**Update Mapping Sub-Team Meeting**

**11/27/2018 – 11:00am**

**Months topic:** Data exploration and landform analysis

**Roll Call**

1. Joe Brennan, SSR10, St. Paul, MN
2. Dave White, 8-LAS, Las Cruces, NM
3. Chance Robinson, 9-STE, Stephenville, TX
4. Jessica Phillipe, 12-STJ, Saint Johnsbury, VT
5. Rebecca Fox, 12-PAS, Paul Smiths, NY
6. Jamin Johanson, 12-DFX, Dover-Foxcroft, ME
7. Stephen Roecker, SSR11, Indianapolis, IN
8. Betsy Schug, 10-FER, Fergus Falls, MN
9. Kyle Thomson, 10-BIS, Bismarck, ND
10. Brianna Wegner, 10-BIS, Bismarck, ND
11. Tyson Morley, 9-ALT, Altus, OK
12. Martin Figueroa, 7-FOR, North Ft Myers, FL
13. George Otto, 7-TUS, Tuskegee, AL
14. Matthew Duval, SSR3, Raleigh, NC
15. Tom D’ Avello, NSSC-GRU, Morgantown, WV
16. Adolfo Diaz, Digitizing Unit, Madison, WI
17. Linda Harring, Digitizing Unit, Madison, WI
18. Wade Bott, SSS, Bismarck, ND

**Introduction**

1. Data exploration and landform analysis
   1. Derive terrain and spectral data products
   2. Select appropriate predictors

**Scale Effects on Terrain Attributes** (Stephen Roecker)

* Smoothing of DEM data may be compensating for other issues related to the source not directly related to true scale issues
* Slope values remain relatively unchanged from 3 to 45 m neighborhood size.
* Different software packages and statistical models account for values in a neighborhood uniquely
* Curvatures are a second derivative and more sensitive to changes
* 15 to 45 m was best neighborhood size for curvature in case study
* In lower relief landscapes of Region 11 have found 10m DEMs with 5x5 window size to be suitable.
* Most in the group favored 5-10m resolution in project work
* Computational times are compounded by resolution and neighborhood size
* Finest resolution elevation models are not always the most practical or predictive

Chance recommended a fine article illustrating model improvements using [mixed scaling in Digital Soil Mapping](https://www.nature.com/articles/s41598-018-33516-6) and Deep Learning and recently featured in Nature.

**Covariate Data Reduction Methods** (Dave White)

* Remove redundant data while making efficient use of data
  + Near Zero Variance – Identifies covariates with constant or near constant values/little variance and contributing little to the overall model
  + Correlation Reduction – Cross-reference all covariates to identify highly correlated variables reducing redundancy
  + Iterative Principle Component Analysis – Multiple iterations of principle components to reduce the covariate set. Target 95% of variance to identify input variables. Summing loading factors will identify

*Three may be useful steps to identify meaningful covariates. Can be used in combination with knowledge of local soil-landscape relationship prior to generating cLHS sampling scheme*

* + Iterative Principle Component Analysis – Multiple iterations of principle components to reduce the covariate set. Target 95% of variance to identify input variables. Summing loading factors will identify
  + Recursive Feature Elimination – Identifies weights of variables based on importance to the models, highest weights are retained

*All data reduction methods can be tested or used in conjunction with knowledge of local soil-landscape or variable importance when known*

**Project Management – MLRA Field Project and DSM** (Joe Brennan)

* Proposed a template for 2 Year MLRA Field Project integrating DSM
  + 36 Milestones to track the linear path of a project, and
  + Aligns with the stages from the SSM
    - Emphasize non-modelling specifics of soil business and project management
    - Highlight the role of the correlation team in the course of the projects
    - Illustrate the importance of timing in completing these complex projects
  + Goals
    - Finalize New Milestones and Propose NASIS Template (Will be brought to the SRSS Group in December)
    - Finalize Descriptive Documentation for Milestones (Brennan, Robinson, Roecker, White, early December)
    - Establish teams/task force to organize specific job aid sections (D’Avello, Kienast, early December) with emphasis on pre-modelling steps (Sequence 1-16)
    - Report Progress at next meeting

**Closing Remarks – December meeting will be cancelled with the holidays. Next meeting on January 22, 2019**