**Properties Sub-Team meeting**

**9/27/18**

Participants:

* 1. Dylan Beaudette
  2. Colby Brungard
  3. Tom D’Avello
  4. Chad Ferguson
  5. Suzann Kienast-Brown
  6. Zamir Libohova
  7. Jessica Philippe
  8. Stephen Roecker
  9. Alex Stum
  10. Travis Nauman
  11. Jim Thompson
  12. Rob Vaughan
  13. Skye Wills
  14. Dave Zimmerman

Agenda:

* Update on properties initiative agreement (Jim)
  + Email from Amanda – she has taken a full-time job and no longer available
  + Colby and Jim will draft a position description and circulate to group for comment
    - Will advertise ASAP
  + The agreement has been signed by NRCS – on to WVU
* Data sharing options
  + Dropbox not an option for NRCS
  + Cloudvault – 8G limit; and issues with files reaching the limit
  + Box – not sure of file size limit; restricted to agency employees; Chad will check into that
  + Google drive
  + WVU ftp; only Tom can put stuff there; 2TB limit
    - Jim will investigate options at WVU for both short-term and long-term storage/sharing options
  + Storage/format
    - Scale to integer (landsat x10000; 16 bit signed integer); compress LZW
    - Alex has script for scaling data in/out of HDF5 format that can handle multiple rasters in one file for moving data around – doesn’t store nodata pixels in every layer so good for irregular project areas
    - For larger properties project – properties, interpretations, covariates NET-CDF format might be an option
  + Interim file sharing solution
    - WVU peeps can download stuff from cloud services and load to ftp for everyone else to access
  + Elevated privileges – Chad will check this out and get back to Suzann
* Field week project
  + Discussion moved to field week call immediately following

**Properties Sub-Team meeting**

**9/11/18**

Participants:

1. Dylan Beaudette – absent
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson – absent
5. Suzann Kienast-Brown
6. Zamir Libohova – absent
7. Jessica Philippe
8. Stephen Roecker
9. Alex Stum
10. Travis Nauman
11. Jim Thompson
12. Rob Vaughan – absent
13. Skye Wills – absent
14. Dave Zimmerman – absent

Agenda:

* Update on properties initiative agreement (Jim)
  + Agreement has been signed by NRCS grant management specialist – funding date 9/24/18
  + Colby will touch base with Amanda to let her know the status
* Computing options
  + WVU – HPC – free access
    - Update on testing (Tom)
    - GRASS is on the system and ready to use
    - Anyone can get access to system – may want to pursue for this group but will wait until Tom is done with testing
  + Citrix VDI modeling group
    - Active directory group created – all USDA employees on this team
    - Software list provided to build profile on the Citrix system
    - Next step is for Suzann and Tom to meet with Paul Fukahara and Jennifer Sweet on processing options
    - More storage in the future; approx. 60TB or so available now
    - Provide Citrix tutorial to group – Suzann
  + Colby – NMSU HPC
    - SAGA script to derive 10m and 30m covariates for US
    - Possibly host products on Data Gateway
    - Run with default parameters although unique parameters would be ideal; others can tweak for their own purposes
    - Provide script/info on derivatives and any particular parameters, etc. to this group – Colby
* Interpretations update
  + Data to Bob Dobos – Travis will follow up
* Set specific short-term project to rally around
  + Update on field week
    - MLRA 130B for extent
      * Using HUC 12 for covariate processing – would HUC 8 or 10 be better?
        + Stephen suggests you don’t need to stratify by HUCs; just need enough overlap for mosaic
        + Colby – watershed important for flow accumulation

HUC 12 boundaries seem arbitrary

* + - * + Tom – process with a larger buffer then clip down
        + Travis – buffer out 4km for terrain indices

Are HUC 12s too arbitrary?

Are we going to end up with boundary artifacts when we predict in adjacent MLRAs?

Do we need to expand processing extent?

Stephen – compare results between different processing approaches; parameters

Travis – we need to focus on project at hand and decide on processing extent

Select intersecting HUC 12s with MLRA 130B; dissolve into one polygon; buffer out 4km for processing; clip back for modeling

10m vs 30m

30m with goals of properties group in mind

Expand extent with 30m data beyond MLRA 130B

Building models on an overlapping area and predict centrally

Predict on target MLRA and all surrounding MLRAs – mosaic target MLRA predictions

Pedologically-based stratifications

Colby – early testing indicates modeling by MLRA produces vastly different validation results and variable importance; he is testing predictions over multiple MLRAs to compare results

MLRA as a predictor doesn’t seem to have impact on results but provides insight and model interpretability

* + - * + Broad goal for field week

Predicting MLRA 130B 30m soil properties that are part of GSM suite of properties

10m for frigid zone project – buffered out by HUC boundaries

30m data for MLRA 130B continuous properties – buffered out by HUC boundaries

30m NLCD for snap raster for processing; 10m NLCD

Test MLRA model overlap – is this a goal of the 2018 field week? YES

Try MLRA 130B only and collection of MLRAs and compare

Tom/Jim select MLRAs and then Travis select HUC 12s that intersect, buffer 4km; becomes processing extent

Suzann/Tom clip 30m dem from Rob to project extent using NLCD snap raster; provide to group over google drive

Travis will acquire 30m spectral data snapped to NLCD; provide to group

* Update on CONUS 30m covariates (Rob)
  + On Google drive – sent to group

**Properties Sub-Team meeting**

**8/23/18 – cancelled**

**Properties Sub-Team meeting**

**8/7/18**

Participants:

1. Dylan Beaudette – absent
2. Colby Brungard – absent
3. Tom D’Avello
4. Chad Ferguson – absent
5. Suzann Kienast-Brown
6. Zamir Libohova – absent
7. Jessica Philippe – absent
8. Stephen Roecker
9. Alex Stum
10. Travis Nauman
11. Jim Thompson
12. Rob Vaughan
13. Skye Wills
14. Dave Zimmerman – absent

Agenda:

* Update on properties initiative agreement (Jim)
  + Paperwork submitted to NRCS in Lincoln
  + Been through WVU and NMSU
  + 150k, 94k to NMSU (post-doc salary) one year of funding for salary
  + 2 years of funding; if recurring funds are available, up to 1 year can be added (can go up to 3 years total)
  + Next step is to hire post-doc position; discuss with Amanda
  + USGS in Moab may have extra funds to channel to NMSU to help fund project past one year of salary to guarantee 2 years
* Update on field week
  + In process with NRCS leadership to request participation from NRCS employees
  + Availability will be the main hurdle
    - Set a date now before we request people’s participation – first week of Oct: 9/30-10/6 (Sun-Sat)
      * Tom will check with Tiffany
  + Check in with other NRCS participants
  + Send most recent copies to Travis
* Interpretations
  + Have approval for Bob Dobos to work on it, just need to get him data (currently out of office)
* Update on CONUS 30m covariates (Rob)
  + 30m NED product for CONUS; simple hydro correction in Arc; 10m fill
  + On Google drive – will send to group
  + HUC 10 boundaries
  + Floating point for AK, CONUS, CA, MX
  + Floating point for CONUS by watershed
  + Integer product as well
  + Not sure how the “best available data” from USGS will impact performance; issues from LiDAR data
  + National covariate stack – citrix
    - Can be used internally and externally eventually
* Stratification options
  + Use centroid of each polygon for prediction to create overlap between physiographic regions
  + MLRA (227) – used to label field points
    - Being updated in FY19
    - Use some sort of DSM process to update MLRA
  + EPA ecoregions (85) (water focused), ecological provinces, USFS subsections (being updated currently; expected in FY19)
  + May not even really matter – mainly need enough points and good covariate stack to capture variability, and process to stitch model results seamlessly together
* Coding and computing
  + Develop flexible code to switch out strata and test them all
  + Develop a workflow
  + Coding in R – several options for parallel processing
    - Tensorflow package in R – use of GPU
  + Possibly interface between R and python when needed
  + Keep all options open as we work through projects; share code on Github
  + Computing options
    - USGS Astro Sciences computing system (Travis)
    - WVU – HPC – free access
      * Jim could request guest account remote access for collaborators
      * Could use GRU funds to purchase disk space if needed
      * Tom is testing development of derivatives – wait for this for next step
      * This seems like best option for collaborative work while still pursuing NRCS in-house solution
    - Long term goal is for in-house (NRCS) solution – may be Citrix
* Set specific project goals to rally around
  + Example: make property maps for field week MLRA
  + Come to next meeting with ideas for specific project to work toward and decide on one to move forward
    - Benefit short term project and longer term overall goals

**Properties Sub-Team meeting**

**7/26/18**

Participants:

1. Dylan Beaudette – absent
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson
5. Suzann Kienast-Brown
6. Zamir Libohova
7. Jessica Philippe – absent
8. Stephen Roecker – absent
9. Alex Stum – absent
10. Travis Nauman
11. Jim Thompson
12. Rob Vaughan – absent
13. Skye Wills
14. Dave Zimmerman – absent

Agenda:

* Update on properties initiative agreement – any new developments? (Jim)
  + Sub-award with NMSU to have post-doc housed there; facilitate collaboration with people in the SW region
  + Start date 9/25/18 – 2 year agreement with one year extension possible
  + Do we want to pursue any of the stratification ideas with the SoilGrids100 data prior to the post-doc starting?
    - Would be wise to get something started; start date is for $ not necessarily the person (they will likely start later)
    - Move forward and provide foundation for post-doc to step into
    - Have a working plan laid out, which can be flexible
      * Start with stratification testing with soilgrids100 data
      * MLRAs – approx. 200 across US
      * EPA/FS ecoregions – nested coarser and finer scale stratification
      * Before the next meeting – everyone
        + Explore options; post data or links to Github
        + Discuss options and decide which stratification to start with at next meeting
      * Colby will test MLRA stratification in upper CO River basin on his prediction of soil depth project
* Update on field week
  + Leadership reviewed; RDs were next
  + Not sure when this will get attention due to recent upheaval in agency chaos, but Suzann will follow-up hopefully within the next week
* Interpretations
  + Follow up with Bob Dobos
    - Travis’ dataset with a specific request for Valley Fever interpretation
    - Travis, Skye, Chad, Suzann
    - Cc Maxine on email request; ask to prioritize after she returns
  + Interpretations staff
  + Volunteers to focus on this?
* Update on CONUS 30m covariates (Rob)
  + 30m hydrologically corrected DEM
  + Landsat composite imagery
    - Disturbance-free imagery?
  + Data access
    - Chat with Rob and come up with a solution
* Webinar – Travis: Applied Digital Soil Mapping
  + Others to join him?
  + Date – Sept or Oct
  + Email Shawn and cc Travis
* gPROP name – is this really it?
  + Solicited group for a product name
    - A few suggestions submitted; will wait for more before voting
* Properties sub-team website
  + Other sub-teams will have open meetings; thoughts on that?
    - Not at this time
  + Link to Github?
    - yes
* Calendar items for meetings – everyone got it?
  + yes

**Properties Sub-Team meeting**

**7/10/18**

Participants:

1. Dylan Beaudette – absent
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson
5. Suzann Kienast-Brown
6. Zamir Libohova – absent
7. Jessica Philippe – absent
8. Stephen Roecker – absent
9. Alex Stum – absent
10. Travis Nauman – absent
11. Jim Thompson
12. Rob Vaughan – absent
13. Skye Wills – absent
14. Dave Zimmerman – absent

Agenda:

* Follow-up from Northeast/South Region NCSS meeting (Jim, Tom)
  + DSM discussion period – Jim, Tom, Matt Levi on panel
  + Some of the standard questions, but some stood out
    - Product versioning – What does it mean? Change in soils? Change in knowledge? Not a temporal change – we need to be clear
    - Dynamic soil properties – particularly in the surface layers – how can we capture these? Future meeting
* Update on properties initiative agreement (Jim)
  + Conversation with Hoover and Kinney/Travis and Amanda (noted in last meeting minutes)
  + Jim working on logistics of hiring, etc. with WVU/remote location
    - Research Assistant Professor vs. Post-Doc
    - 18-24 months of funding combining existing funds with new funds
  + Pursue both position to focus on project and group workshops
  + NRCS travel cannot be supported with initiative money – cooperator travel can
  + Draft deliverables in CESU to capture transfer of expertise/technology (raster datasets, scripts, process document, etc.), expectation of interaction with the DSM Focus Team, and other items identified by properties sub-team
  + Do we want to pursue any of the stratification ideas with the SoilGrids100 data prior to the post-doc starting? Future meeting
* Update on field week (Tom)
  + Conversation with Lindbo – very receptive and supportive
  + Proposal to NHQ this week
    - Great Smoky’s NP – 7 field crew
    - 5 DSM Focus Team soil scientists – 3 NRCS, 2 cooperators
  + Ratio of local crew to DSM Focus Team members for future field weeks will be project dependent
  + Lindbo suggested two field weeks for FY19 field season – one western (Bob Marshall Wilderness or Cascades); one eastern (White Mtn NF)
  + Work with field crew prior to field week for sampling design and other prep work for modeling
* gPROP name – is this really it?
  + Solicit group with a product name and vote
* Github – everyone accessing ok? Send url again
* Raster products weekly article 6/29/18

Agenda items tabled until next meeting:

* Interpretations
  + Follow up with Bob Dobos
  + Interpretations staff
  + Volunteers to focus on this?
* Update on CONUS 30m covariates (Rob)
* Webinar – Travis: Applied Digital Soil Mapping
  + Others to join him?
  + Date – Sept or Oct
* Calendar items for meetings – everyone got it?
* Properties sub-team website
  + Other sub-teams will have open meetings; thoughts on that?
  + Link to Github?

**Properties Sub-Team meeting**

**6/18/18**

Participants:

1. Dylan Beaudette – absent
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson
5. Suzann Kienast-Brown
6. Zamir Libohova – absent
7. Jessica Philippe – absent
8. Stephen Roecker
9. Alex Stum
10. Travis Nauman – absent
11. Jim Thompson
12. Rob Vaughan – absent
13. Skye Wills
14. Dave Zimmerman

Agenda:

* Update on WVU agreement details – Jim
  + Soils2026 raster continuous soil properties project
  + Conversation with Hoover, Kinney
    - Explained focus team vision for these products
    - Supportive of approach and products
      * Not using SSURGO or STATSGO for input data – derived from point data using statistical/machine learning methods
    - What is the delivery mechanism and how does that influence what we produce?
  + 150k over 2 years
    - Opportunity to add funding after 2 years
    - Extension for 3 years available if needed
  + Post-doc
    - Conversation with Amanda and Travis
      * She is interested
    - Preference is for post-doc to be in Morgantown, but not imperative
      * Location not as important as getting the right person and getting the work done
      * Could sub-contract with Colby at NMSU
      * Main goal is get this done; continuous soil property rasters for US asap
    - Create momentum and push goals of focus team forward
  + Kinney requested proposal by July 15
    - Contract to start before Sept 30 to obligate FY18 funds; to begin spending on Oct 1
  + Improvements to previous efforts
    - Covariates – better input data
      * For example: parent materials – Skye and others working on this
      * Rob is also working on 30m covariates (elevation, imagery)
    - More input point data
    - Stratification of the modeling domains
  + What role does the focus team play?
    - Post-doc becomes a member of the sub-team
    - Collaborates with sub-team who provides direction, discussion, oversight
      * Sub-team actively engaged with post-doc
    - Engage with SSD staff; incorporate property products into yearly workloads
      * Share your ideas on how to make this succeed
        + Ownership of update process to improve product
        + Connect to acre goals
        + Connect to DSM projects that SSOs are already doing in their local areas
        + Replicate node idea of GSM structure with each SSD Region serving as a node
    - Goal is to integrate work of post-doc and sub-team into agency so NRCS/NCSS has ownership over methods and products
* 2018 field week proposal – Tom
  + Proposal emailed to group
    - Dates have not been decided; will wait for proposal to move forward and determine how many people can be supported to attend
  + Training via an in-progress project (update or initial)
  + Cross pollinate between DSM focus team and field crew
  + Achieve objective of project
  + Develop a network of SSD staff
  + Feeds into goals of DSM sub-teams (initial, update, properties)
  + Structure weeks to integrate both field and modeling activities
* Interpretations update – info from Maxine – Suzann will send email
  + Approved as SSRA priority; not funded
    - Have the ability to adjust soil properties from site specific locations and generate on the fly interpretations (from ready-to-use interpretations) for desktop and mobile applications.
    - Have the ability for users to create new interpretations outside of the transactional NASIS database.
    - Have the ability to use geospatial layers from many formats to integrate into the soils data for developing more spatially explicit interpretations.
  + Dylan will summarize work that he and Jason started
  + Set up meeting with interpretations staff to discuss what we envision
    - Subset of people who want to focus on this?
* Github – dsm-properties-subteam under ncss-tech
  + Stephen – done
  + Add members and meeting info and other supporting documentation

**Properties Sub-Team meeting**

**6/6/18**

Participants:

1. Dylan Beaudette
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson
5. Suzann Kienast-Brown
6. Zamir Libahova
7. Jessica Philippe – absent
8. Stephen Roecker
9. Alex Stum
10. Travis Nauman
11. Jim Thompson
12. Rob Vaughan – absent
13. Skye Wills
14. Dave Zimmerman

Agenda:

* Follow-up from West Region NCSS meeting (Suzann, Travis, Colby)
  + Raster interpretations
    - Raster interpretations generator project (gSSURGO)
      * Drew Kinney and Dave Hoover both talked about this project at the conference
      * Upon further clarification – the project has been approved but not funded; received information from Maxine Levin and passed on to Dylan to compare to what he and Jason had worked on previously
      * Suzann will follow up with interpretations staff and set up a meeting to discuss our goals of developing interpretations from continuous properties
    - Bob Dobos – sub-team to provide example dataset to start exploration of interpretations from continuous property data
      * Travis has a dataset from the upper CO River basin that has continuous properties predicted in depth intervals; data structure is similar to what we are pursuing
      * Perhaps Bob can focus on Valley Fever interpretation for this test dataset
      * Suzann will follow up with Bob and propose the CO River basin dataset for testing; perhaps set up a meeting with him
      * Skye and Zamir can follow up with Bob if needed
  + Soils2026 continuous properties project funded
    - Funds channeled through WVU; Jim will expand on this to the group
      * Jim awaiting details of agreement from Hoover; he hopes to have details at our next sub-team meeting
    - Discuss best use of funds
      * Personnel – hire a post-doc
        + Focus on specific tasks such as ranking/weighting of point data, stratification for modeling domains, etc
        + Person needs to be fully integrated with NRCS/NCSS and this sub-team for this to be successful
        + Amanda Ramcharan was suggested; Travis will inquire about her situation
      * Working sessions – bring everyone together in workshop setting for a week at a time since time is everyone’s limiting factor
        + Funds from agreement could be used for non-NRCS personnel travel; we can submit a proposal to HQ to fund NRCS personnel for working sessions
    - Ideally, we would do both – hire task oriented post-doc and hold working sessions
  + Other items from the meeting?
    - None
* Group discussion
  + As we move forward, it is imperative we demonstrate the application of these raster products
  + Appeal to those inside and outside NCSS with application for specific concerns
    - Link to conservation planning; farm bill programs
    - Wetlands
    - Ecological site development
    - Dust
  + Discussion initiated about 30m scale – need to determine scale that will help manage expectations – what’s possible vs. what’s reasonable – will table discussion for future meeting
* Next steps
  + Test some ideas on SoilGrids100 covariate data
    - Use this data to test some of the most pertinent questions as we are working toward preparing other covariate data
    - Prioritize testing
      * Stratification of modeling domains
        + Perhaps start with MLRAs to stratify and compare results to SoilGrids100
        + Parallelization of workflow should be evaluated
      * Ksat, AWC, depth to restrictive layer, and thickness were key to hydrologists needs (from TX meeting)
  + Continue work with Rob and Colby
    - Development of 30m covariates
  + Others?
* Other items
  + gPROP for name of continuous property products – chime in if you have other ideas
  + Suzann is working with Kyle Stephens from the database focus team on a short article for the SSD weekly outlining the gridded products and how they are related, or not
  + The DSM focus team has presented five NSSC webinars in the past six months and would like to continue the series with one every month or so; please volunteer if you have interesting DSM projects that could fit into a one-hour webinar
    - Travis has a couple projects he could present
    - Dave White from Las Cruces SSO has also agreed to present his update work

Next meeting: June 18 @12:30pm CST

**Properties Sub-Team meeting**

**5/16/18**

Participants:

1. Dylan Beaudette
2. Colby Brungard
3. Tom D’Avello
4. Chad Ferguson
5. Suzann Kienast-Brown
6. Zamir Libahova – absent
7. Jessica Philippe
8. Stephen Roecker – absent
9. Alex Stum
10. Travis Nauman
11. Jim Thompson
12. Rob Vaughan
13. Skye Wills
14. Dave Zimmerman

Agenda:

* Focus team update
  + Vision
    - Nationwide continuous property stack
    - Follow GlobalSoilMap specifications as a starting point
      * Recognize the flexibility to adapt as needed
        + Add more properties, change depth intervals, etc.
        + Add properties to some parts of the country, not others (e.g. EC)
    - Properties predicting using pedon point data for training
    - Discussion of the need to consider horizons vs. depth intervals (local vs. national scale product)
  + Soils2026
    - National coverage continuous soil property data is Tier 3 of the Soils2026 effort
    - Question yet to be answered: when is the national coverage property data considered full-coverage soils information for meeting the Soils2026 goal?
      * We will need to produce something to demonstrate utility before this question is considered
  + Ground work – Rob and Colby
    - Discussions between Suzann, Rob, and Colby have led to some developments in testing and exploring options
    - Rob is heading up an effort to create a thinner set of covariates (compared to Soilgrids) and use resources at USFS GTAC to test capabilities with GEE and Tensorflow to predict properties
      * Option to keep covariates on GEE as assets, but not necessarily create there, especially hydrologically based derivatives
      * Process available from GTAC to develop spectral data from Landsat archive that removes disturbances in imagery
        + May impact dynamic soil properties effected by land use changes; will need to consider
      * Desire to leverage GEE resources without getting too tied into Google; definitely no plan to use GEE as final data repository or require users to interact with GEE in any way
    - Colby is entering agreement with USFS to provide property data for the Cascades region
      * Focus team members already looped into project: Jim, Suzann, Travis
      * Project can serve as test area for ideas/methods to apply to larger effort
      * Will focus on Mt. Hood area initially, then expand to greater Cascades region
      * Exploring discrete entities to stratify the area for modeling; Noller – geomorphic environments; LRUs
* Group discussion
  + Data processing options
    - GEE
    - HPC options; Univ of Illinois, WVU, USGS
    - Citrix-based virtual desktop system at NRCS Ft. Worth center; can customize to meet processing needs; only available to those with a LincPass
  + Discrete units in modeling
    - MLRAs; LRUs; what is appropriate?
    - Option to use discrete elements as modeling domains and develop local models
    - Option to develop global model with more sophisticated algorithm and incorporate discrete elements as a covariate
    - Leave location our cross-validation methods could be explored
    - Balance model interpretability with prediction accuracy
    - Comparison of local vs global results
      * Set goal posts early in process
      * Use some sort of matrix for comparison
      * Do the models have pedogenic interpretation? Does it matter?
* Group – these items will be requested by email
  + Vision
  + Expertise or interests
  + Involvement
* Next steps
  + Test some ideas on soilgrids 100 covariate data
    - Use this data to test some of the most pertinent questions as we are working toward preparing other covariate data
    - Will discuss this further and prioritize testing at next meeting
  + Continue work with Rob and Colby
  + Others?
* Decide on meeting frequency and set next meeting
  + Minimum of once a month – more frequent is better for building and maintaining momentum
  + Next meeting scheduled for Wed June 6 @1pm CST