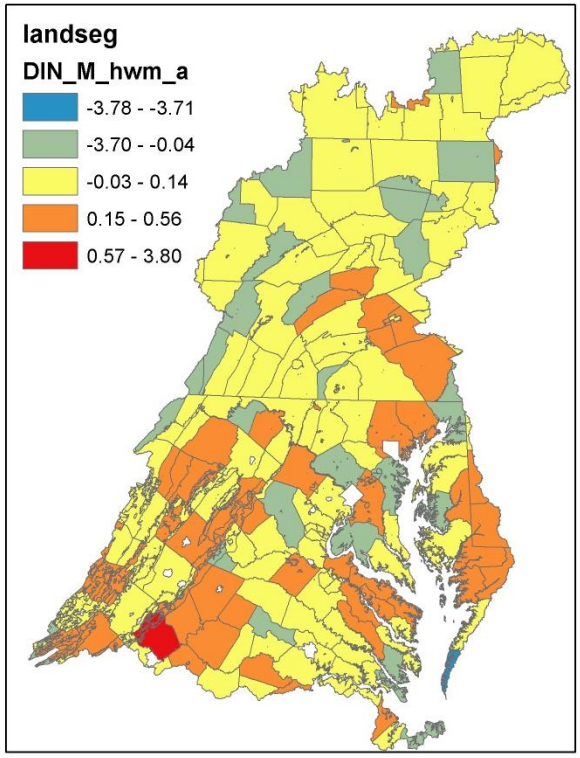
Slope:
DIN output versus total input regression



Mean=0.14
cv=1.53

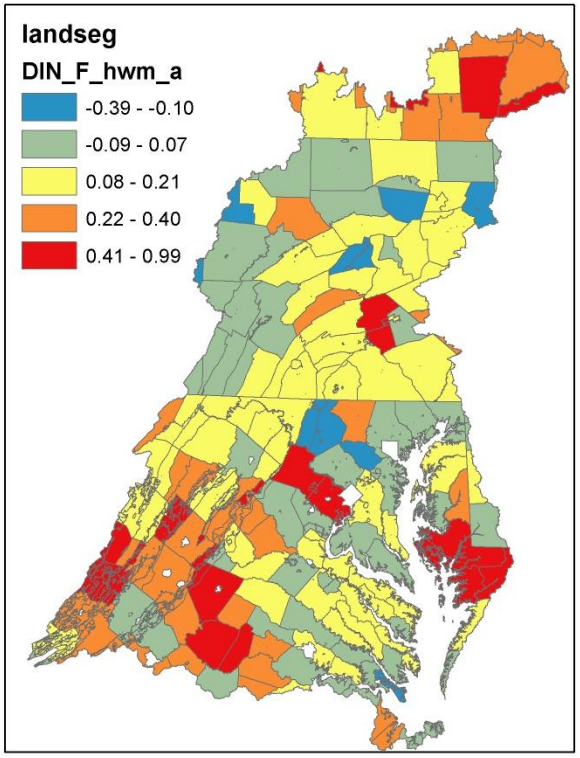
Slope of regression between DIN output and manure+fertilizer+atmos. Dep.+legume

TN



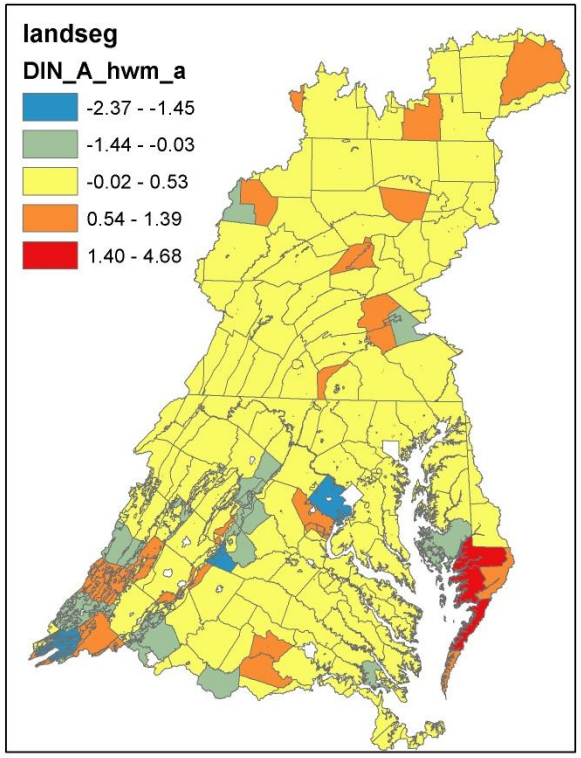
Mean=0.0563
cv=9.1

Manure



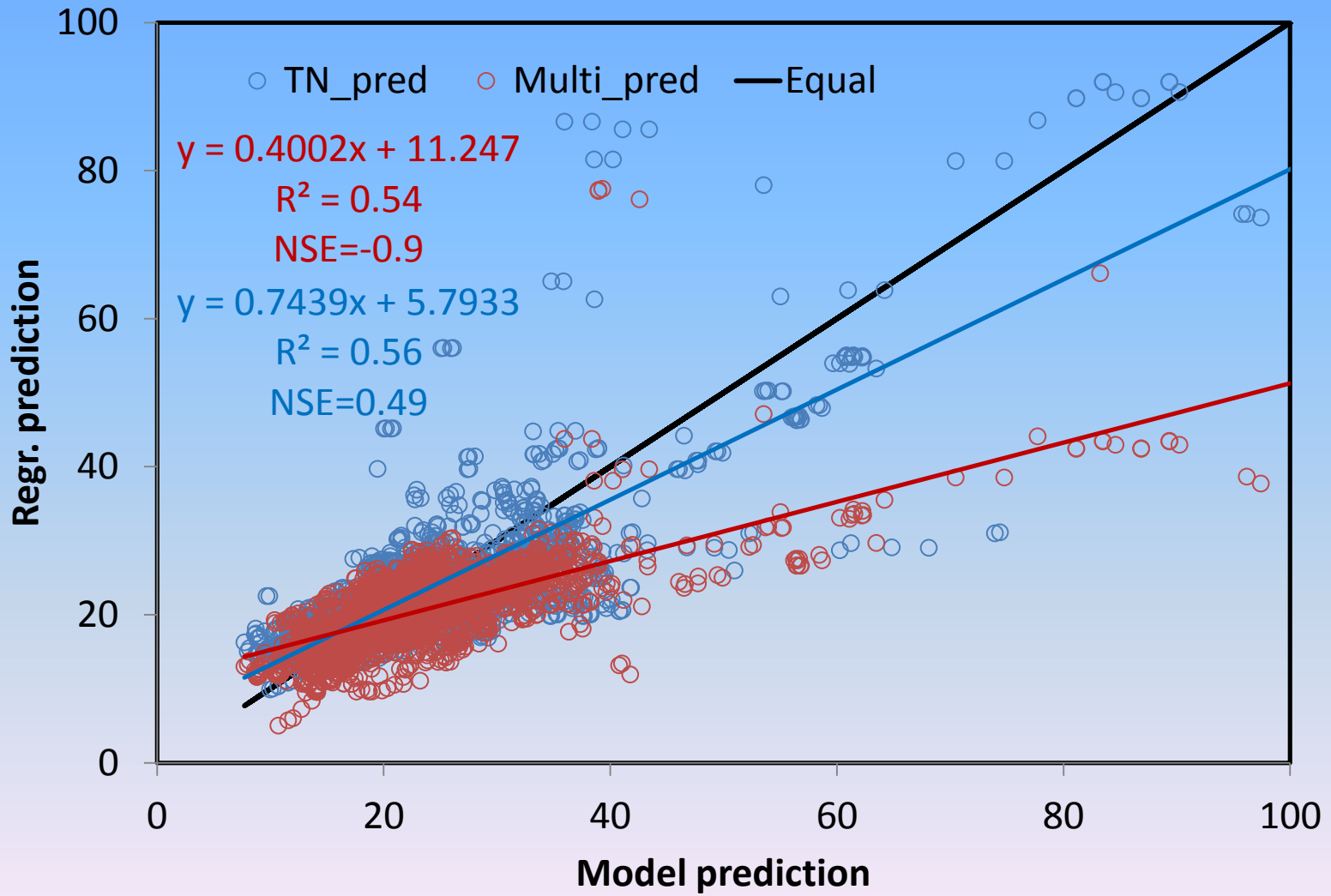
mean=0.168
cv=1.19

Fertilizer

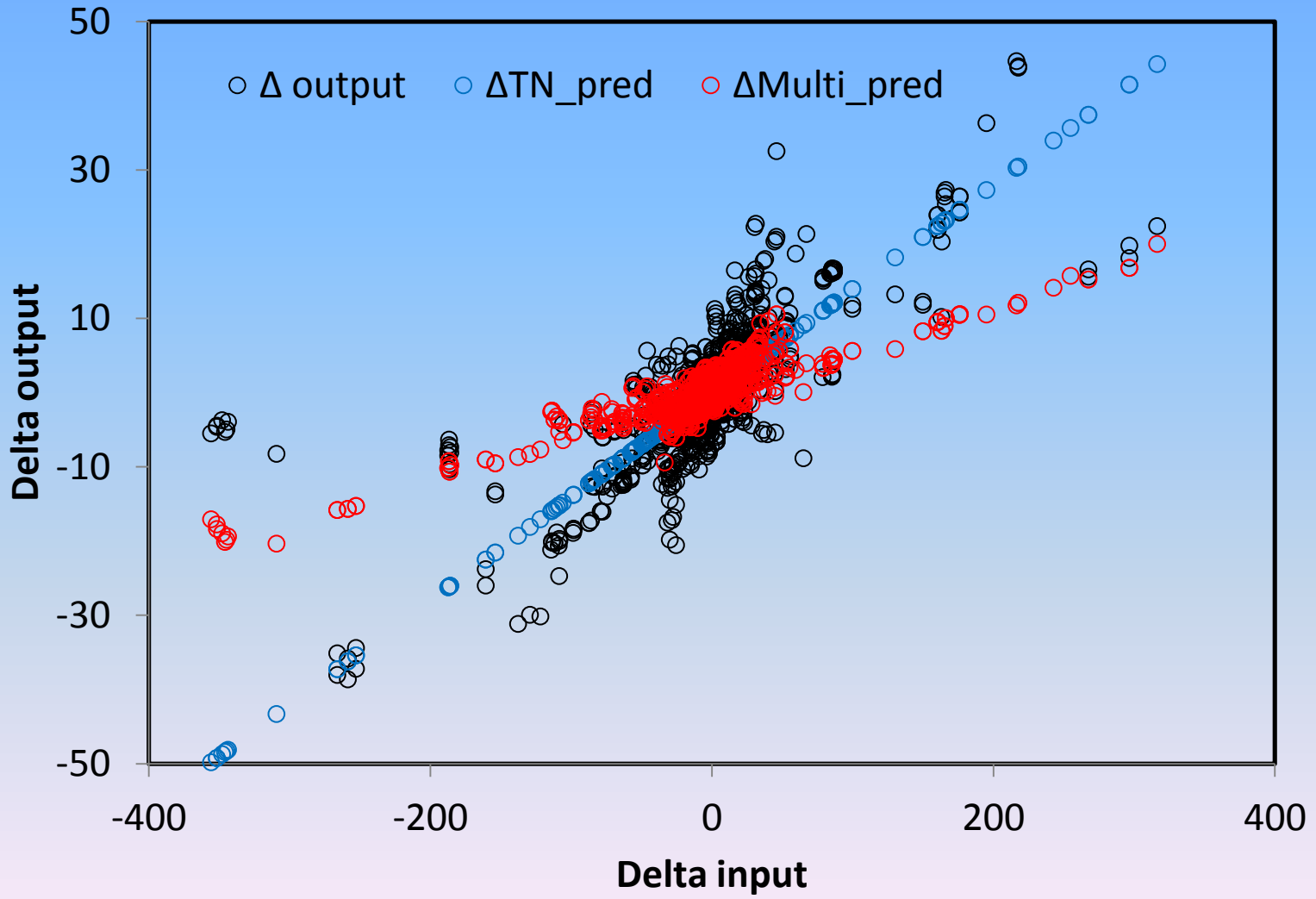


mean=0.284
cv=2.0

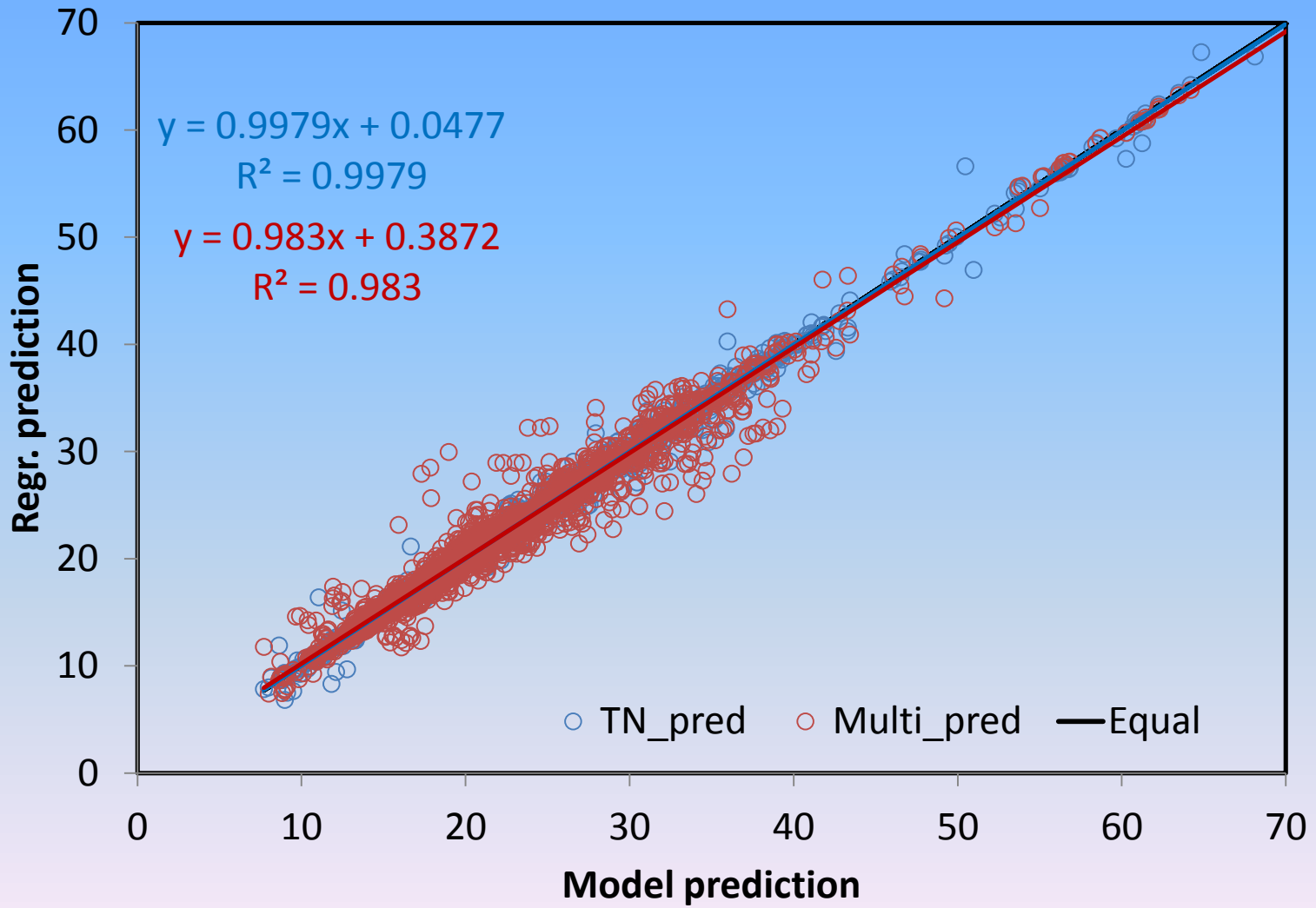
DIN output versus regression prediction using average slope and interception



Demeaned total loading versus model DIN output and regression prediction

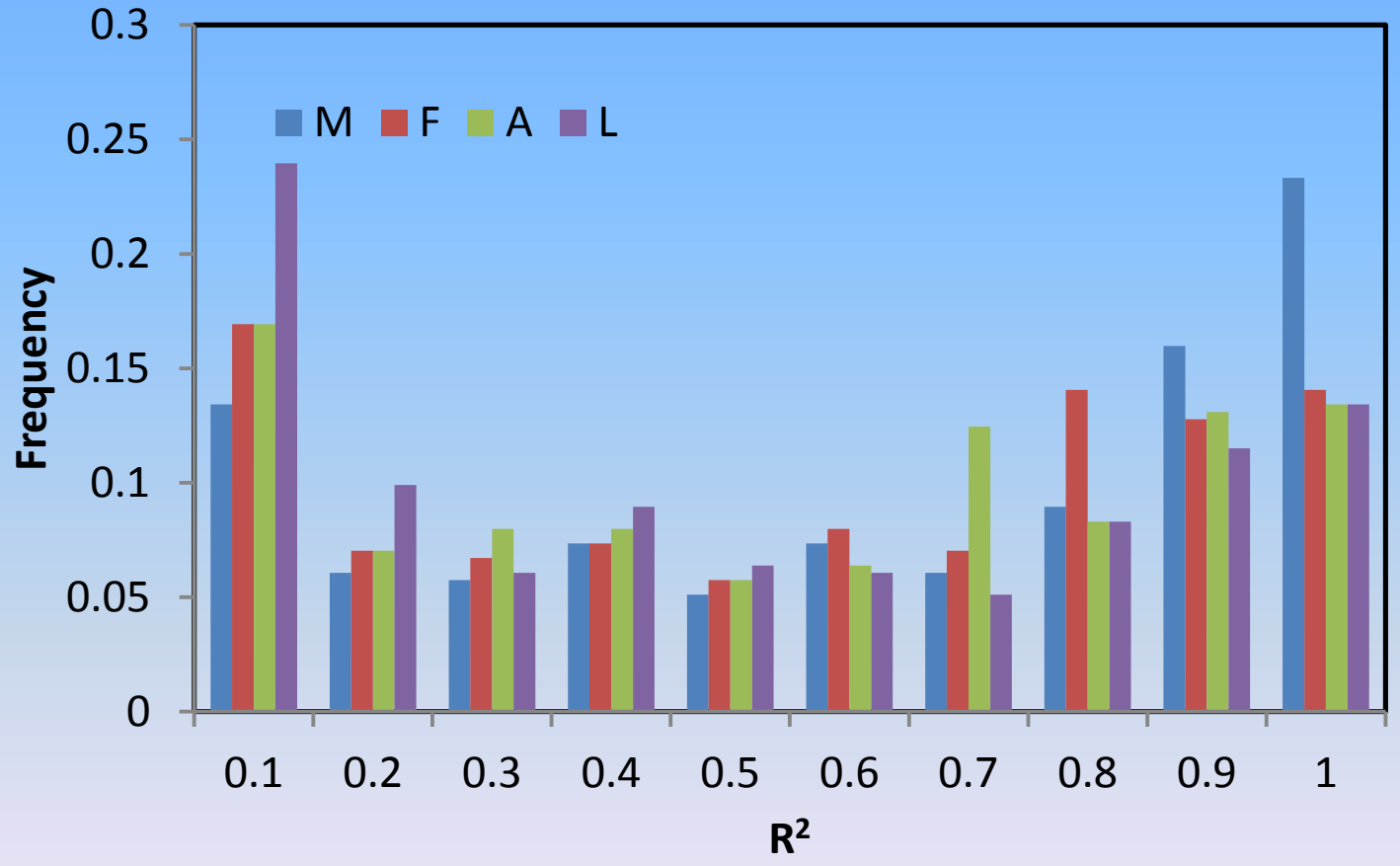


DIN output versus regression prediction segment by segment

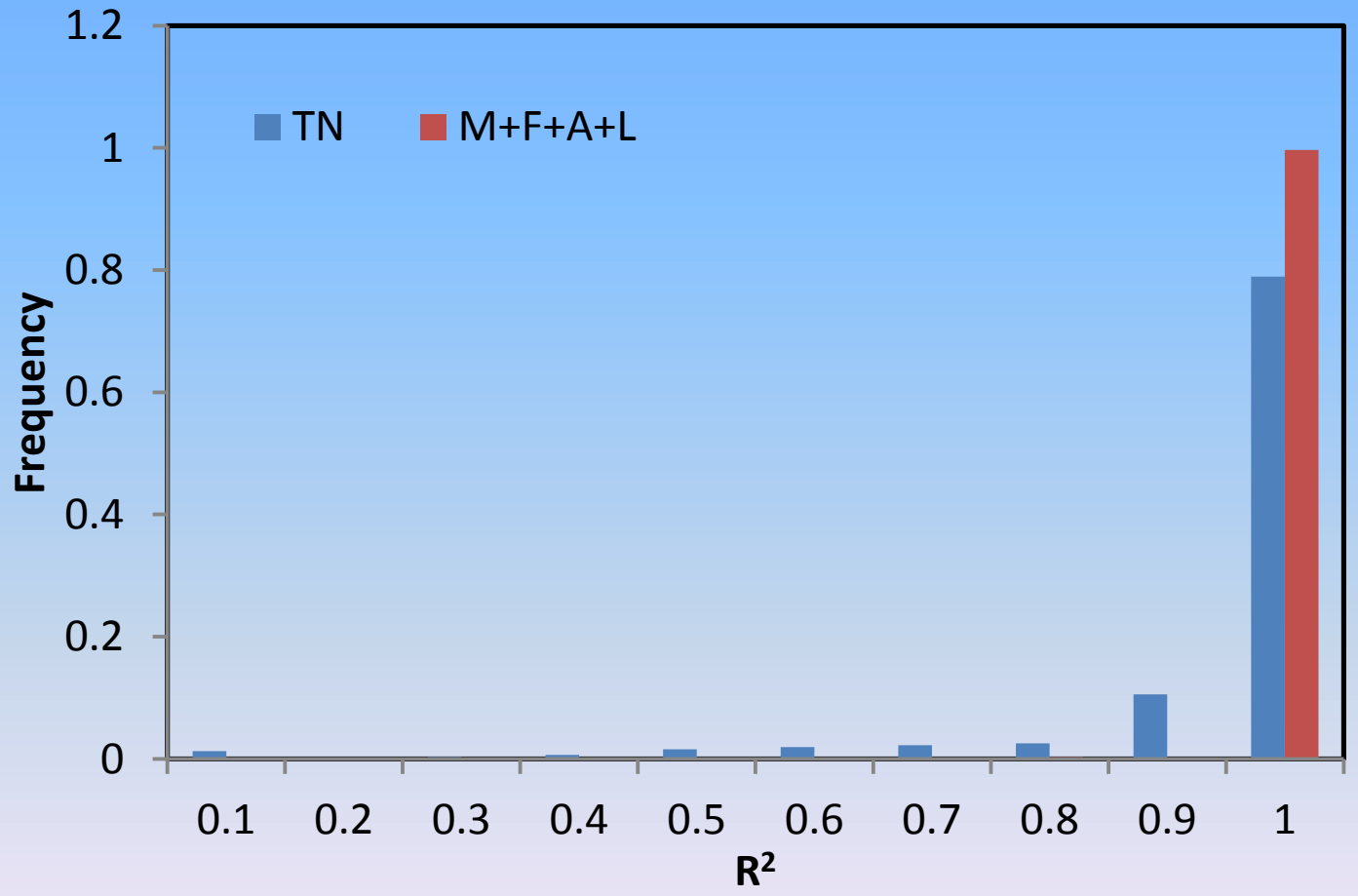


Organic N on high-tillage cropland with manure

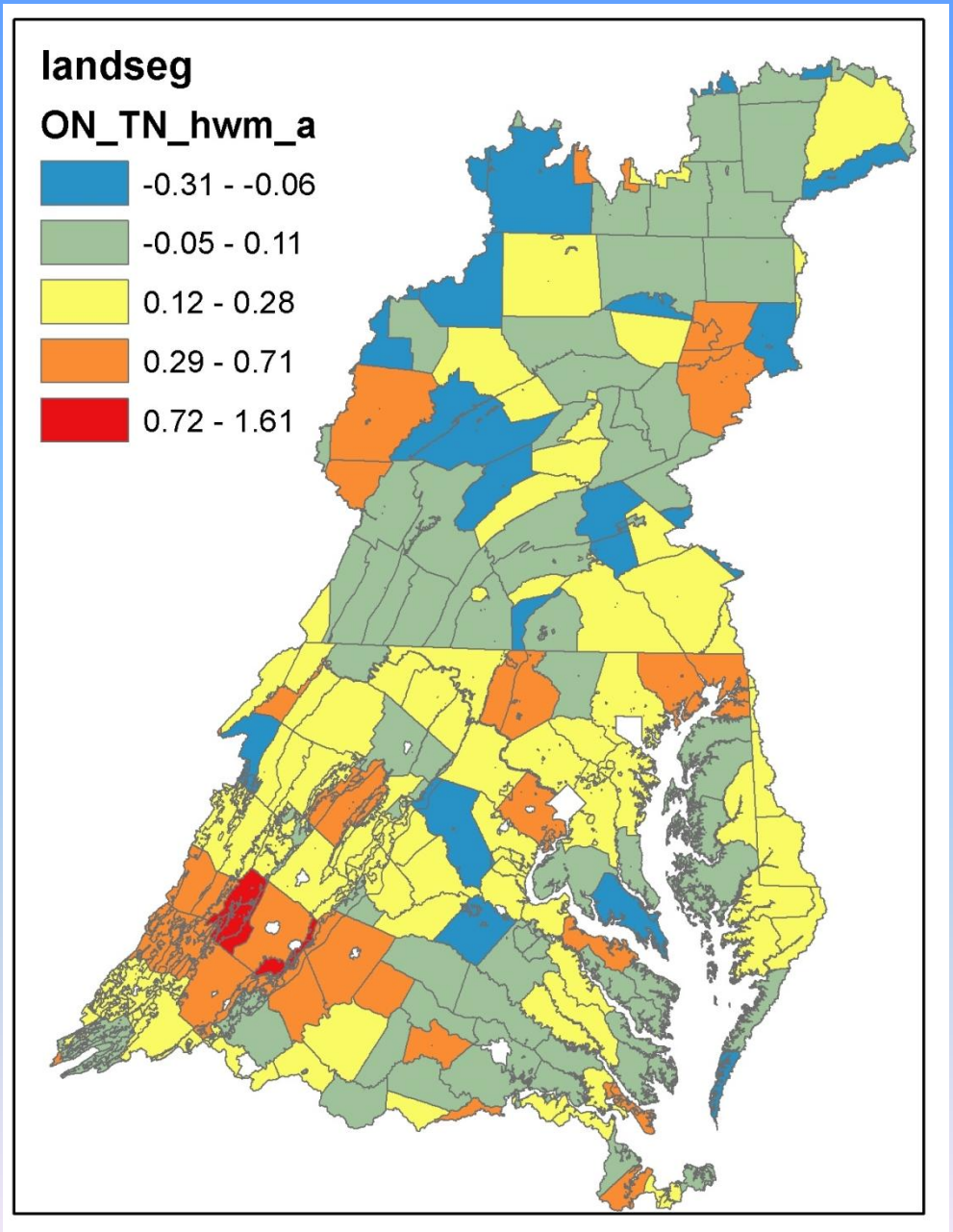
R^2 frequency of regression between organic N output and inputs



R^2 frequency of regression between Organic N output and total input and multi-variates



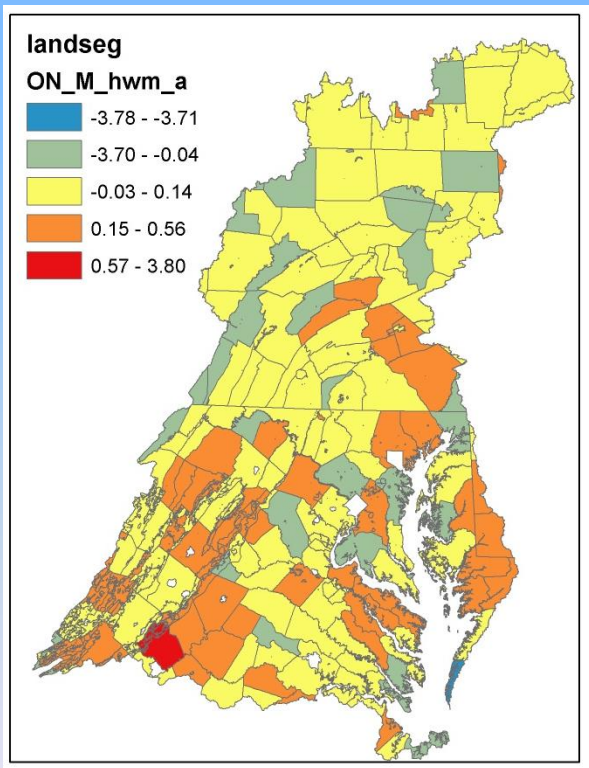
Slope: Organic N output versus total input regression



Mean=0.091
cv=0.47

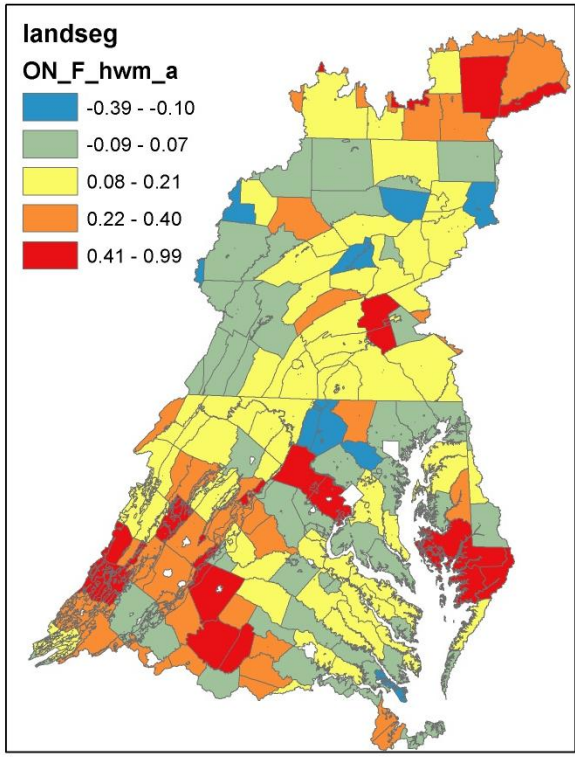
Slope of regression between Organic N output and manure+fertilizer+atmos. Dep.+legume

Manure



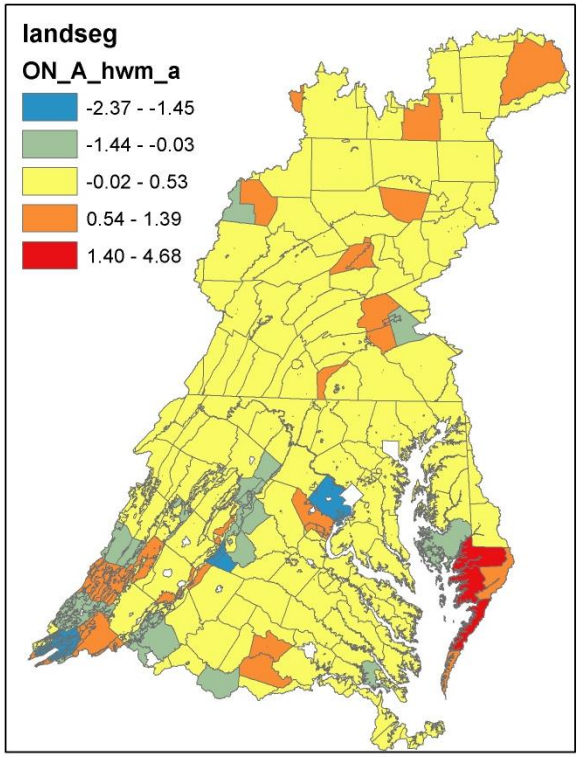
Mean=0.11
cv=0.54

Fertilizer



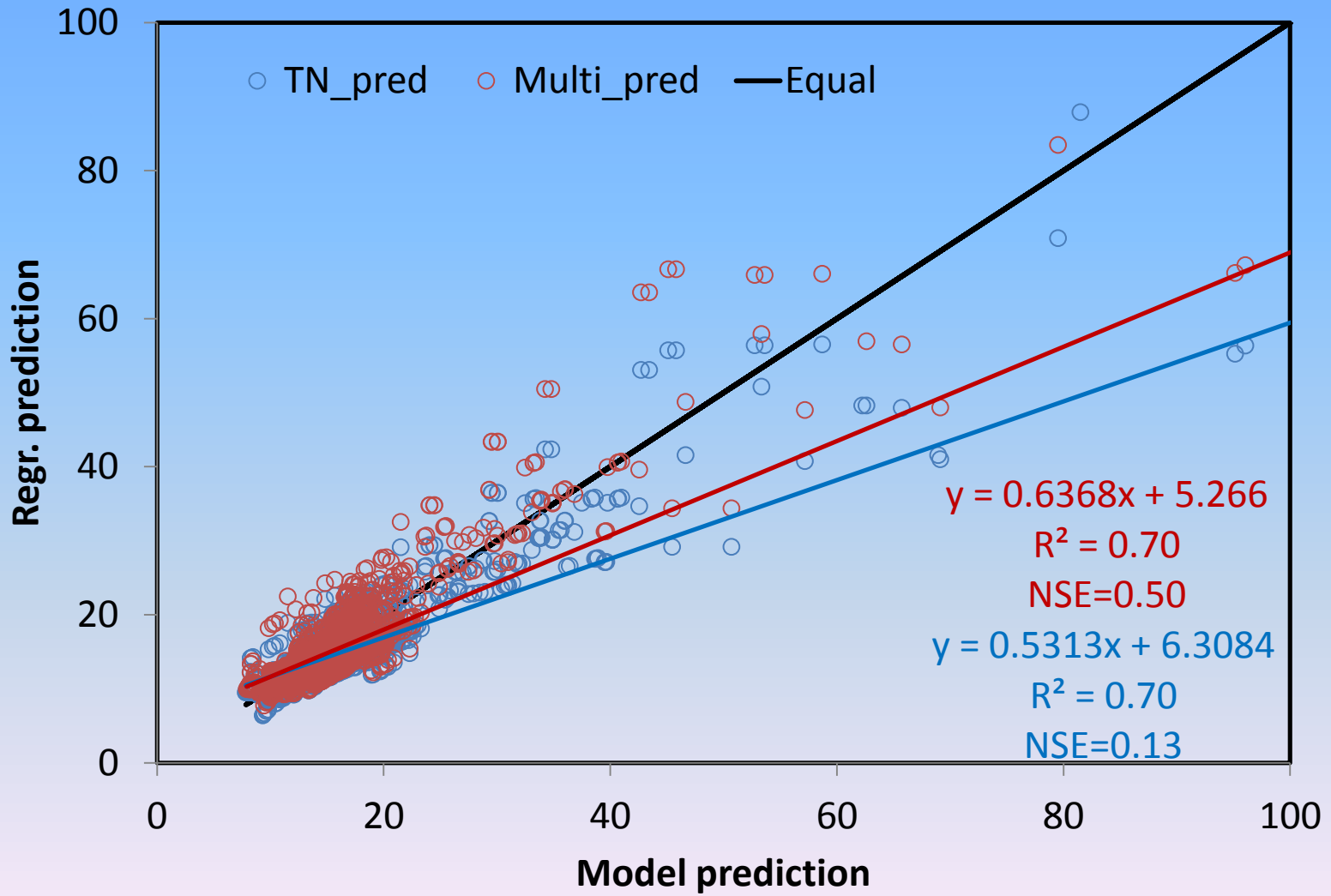
mean=0.079
cv=0.61

Atdep

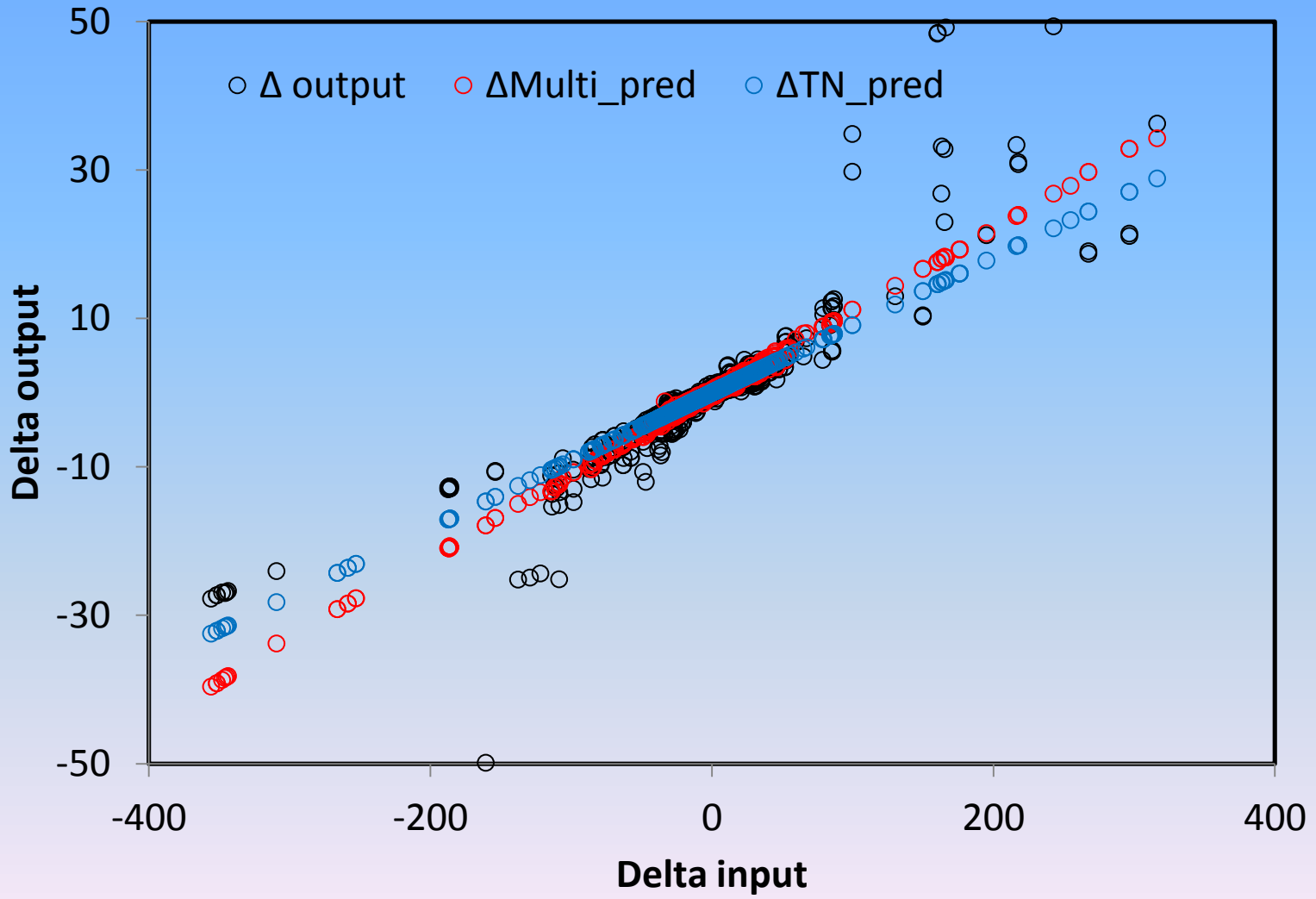


mean=0.13
cv=1.4

Organic N output versus regression prediction using average slope and interception

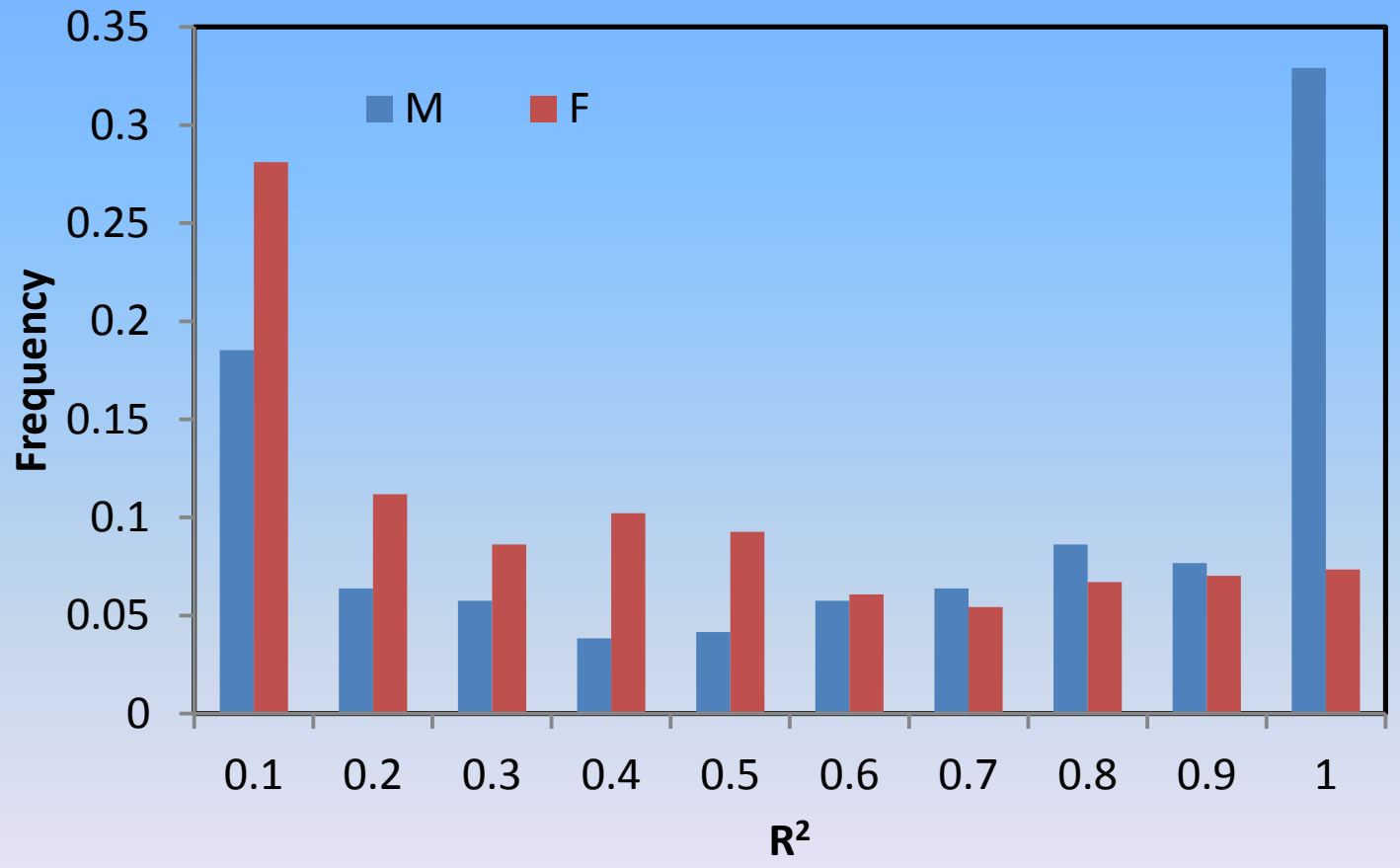


Demeaned total loading versus model Organic N output and regression prediction

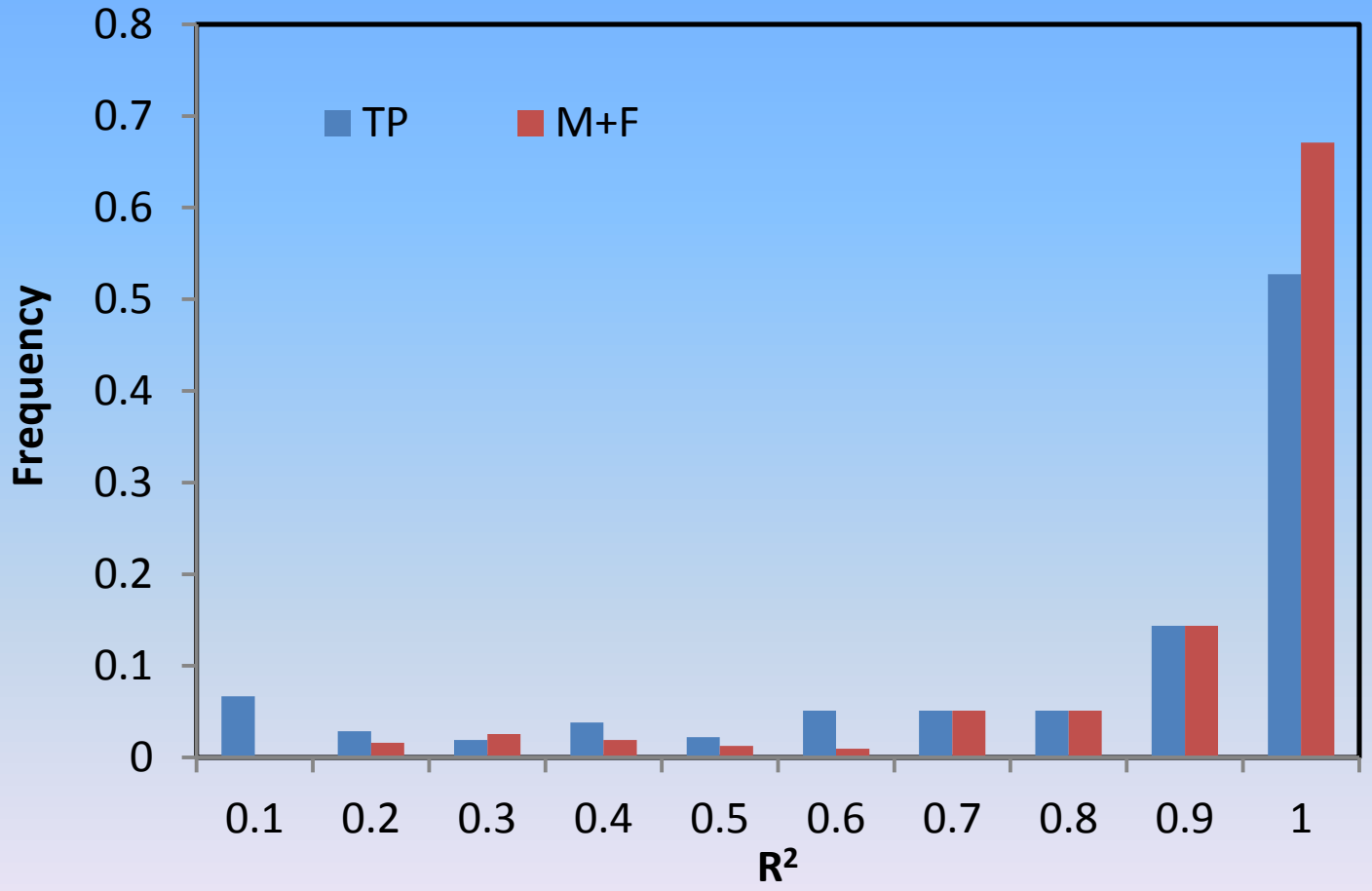


Total P on high-tillage cropland with manure

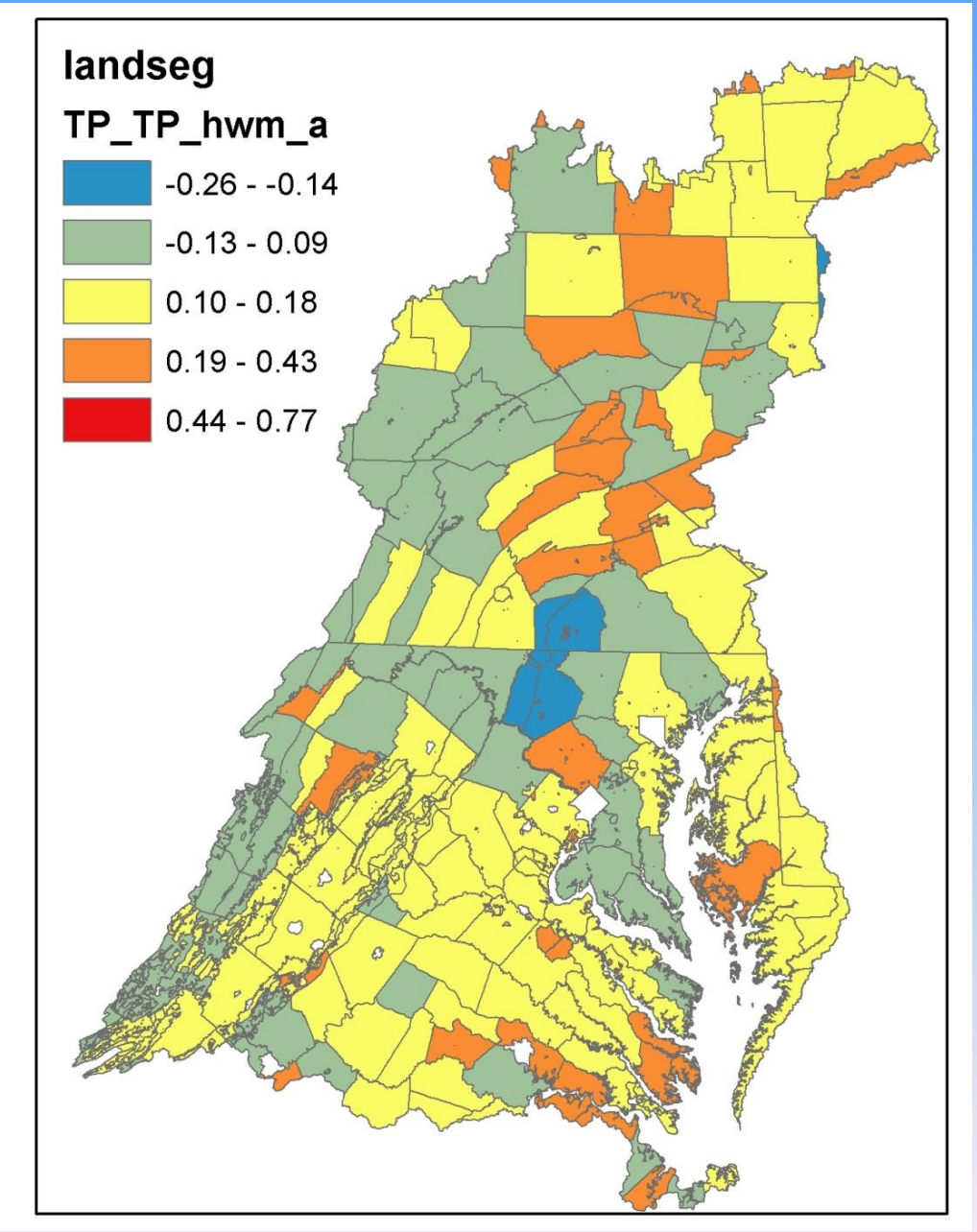
R^2 frequency of regression between total P output and inputs



R^2 frequency of regression between Total-P output and total input and multi-variates

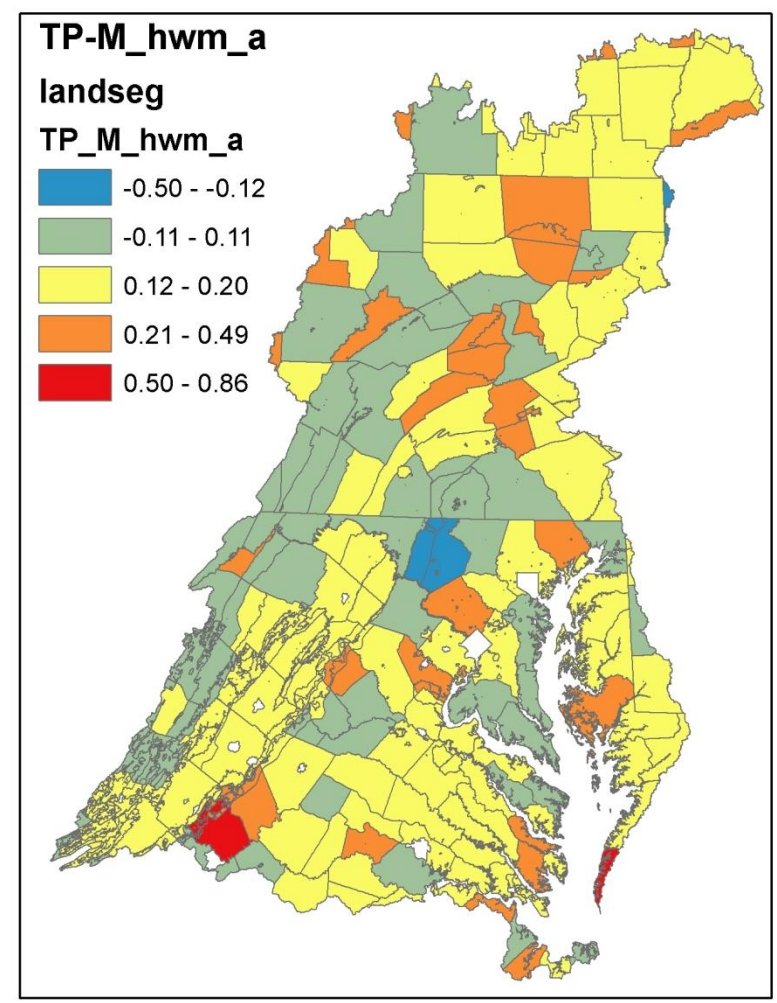


Slope:
Total P output versus total input regression

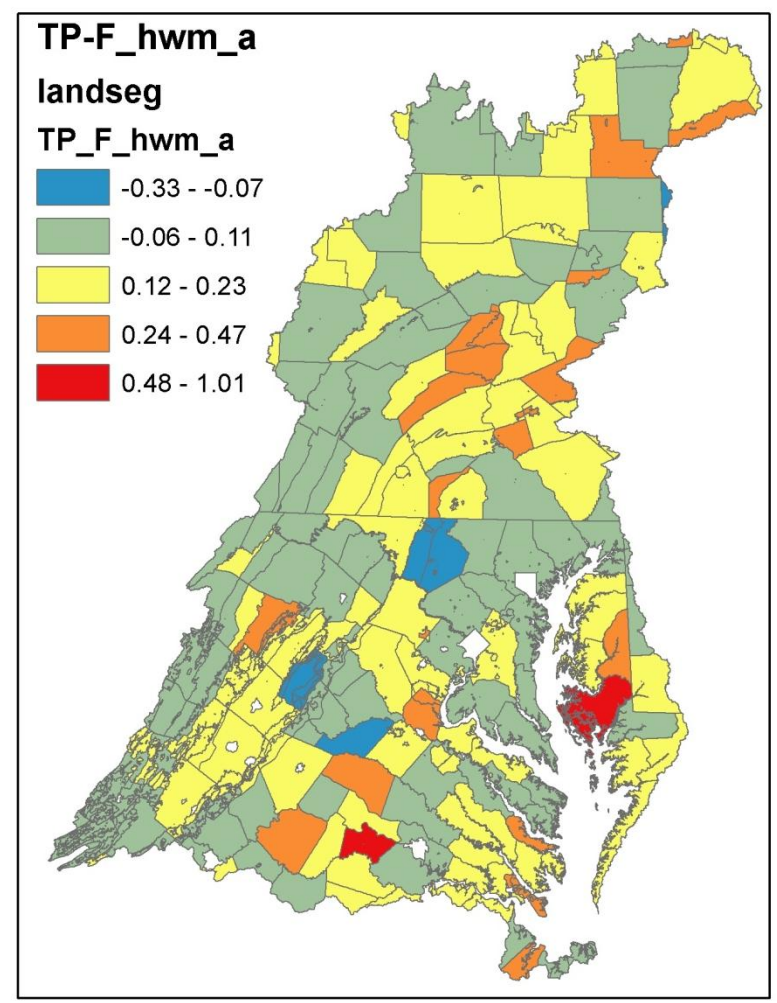


Mean=0.1205
cv=0.74

Slope of regression between Total-P output and manure+fertilizer

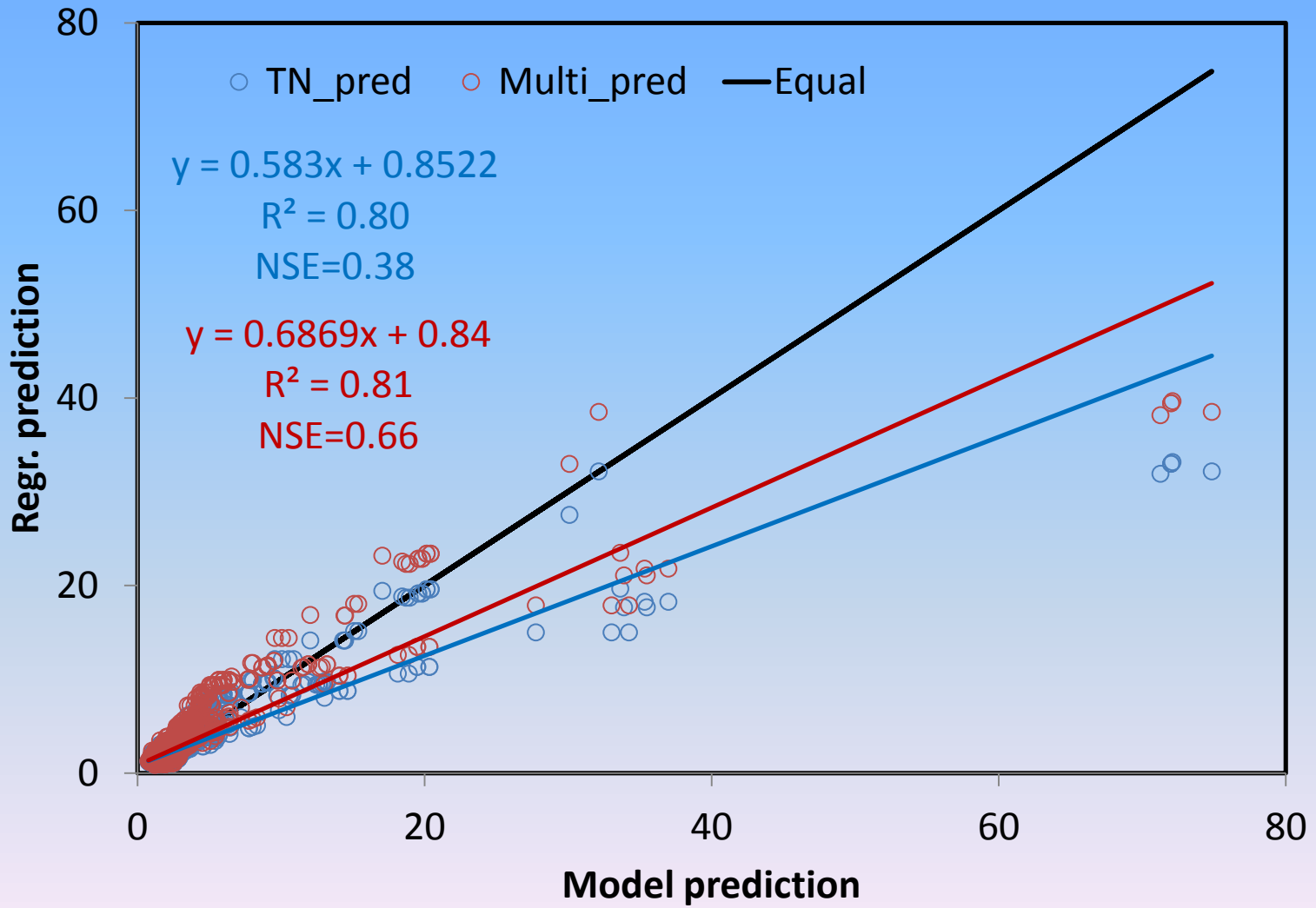


Mean=0.145
cv=0.77

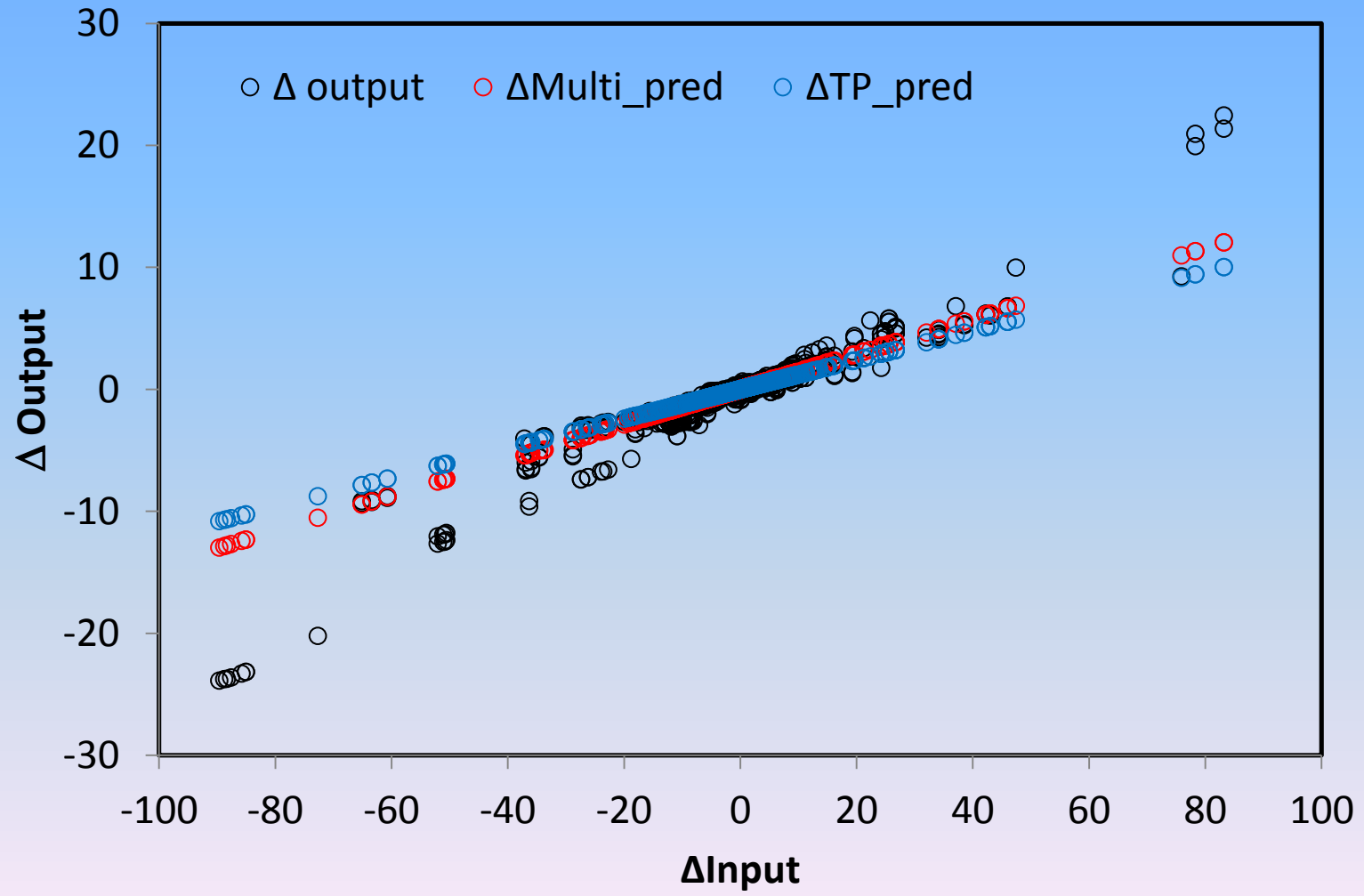


mean=0.139
cv=1.04

Total P output versus regression prediction using average slope and interception

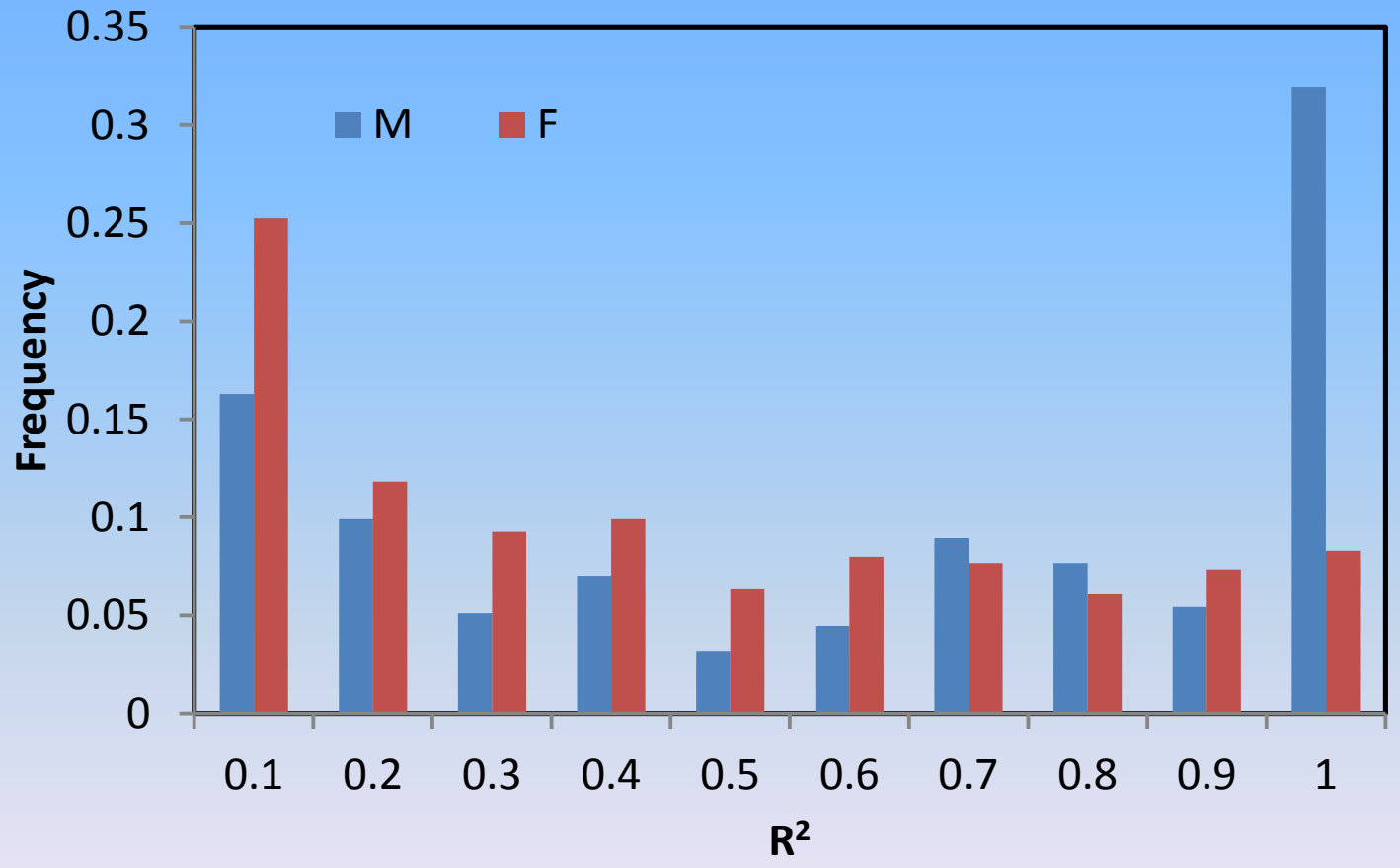


Demeaned total loading versus model total P output and regression prediction

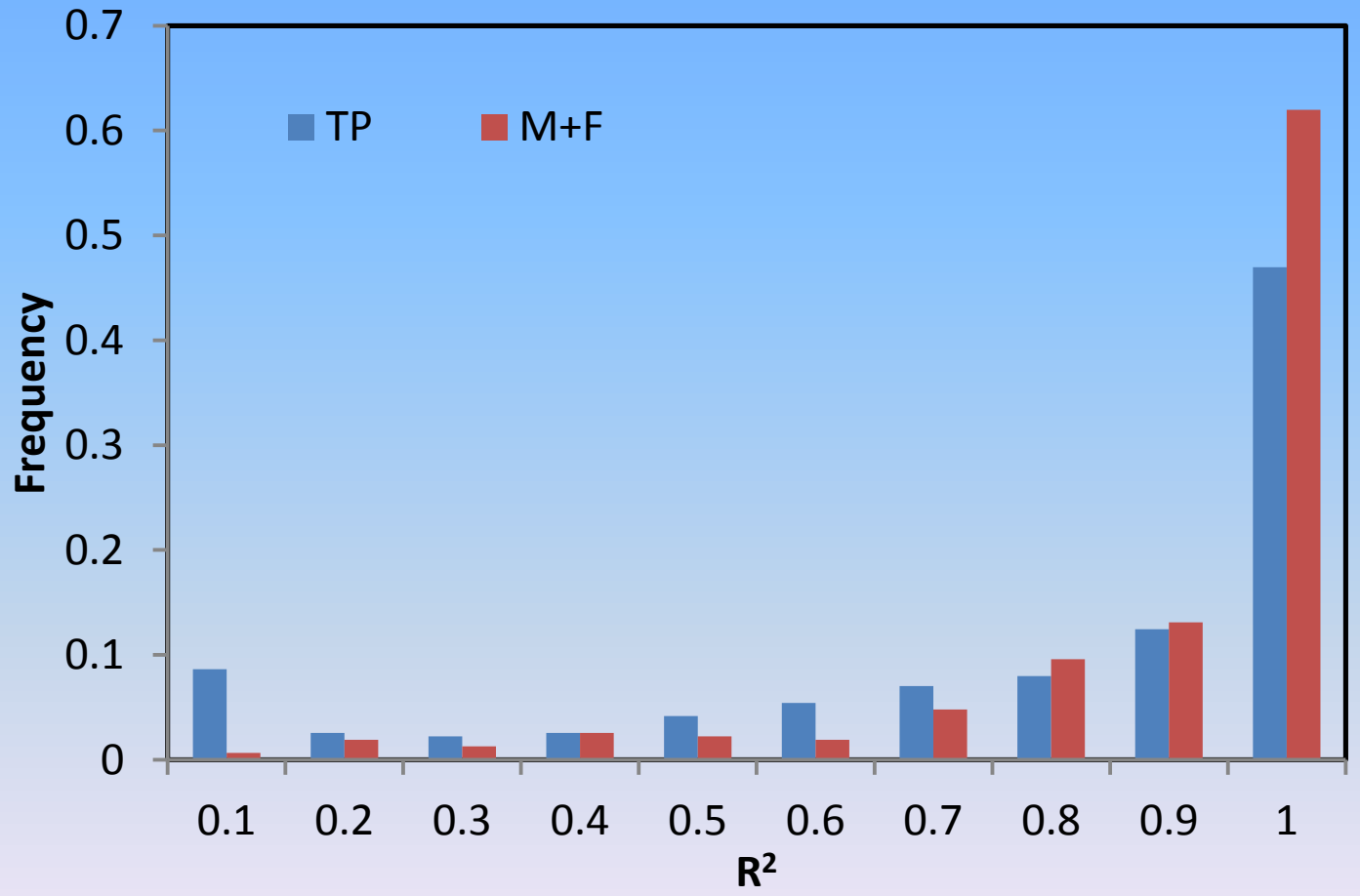


PO4 on high-tillage cropland with manure

R^2 frequency of regression between PO4 output and inputs

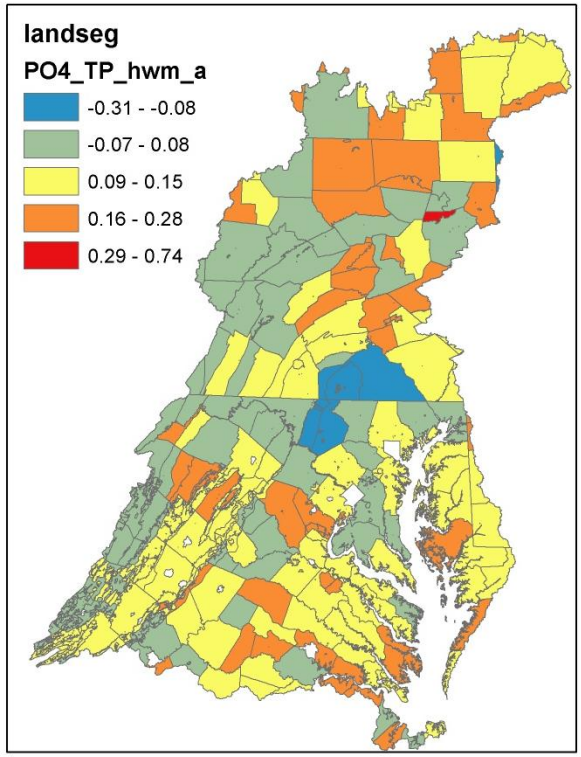


R^2 frequency of regression between PO4 output and total input and multi-variates



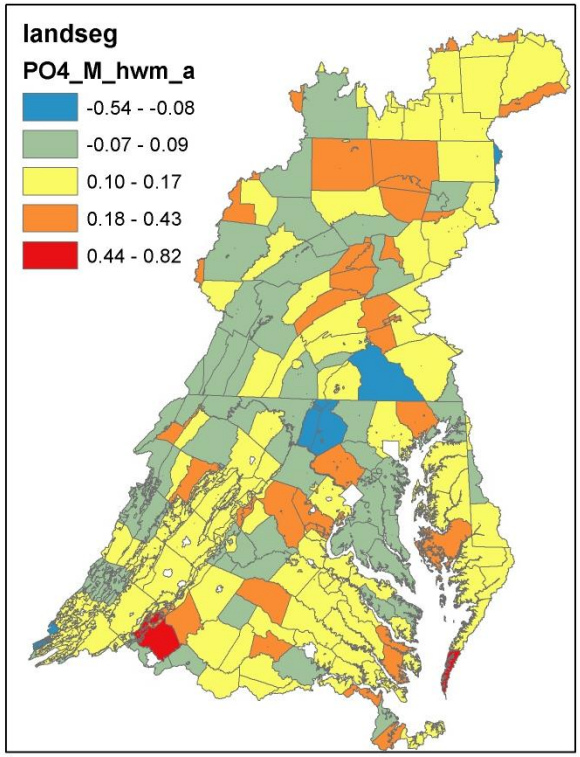
Slope of regression between PO4 output and inputs

TP



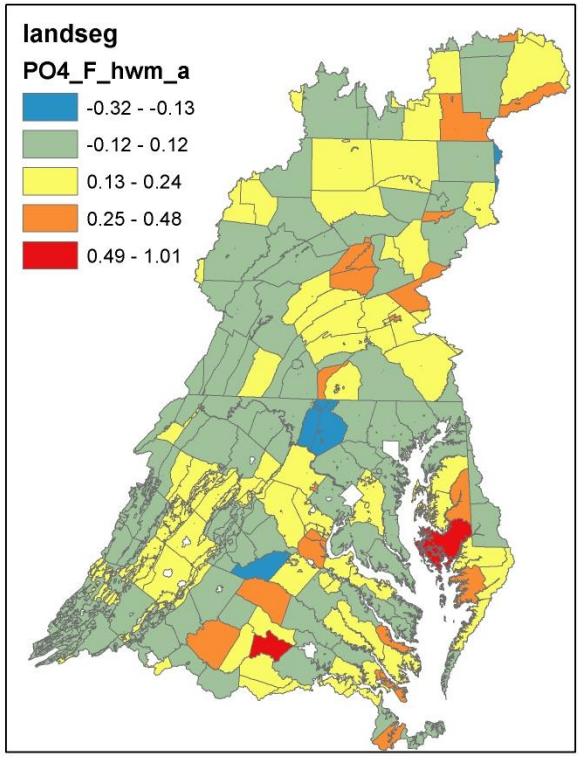
Mean=0.1056
cv=0.84

Manure



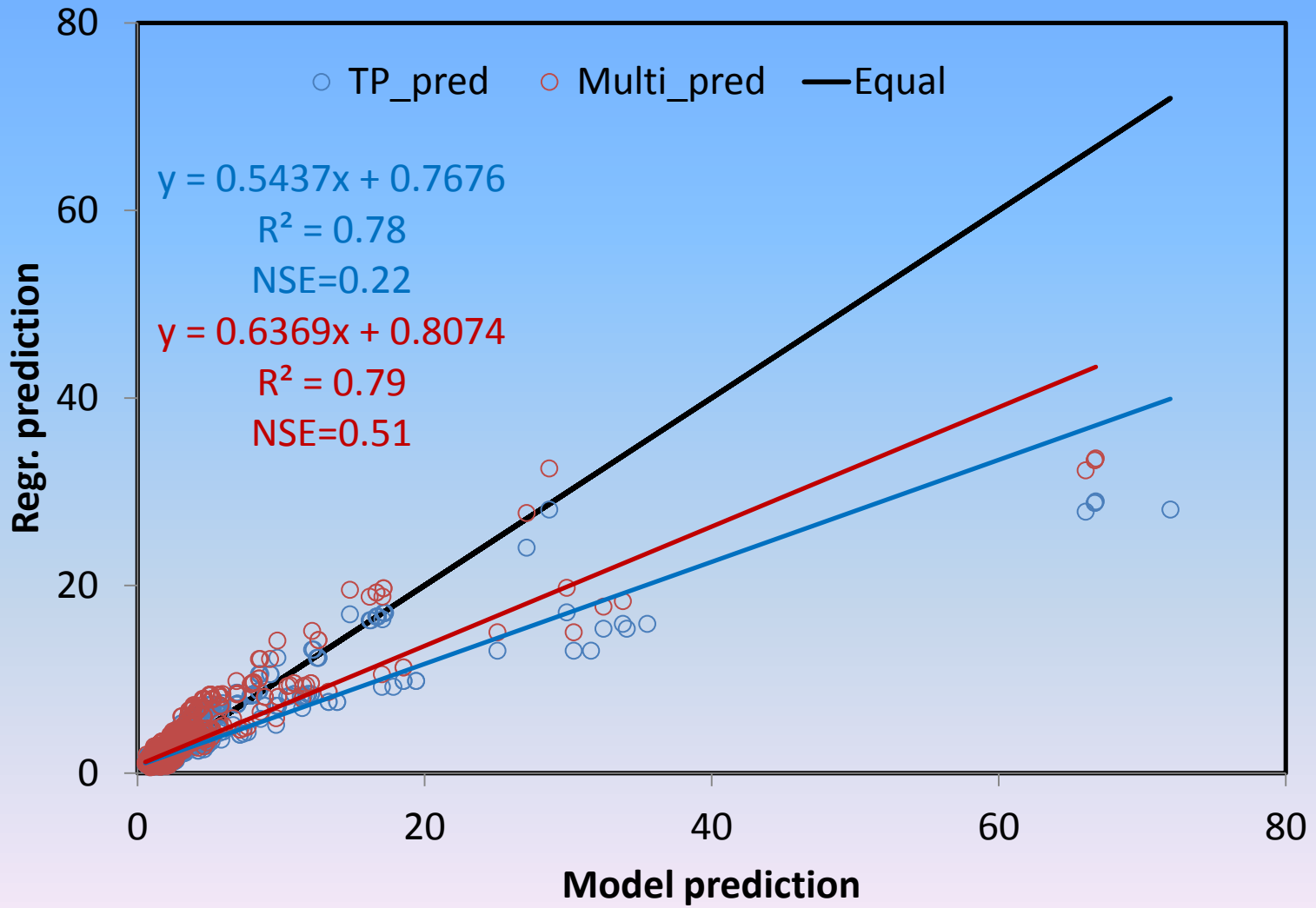
Mean=0.123
cv=0.89

Fertilizer

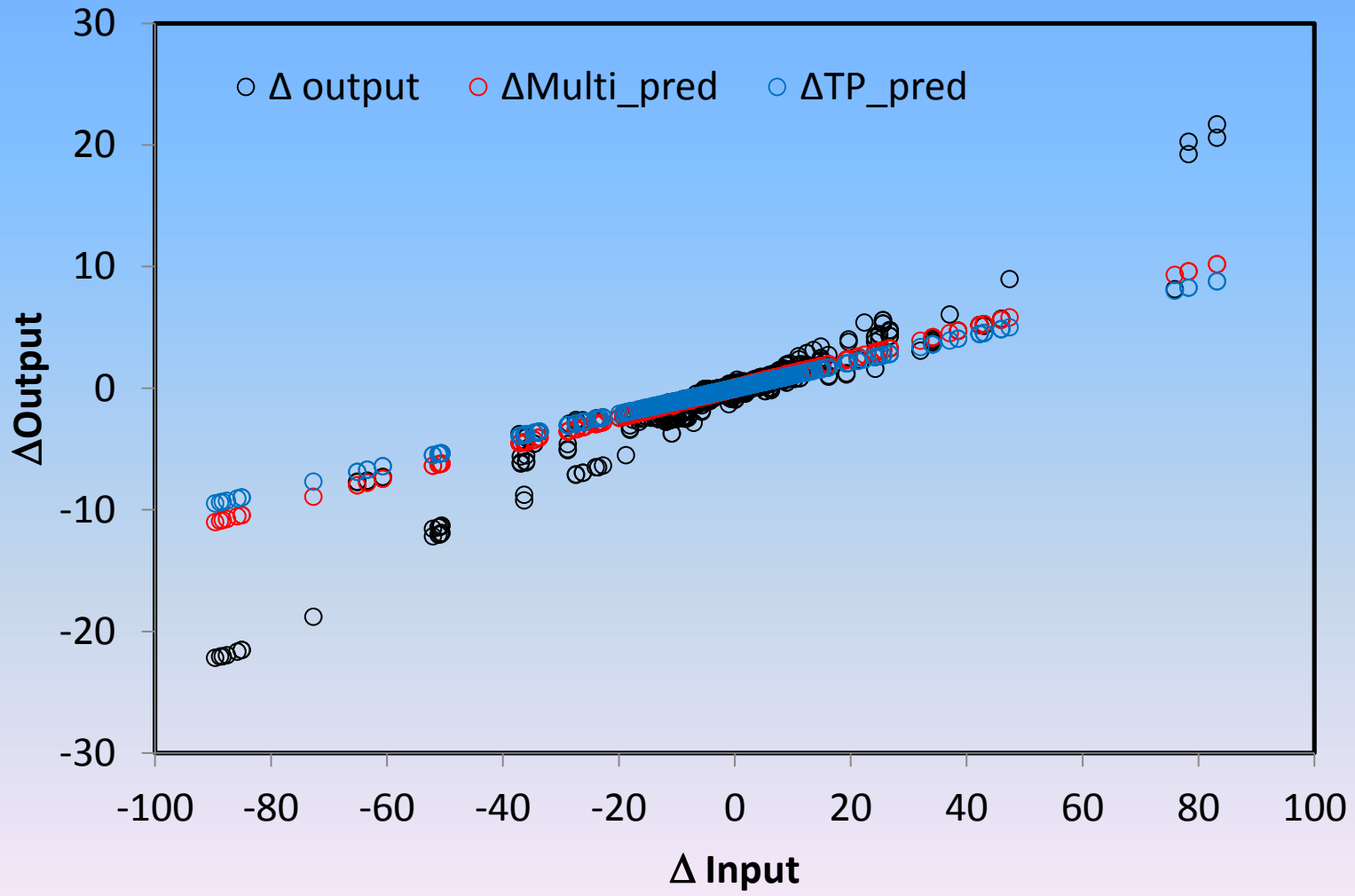


mean=0.136
cv=1.08

PO4 output versus regression prediction using average slope and interception

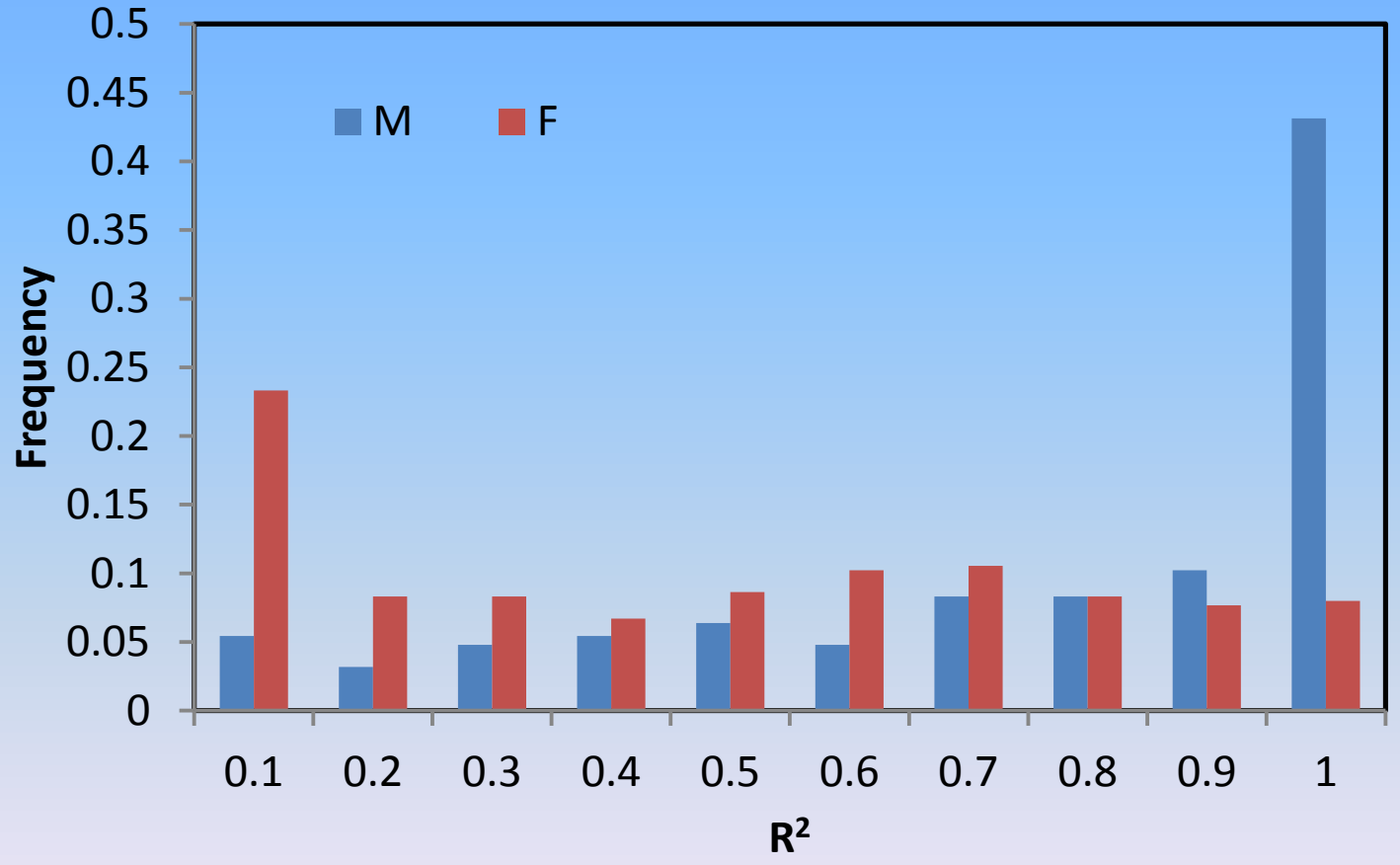


Demeaned total loading versus model PO4output and regression prediction

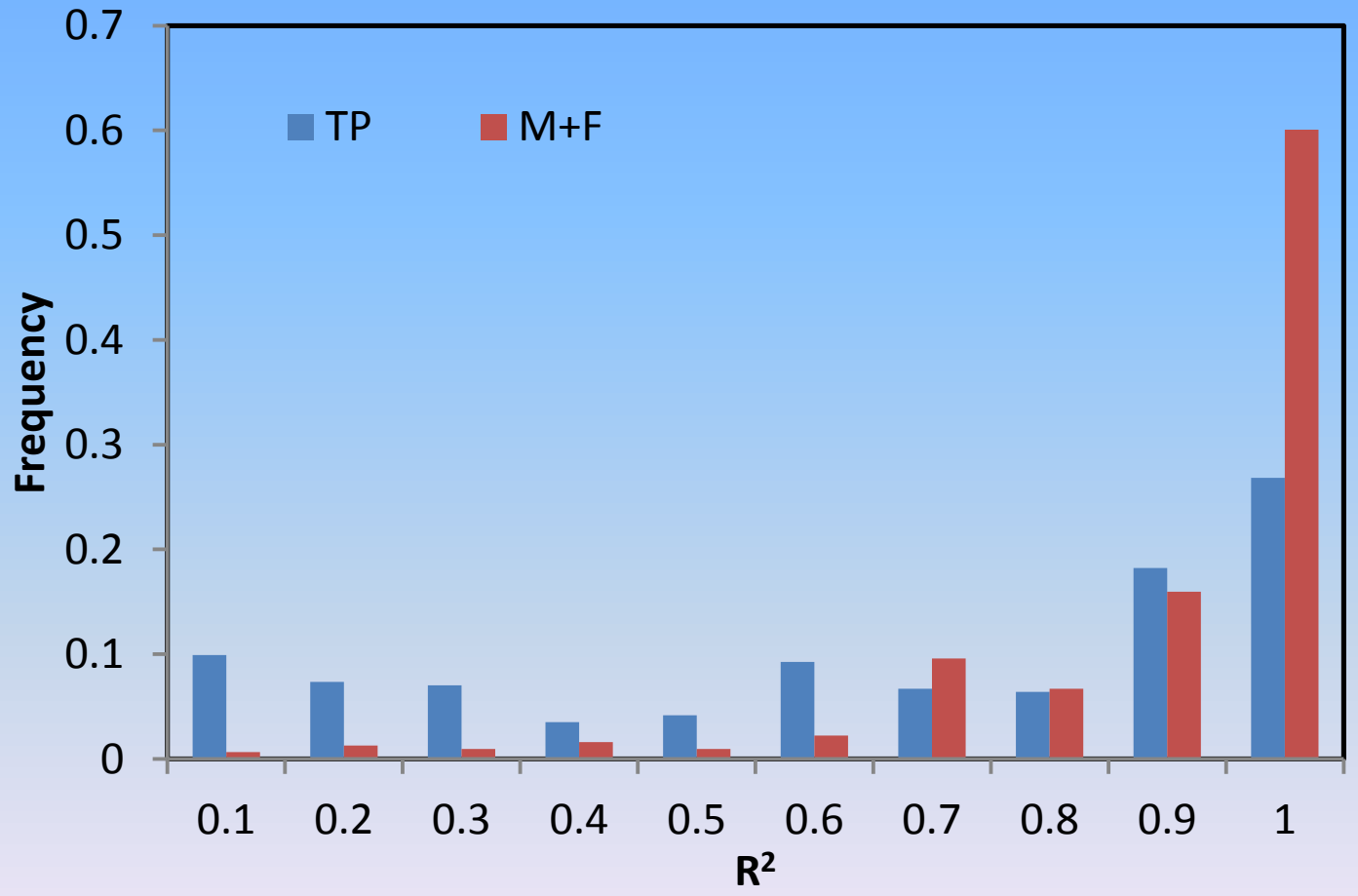


Organic P on high-tillage cropland with manure

R^2 frequency of regression between organic P output and inputs

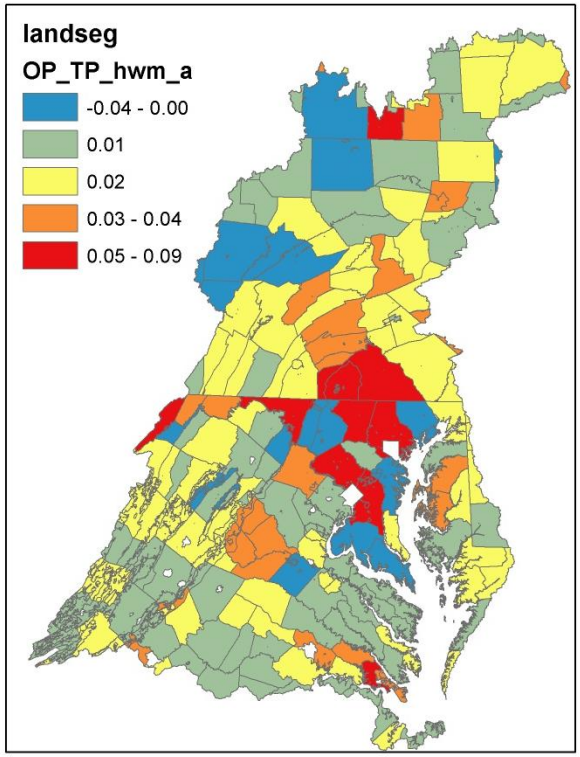


R^2 frequency of regression between Organic P output and total input and multi-variates



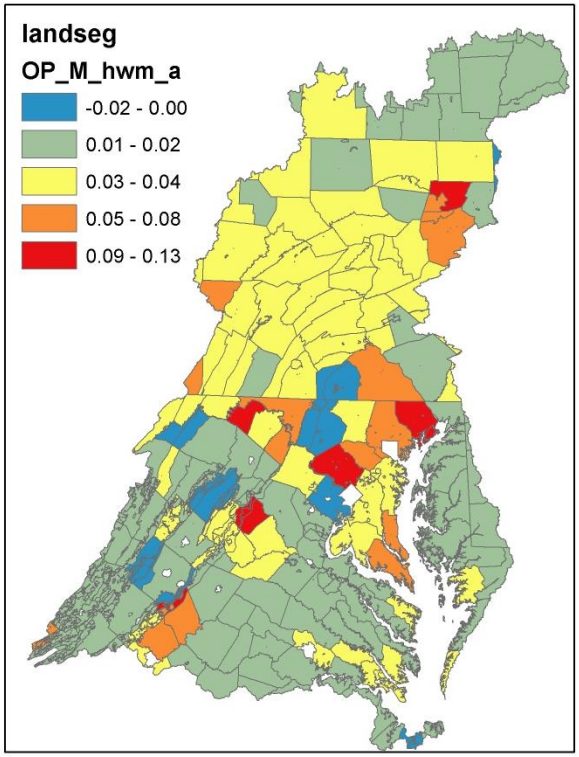
Slope of regression between organic P output and inputs

TP



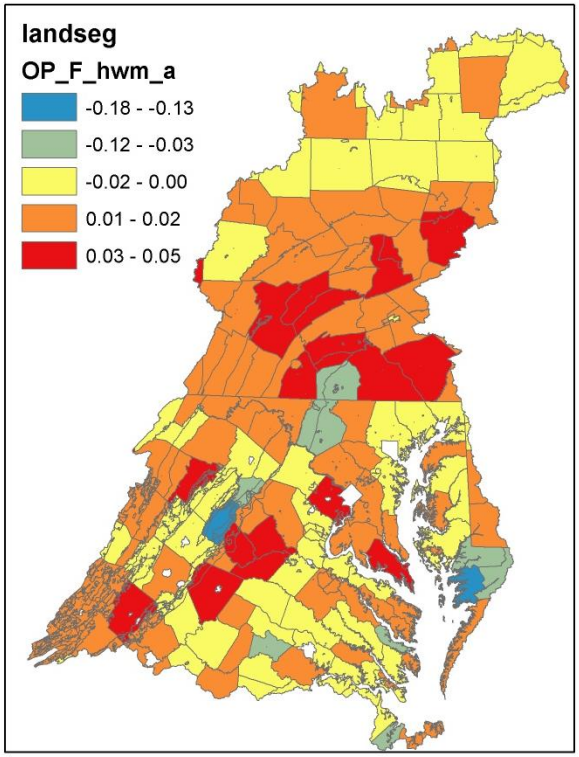
Mean=0.015
cv=1.165

Manure



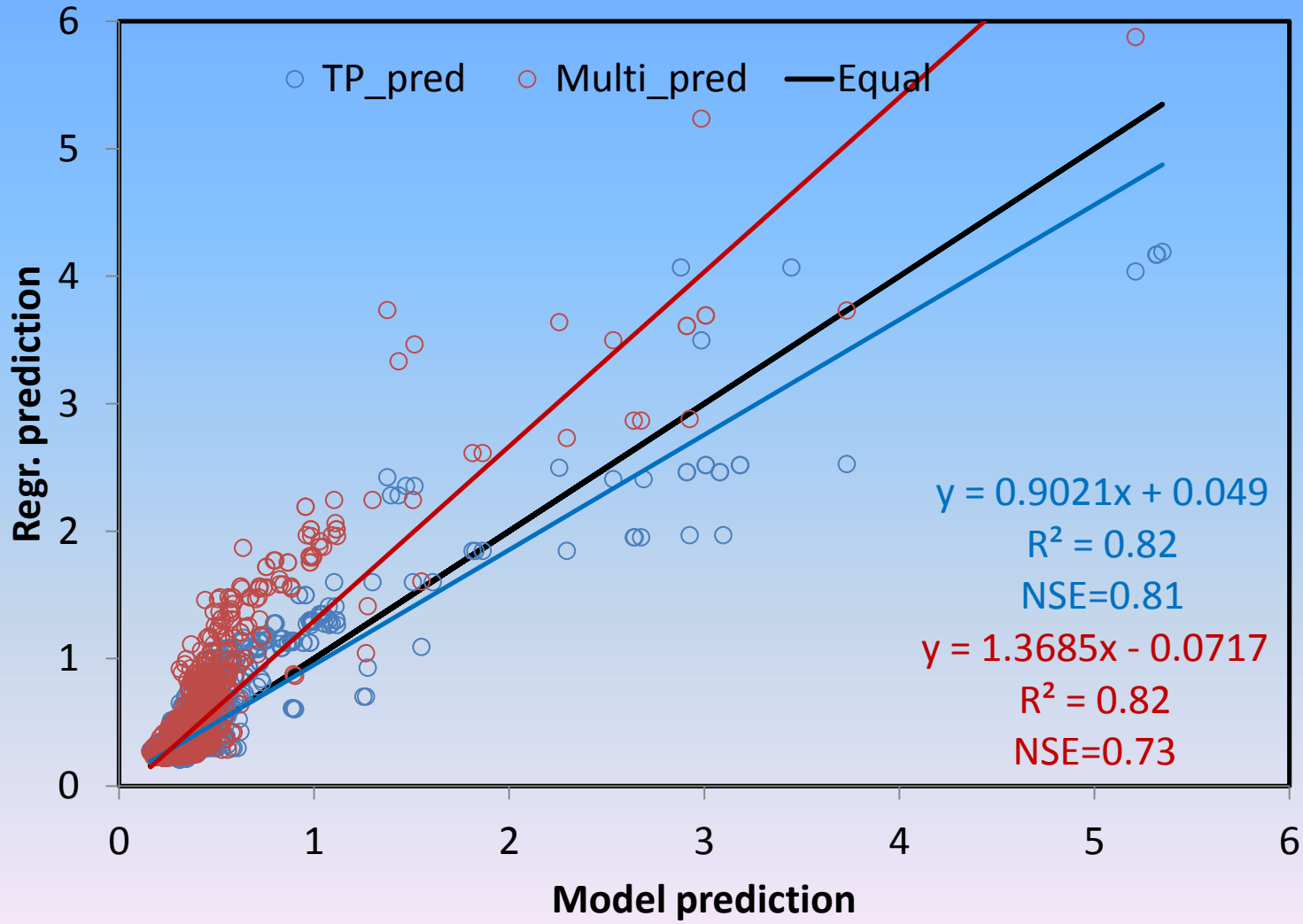
Mean=0.022
cv=0.97

Fertilizer

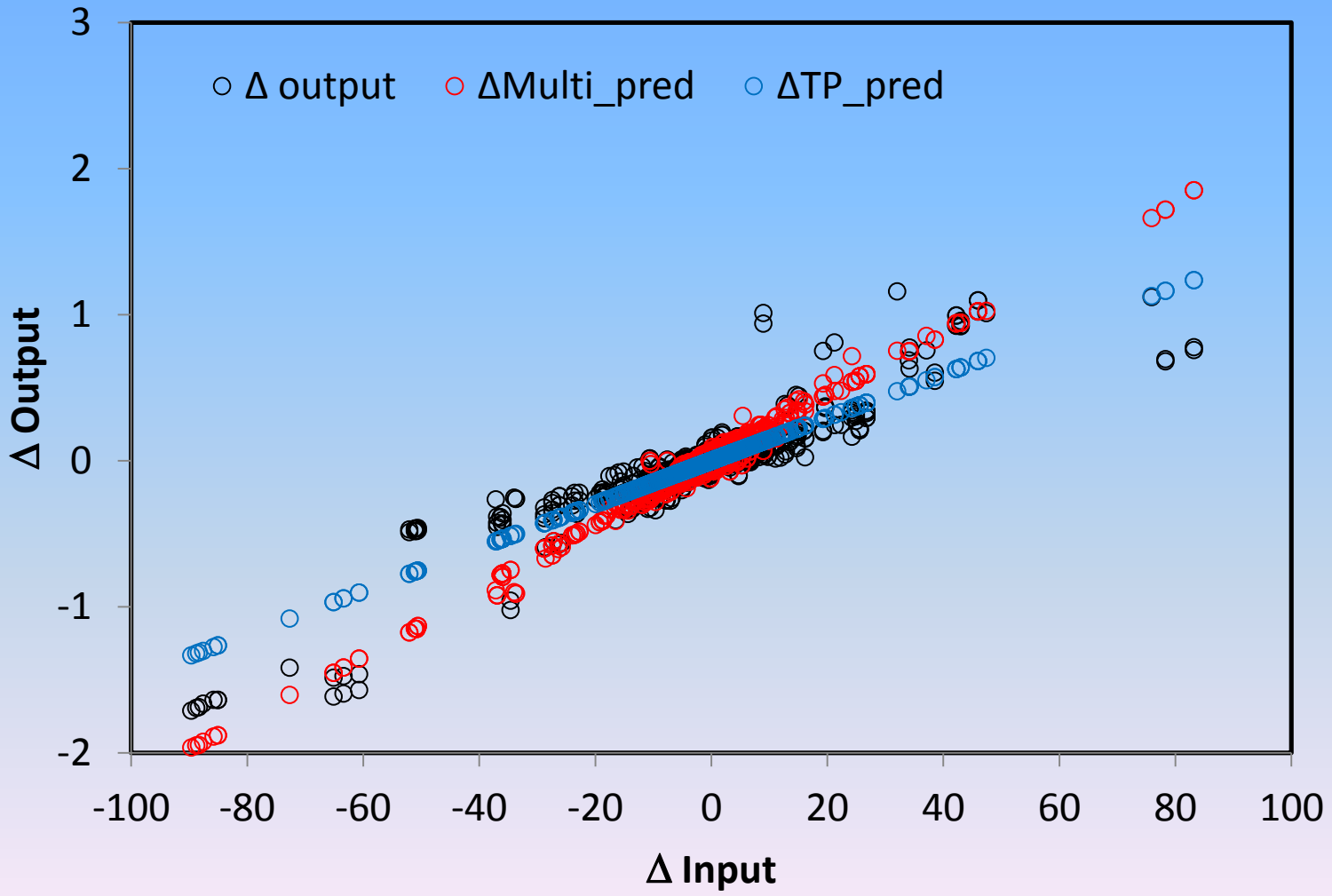


mean=0.0028
cv=9.1

Organic P output versus regression prediction using average slope and interception



Demeaned total loading versus model PO4 output and regression prediction



Summary for high-tillage cropland with manure

Constituent	Total input R2	Multi-V. R2	Total input NSE	Multi-V. NSE
Total N	0.73	0.73	0.27	0.66
DIN	0.56	0.54	0.49	-0.90
Organic N	0.70	0.70	0.13	0.50
Total P	0.80	0.81	0.38	0.66
PO4	0.78	0.79	-0.22	0.51
Organic P	0.82	0.82	0.84	0.85

Conclusions

- **Good prediction for DIN and TN on pasture, but relatively poor for ON.**
- **Good prediction for TN and ON on cropland, but relatively poor for DIN.**
- **All are good for P.**
- **TN and multi-variate predictions are similar in R^2, but MV is relatively better in NSE for most cases.**

THE END