SMAPVEX16 Soil Moisture Calibration

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Outline

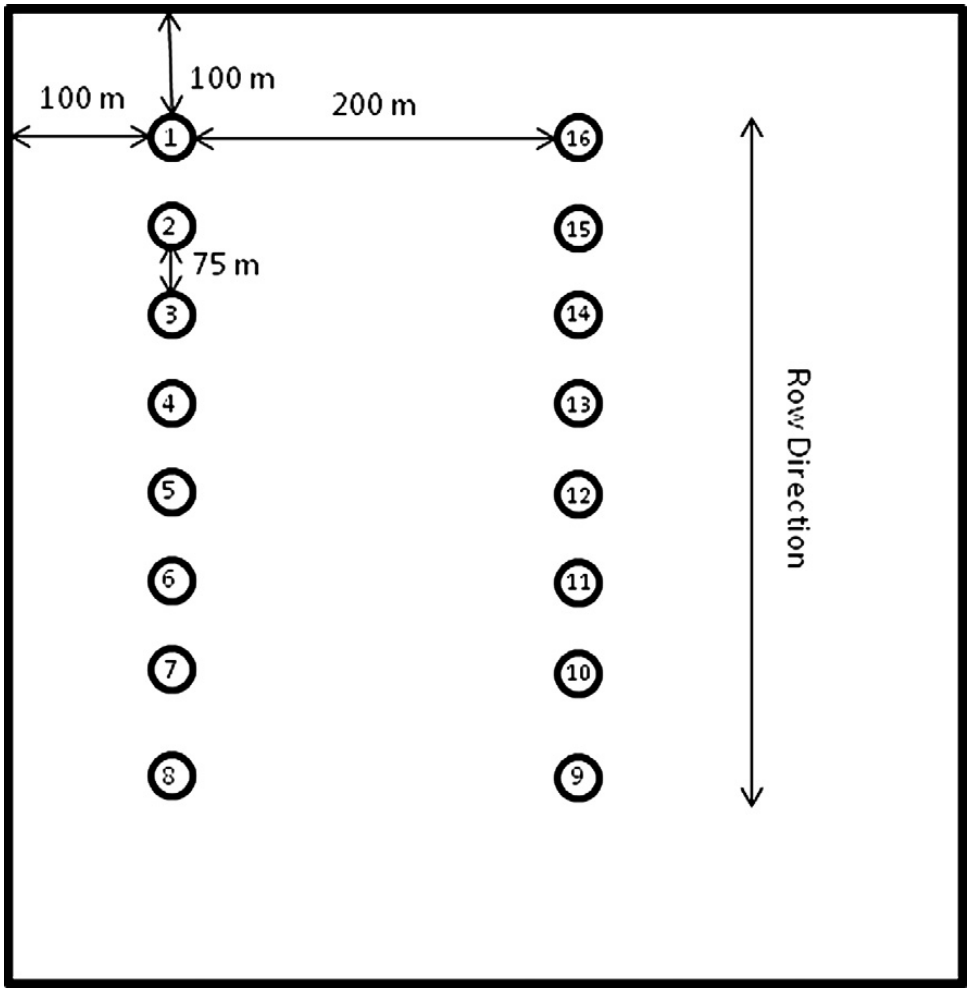
- Calibration procedure and 2016 calibration results
- Comparison of results to 2012
- Transferability of calibration equations
- The good news and the bad news*

*it's mostly bad

Calibration Procedure

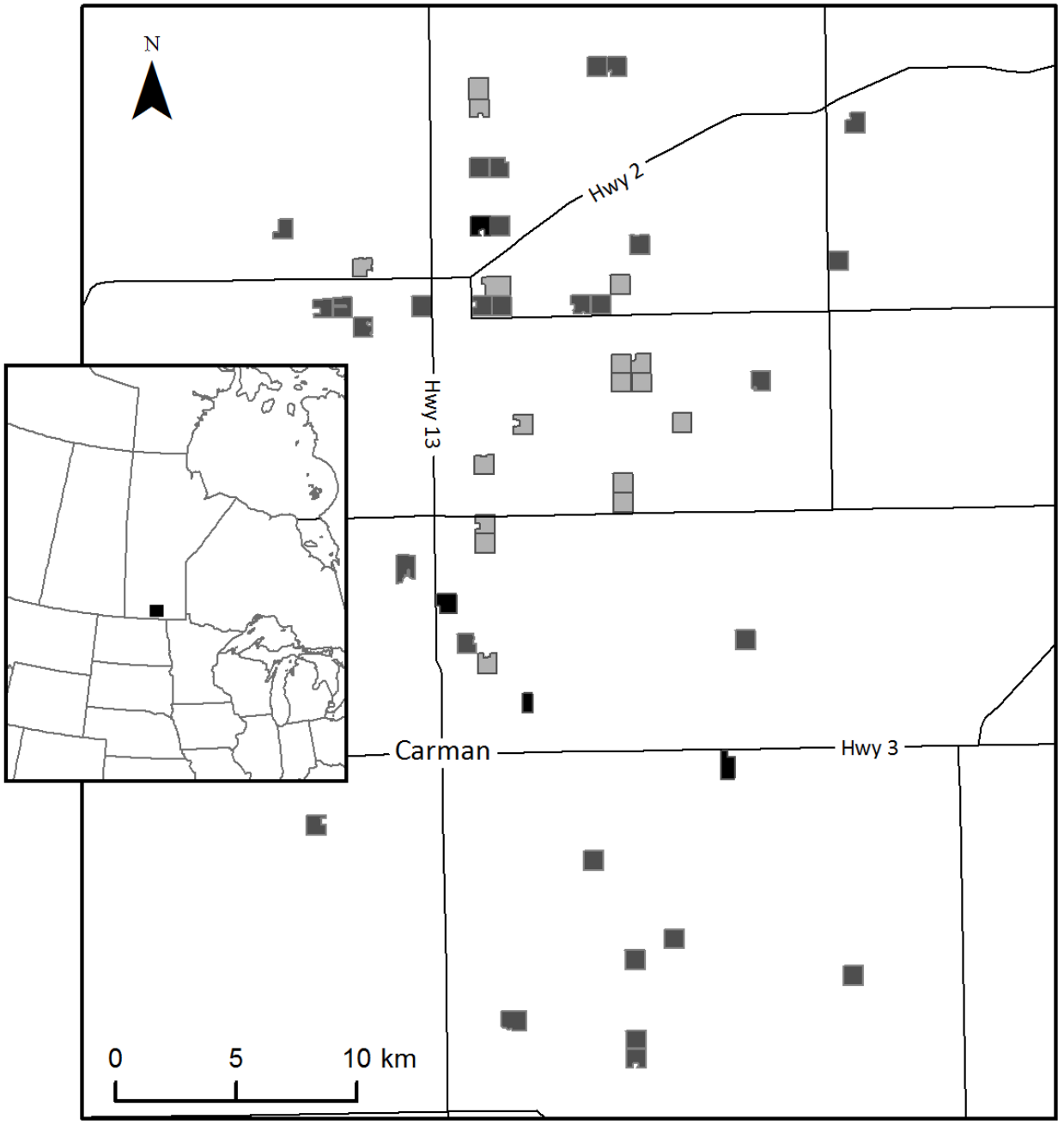
- Two measurement windows
  - June 8-20 and July 14-22
- 13 sample days (17 in 2012)
  - 7 days in window 1, 6 in window 2
- Cores extracted at Point 1 each day and rotating 2nd core
  - With each core, 3 hydra probe readings taken

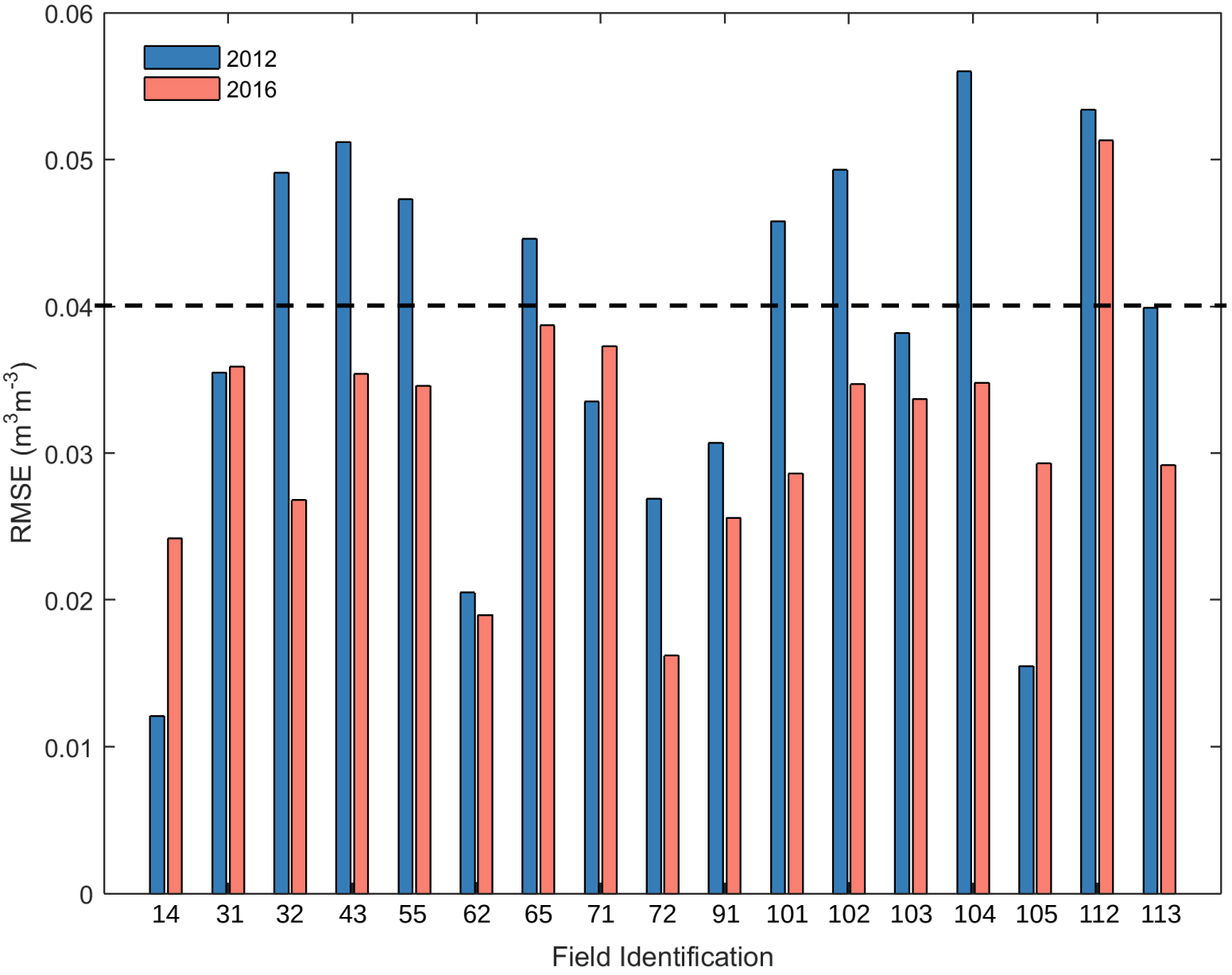
Calibration procedure



Calibration Results

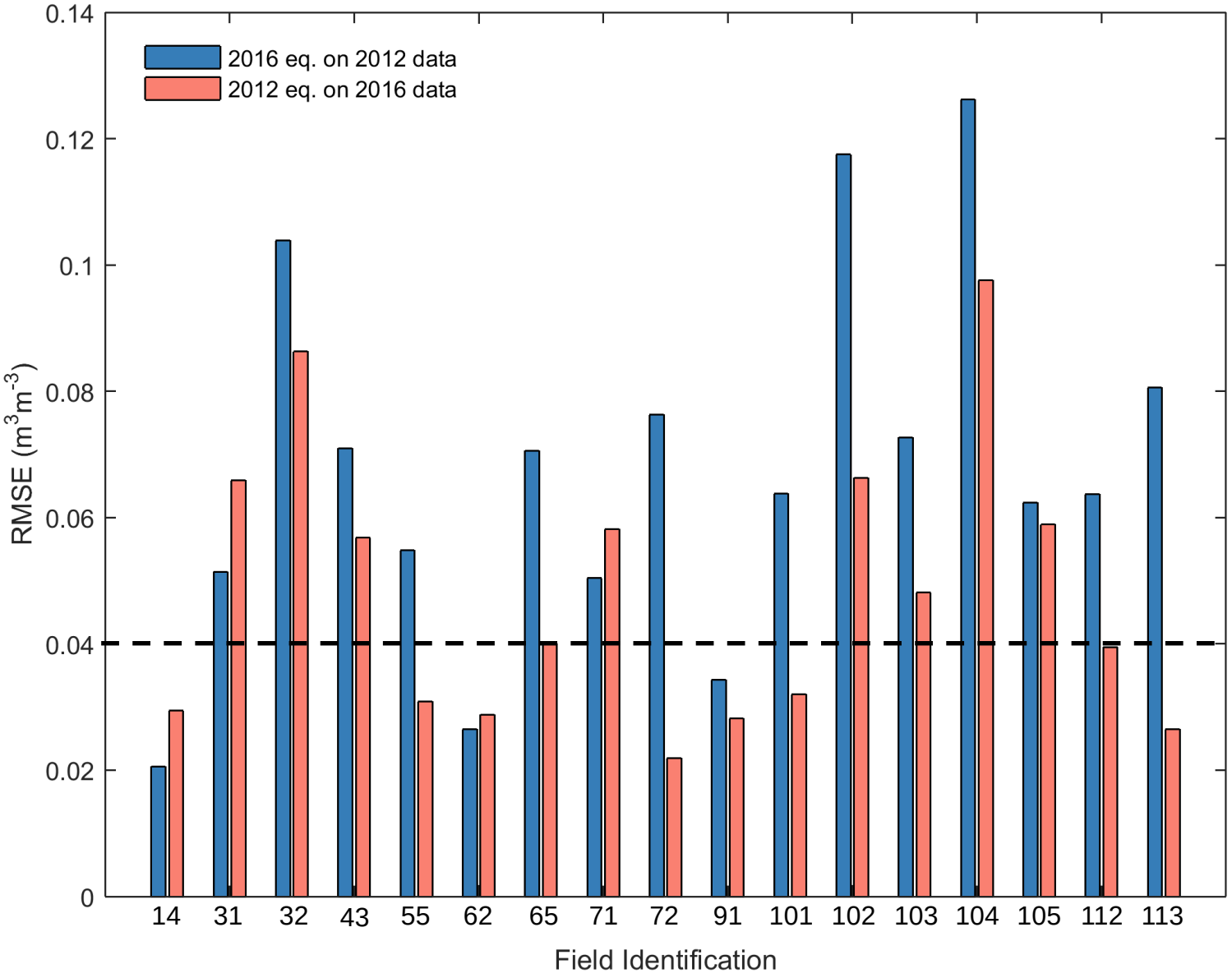
- 21 fields were resampled in 2016
- 4 fields had alternative soil texture characteristics relative to 2012




2012
2016
0.06
0.05
0.04
0.03
0.02
0.01
0
RMSE (m3m-3)
14
31
32
43
55
62
65
71
72
91
101
102
103
104
105
112
113
Field Identification

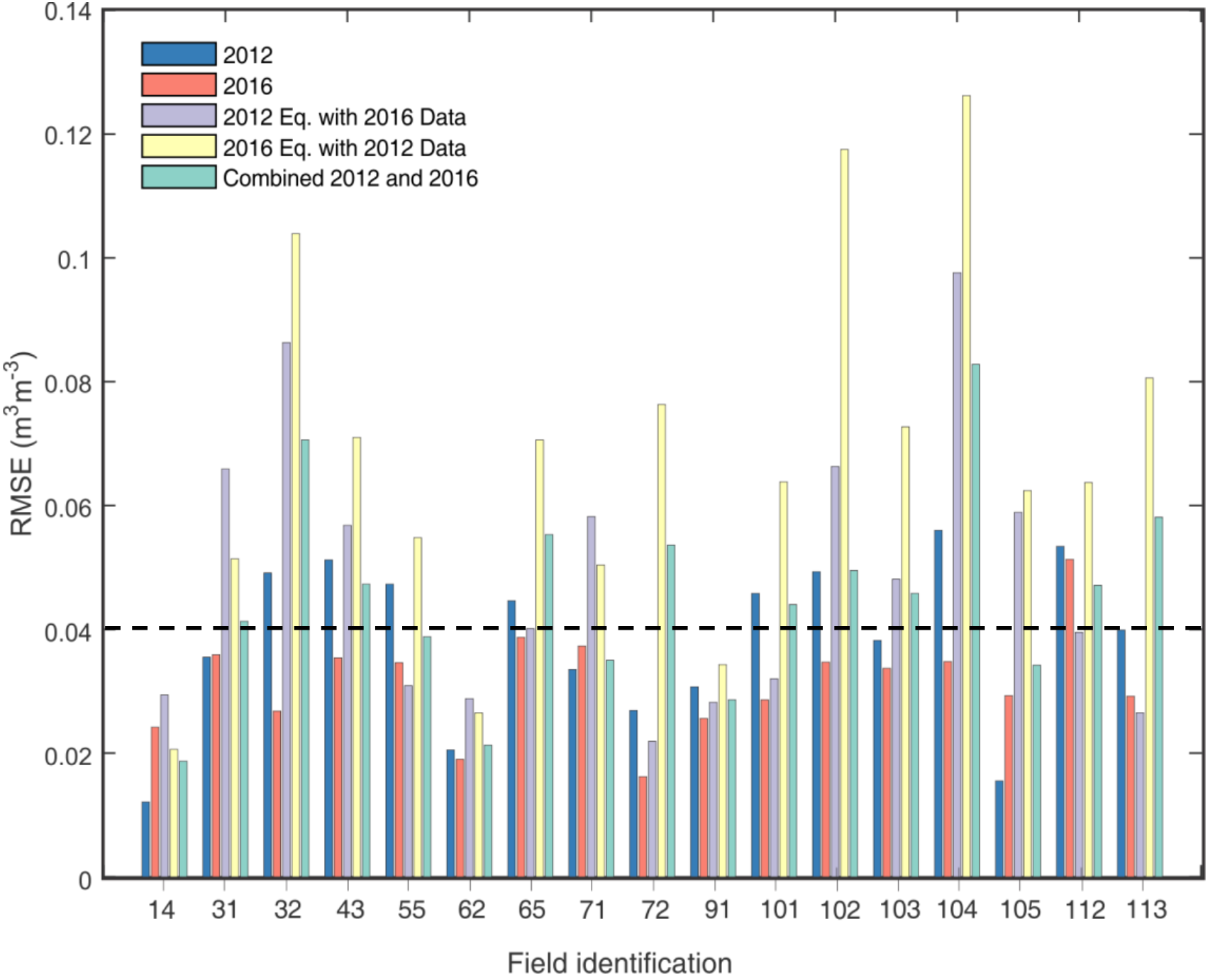
Transferability

- Nearly twice as many cores collected in 2016
- Cores collected in 2016 over a smaller range of soil moisture (0.24-0.44 m^3m^{-3}) than 2012 (0.11-0.41 m^3m^{-3})
- Examined errors of equations derived in 2016 to data collected in 2012 and vice versa


2016 eq. on 2012 data
2012 eq. on 2016 data
RMSE (m3m-3)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
31
32
43
55
62
65
71
72
91
101
102
103
104
105
112
113
Field Identification

Transferability

- Developed a calibration equation using core data collected in both 2012 and 2016 for each field
- Reduced the impact of the number of cores collected in 2016


2012
2016
2012 Eq. with 2016 Data
2016 Eq. with 2012 Data
Combined 2012 and 2016
RMSE (m3m-3)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
14
31
32
43
55
62
65
71
72
91
101
102
103
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113
Field identification

Bad News

- Calibration equations do not transfer year to year
- Why?
  - In this case, not due to changes in bulk density
    - Average bulk density used both years; CV between years not significantly different
  - Significant difference in CV of gravimetric water content between 2012 and 2016 (larger CV in 2012)

Bad News

- Without *a priori* knowledge of soil moisture conditions equations can not successfully be transferred
- But there is some hope…

Good News

- There is as much variability in bulk density and soil moisture within a small area of the field as the rest of the field

- If field has no topographic or textural differences, calibration could be conducted at a single location on the transects