

CURRICULUM VITAE

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Jiyul Chang, Lecturer/Research Associate

Ph.D. in Agronomy (Precision Ag, GIS, Remote Sensing)

Berg Ag Hall #210, Box 2207A
Plant Science Department
South Dakota State University
Brookings, SD 57007

Phone: Work: (605) 688-4594
email: Jiyul.chang@sdstate.edu

Education

- Ph.D. in Agronomy, South Dakota State University, Brookings, SD, May 2002.
- M.S. in Agronomy, South Dakota State University, Brookings, SD, July 1997.
- B.S. in Biology, Yonsei University, Seoul, Korea, Feb. 1988.

Employments

- Lecturer in Agronomy, Horticulture, and Plant Science Department, South Dakota State University (August 2015 - Present).
- Research Associate II in Plant Science Department, South Dakota State University (June 2009 – July 2015).
- Research Associate II in Geographic Information Science Center of Excellence, South Dakota State University (June 2006 – May 2009).
- Post-doctoral research associate in Plant Science Department, South Dakota State University (May 2002 – May 2006).

Teaching Responsibility

- PS 213: Introductory Soil Lab
- PS/HO 285: Agricultural Computation
- PS 427: Precision Ag Data Mapping
- PS 440L: Crop Management with Precision Farming Lab

Research Projects

- Measuring GHG emission and soil organic matter in grazing fields
- Measuring GHG emission from biochar treated soil
- Developing nutrient management zones
- Site-specific crop/fertilizer management (precision agriculture)
- Soil fertilities in different landscapes / Soil spatial variability

- Cropping systems: water use efficiency, nutrient use efficiency, C sequestration
- Geospatial analysis and mapping using GIS
- Remote sensing for crop and nutrients management
- Crop field mapping using various satellite images

Grants:

Syngenta: Advanced Remote Sensing Project for Mapping Crop Fields (2012-2013): \$39,000.

Training

- SSToolbox Training (General). Dec. 1999.
- ERDAS IMAGINE Training (Modeling, Classification). Aug. 2000.

Specialized Skills

1. Field techniques:
 - a. Systematic soil and plant sampling
 - b. Developing field maps with carrier phase kinematic DGPS
 - c. Developing soil EC maps with EM38 and Veris 3100 for soil moisture trend
 - d. Developing yield maps with yield monitoring data
 - e. Using CropScan multi-spectrometer and CID 700 hyper-spectrometer
 - f. Experimental design for small field experiments
 - g. Experimental design for large production field experiments
 - h. Using CI 110 Leaf Area Index
 - i. Photosynthesis measurement using CID 510 and Porometer (Decagon)
2. Computer techniques:
 - a. Spatial Statistics/Mapping
 - SAS, GEOEAS, GS+, S-Plus, SigmaPlot
 - Management Zone Analyst, Surfer
 - Ag Leader SMS, Ag Data Mapping Solution
 - b. Remote Sensing/GIS
 - Advanced multi-scale / multi-temporal data analysis with eCognition
 - Classification of remote sensing data (MODIS, AWiFS, Landsat, IKONOS, QuickBird, aerial photos) with ERDAS IMAGINE
 - ArcGIS, ArcView, ArcInfo, SSToolbox, SMS, ADMS
 - c. Programming
 - FORTRAN, Basic, EASI
3. Laboratory techniques:
 - a. NO₃-N, NH₄-N, and P analysis on Astoria Analyzer
 - b. DOC analysis on Dohrman Carbon analyzer
 - c. Delta ¹³C and ¹⁵N analysis on Europa mass spectrometer
 - d. Soil texture analysis

e. Leaf area measurement

Peer Reviewed Publications

1. Chang, J., D. E. Clay, S. A. Clay, A. J. Smart, and M. Ohrtman (2017). An In-Situ Precision Conservation Assessment Method for Measuring Feces NH₃-N and CO₂-C Emissions and Decomposition Rate Constants. (Accepted in Agron. J.).
2. Clay, D.E. G. Reicks, J. Chang, T. Kharel, S.A. Bruggeman. (2017). Assessing a fertilizer program: short- and long-term approaches. In A. Chatterjee and D. Clay (eds), Soil Fertility Management in Agroecosystems. ASA/Crop Science/SSSA digital library, Madison WI. (In press)
3. Chang, J., D. E. Clay, S. A. Clay, R. Chintala, J.M. Miller, and T. Schumacher (2016). Biochar Reduced Nitrous Oxide and Carbon Dioxide Emissions from Soil with Different Water and Temperature Cycles. Agron. J. 108:2214-2221.
4. Chang, J., D. E. Clay, A. Smart, S. Clay. (2016). Estimating annual root decomposition in grassland systems. Rangeland Ecology & Management. 69:288-291.
5. Chang, J., D.E. Clay, S.A. Hansen, S.A. Clay, and T. Schumacher. (2014). Water stress impacts on transgenic corn in the northern Great Plains. Agron. J. 106:125-130.
6. Clay, D.E., J. Chang, S. A. Clay, J. Stone, R. H. Gelderman, G. C. Carlson, K. Reitsma, M. Jones, L. Janssen, and T. Schumacher. (2012). Corn Yields and No-Tillage Affects Carbon Sequestration and Carbon Footprints. Agronomy Journal. 104:763-770.
7. Chang, J., D.E. Clay, L. Leigh, D. Aaron, K. Dalsted, and M. Volz. (2008). Evaluating modified atmospheric correction methods for Landsat imagery: Image-based and model-based calibration methods. Communications in Soil Science and Plant Analysis. 39:1532-1545.
8. Chang, J., Matthew C. Hansen, Kyle Pittman, Mark Carroll, and Charlene Dimiceli. (2007). Corn and soybean mapping in the United States using MODIS time-series data sets. Agronomy Journal. 99:1654-1664.
9. Clay, D.E., K. Kim, J. Chang, S.A. Clay, and K. Dalsted. (2006). Characterizing water and nitrogen stress in corn using remote sensing. Agronomy Journal. 98:579-587.
10. Clay, D.E., C.G. Carlson, S.A. Clay, C. Reese, Z. Liu, J. Chang, and M.M. Ellsbury. (2006). Theoretical derivation of stable and nonisotopic approaches for assessing soil organic carbon turnover. Agronomy Journal. 98:443-450.

11. Chang, J., and D. E. Clay. (2005). Identifying factors for corn yield prediction models and evaluating model selection methods. *Korean Journal of Crop Science*. 50(4): 268-275.
12. Clay, D.E., C.G. Carlson, S.A. Clay, J. Chang, and D.D. Malo. (2005). Soil organic carbon maintenance in corn (*Zea mays* L.) and soybean (*Glycine max* L.) as influenced by elevation zone. *Journal of Soil and Water Conservation*. 60(6): 342-348.
13. Chang, J., S. A. Clay, D. E. Clay, D. Aaron, D. Helder, and K. Dalsted. (2005). Clouds Influence Precision and Accuracy of Ground-Based Spectroradiometers. *Commun. Soil Sci. Plant Anal*. 36:1799-1807.
14. Chang, J., S.A. Clay, D.E. Clay, and K. Dalsted. (2004). Detecting Weed-Free and Weed-Infested Areas of a Soybean Field Using Near-Infrared Spectral Data. *Weed Science*. 52:642-648.
15. Chang, J., D.E. Clay, C.G. Carlson, C.L. Reese, S.A. Clay, D.D. Malo, and M.M. Ellsbury. (2004). Defining Yield Goals and Management Zones to Minimize Yield and Nitrogen and Phosphorus Fertilizer Recommendation Errors. *Agronomy Journal*. 96:825-831.
16. Chang, J., D.E. Clay, K. Dalsted, S.A. Clay, and M. O'Neill. (2003). Corn (*Zea mays* L.) Yield Prediction Using Multispectral and Multidate Reflectance. *Agronomy Journal*. 95:1447-1453.
17. Chang, J., D.E. Clay, C.G. Carlson, S.A. Clay, D.D. Malo, R. Berg, and W. Weibold. (2003). Different Techniques to Identify Management Zones Impact Nitrogen and Phosphorus Sampling Variability. *Agronomy Journal*. 95:1550-1559.
18. Clay, D.E., J. Chang, D.D. Malo, C.G. Carlson, C.L. Reese, S.A. Clay, M. Ellsbury, and B. Berg. (2001). Factors influencing spatial variability of soil apparent electrical conductivity. *Commun. Soil Sci. Plant Anal*. 32:2993-3008.
19. Clay, D.E., J. Chang, C.G. Carlson, J. Lee, D.D. Malo, S.A. Clay, and M. Ellsbury. (2000). Precision Farming Protocols: Part 2. Impact on Profitability. *Commun. Soil Sci. Plant Anal*. 31:2969-2985.
20. Chang, J., D.E. Clay, C.G. Carlson, D.D. Malo, S.A. Clay, J. Lee, and M. Ellsbury. (1999). Precision Farming Protocols: Part 1. Grid Distance and Soil Nutrient Impact on the Reproducibility of Spatial Variability Measurements. *Prec. Agr*. 1: 277-289.
21. Clay, D.E., J. Chang, S.A. Clay, M. Ellsbury, C.G. Carlson, D.D. Malo, D. Woodson, and T. DeSutter. (1997). Field Scale Variability of Nitrogen and Delta15-N in Soil and Plants. *Commun. Soil Sci. Plant Anal*. 28: 1513-1527.

Crop Management Manual Books

1. Chang, J., C.L. Reese, T. Kharel, S.A. Clay, and D.E. Clay. (2016). An Introduction to Precision Farming. Chapter 19 in *Corn: Best Management Practices*. In Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). iGROW South Dakota State University.
2. Clay, D.E., J. Chang, and C.G. Carlson,. (2016). Precision Soil Sampling. Chapter 21 in *Corn: Best Management Practices*. In Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). iGROW South Dakota State University.
3. Chang, J., and D. E. Clay. (2016). Matching Remote Sensing Tool to Your Problems. Chapter 22 in *Corn: Best Management Practices*. In Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). iGROW South Dakota State University.
4. Chang, J., D.E. Clay, S.A. Clay and C. Reese. (2013). Using Remote Sensing Technique to Assess Soybean Yield Limiting Factors. Chapter 16. *In* Clay, D.E., Carlson, C.G. Clay, S.A., Wagner, L., Deneke, D., Hay, C. (eds). IGROW Soybean: Best Management Practices. South Dakota State University, Extension Service, Brookings, SD.
5. Clay, D.E., C.G. Carlson, J. Chang, and C. Reese. (2013). Overcoming production barriers using precision soil sampling. Chapter 20. *In* Clay, D.E., C.G. Carlson, S.A. Clay, L. Wagner, D. Deneke, and C. Hay, C. (eds). iGrow Soybean: Best Management Practices. South Dakota State University, Extension Service, Brookings, SD.
6. Chang, J., K. Dalsted, D.E. Clay, and G. Carlson. (2012). Precision wheat management. Chapter 14. *In* Clay, D.E., C.G. Carlson, and K. Dalsted (eds). iGrow Wheat: Best Management Practices for Wheat Production. South Dakota State University, South Dakota Cooperative Extension Service, Brookings, SD.

Book

- Clay, D.E., N. Kitchen, C. Gregg Carlson, Jonathan Kleinjan, and Jiyul Chang. (2007). Using historical management to reduce soil sampling errors. p49-64. *In* F.J. Pierce and D.E. Clay (ed.). GIS Applications in Agriculture, CRC Press.

Site-Specific Management Guidelines

1. Clay, S.A., J. Chang, D.E. Clay, and K. Dalsted. (2004). Using remote sensing to develop weed management zones in soybean. Site Specific Management Guidelines #42. Potash & Phosphate Institute. South Dakota State University.

2. Clay, D.E., C.G. Carlson, and J. Chang. (2004). Determining the “Best” approach to identify nutrient management zones: A South Dakota example. Site Specific Management Guidelines #41. Potash & Phosphate Institute. South Dakota State University.
3. Dalsted, K., L.F. Paris, D.E. Clay, S.A. Clay, C.L. Reese, and J. Chang. (2003). Selecting the Appropriate satellite remote sensing product for precision farming. Site Specific Management Guidelines #40. Potash & Phosphate Institute. South Dakota State University. Brookings, SD 57007.

Thesis and Dissertation

- Chang, Jiyul. (2002). Identifying Management Zones Using Soil, Crop, and Remote Sensing Information. Ph.D. Dissertation. Plant Science Department, South Dakota State University. Brookings, SD.
- Chang, Jiyul. (1997). Soil Spatial Variability as Influenced by Landscape Position and Soil Sampling Strategy. Theses for MS. South Dakota State University, Brookings, SD 57007.

Proceedings

1. Chang, J., D.E. Clay, C.G. Carlson, S.A. Clay, and D.D. Malo. (2003). The Influence of Different Classification Approaches on N and P fertilizer Recommendations. *In* P.C. Robert et al. (ed.). Proceeding of the 6th International Conference on Precision Agriculture. July 14-17, 2002. Minneapolis, MN. ASA-CSAA-SSSA, Madison WI.
2. Clay, D.E., J. Chang, C. Reese, Z. Liu, C.G. Carlson, and S.A. Clay. (2003). The influence of landscape position, nitrogen, and available water on soybean quality. *In* P.C. Robert et al. (ed.). Proceeding of the 6th International Conference on Precision Agriculture. July 14-17, 2002. Minneapolis, MN. ASA-CSAA-SSSA, Madison WI.
3. Chang, J., D.E. Clay, C.G. Carlson, S.A. Clay, and C.L. Reese. (2000). The Influence of Different Approaches for Identifying Inorganic N and P Management Zones on Fertilizer Recommendation. [CD-ROM computer file]. *In* P.C. Robert et al. (ed.). Proceeding of the 5th International Conference on Precision Agriculture. July 16-19, 2000. Bloomington, MN. ASA-CSAA-SSSA, Madison WI.
4. Clay, D.E., S.A. Clay, Z. Liu, C. Reese, and J. Chang. (2000). Spatial Variability of C-13 Isotopic Discrimination in Corn (*Zea Mays*). [CD-ROM computer file]. *In* P.C. Robert et al. (ed.). Proceeding of the 5th International Conference on Precision Agriculture. July 16-19, 2000. Bloomington, MN. ASA-CSAA-SSSA, Madison WI.
5. Clay, D.E., C.G. Carlson, J. Chang, S.A. Clay, D.D. Malo, M. Ellsbury, and J. Lee. (1999). Systematic Evaluation of Precision Farming Soil Sampling Requirements. pp. 253-265. *In* P.C. Robert et al. (ed.). Proceeding of the 4th International

Conference on Precision Agriculture. July 19-22, 1998. St. Paul, MN. ASA-CSAA-SSSA, Madison WI.

Other Publications

1. Chang, J. (2008). Mapping corn and soybean in the U.S. using moderate spatial resolution satellite imagery. *Crop, Soils, Agronomy News*. Vol. 53 No 1.
2. Johnston, C.A. and J. Chang. (2005). Vegetative indicators of condition, integrity, and sustainability of Great Lakes coastal wetlands. US EPA STAR program progress report.
3. Clay, S., J. Chang, J. Kleinjan, C. Runge, and D. Clay. (2003). Satellite Imagery for Weed Scouting. Annual Report. Plant Science Department. Brookings, SD 57007.
4. Dalsted, K., D. Clay, S. Clay, C. Reese, and J. Chang. (2003). Selecting the Appropriate Remote Sensing product for Land management. Annual Report. Plant Science Department. Brookings, SD 57007.
5. Chang, J., D. Murphy, C. Reese, D. Clay, S. Clay, M. Ellsbury, C. Carlson, and D. Malo. (2000). Spatial and temporal yield variability in a field located in Eastern South Dakota. Soil PR00-32. *In Soil and Water Science Research, 2000, Annual Report.* Plant Science Department, Agricultural Experimental Station, SDSU, Brookings, SD 57007.
6. Malo, D.D., D.K. Lee, J.H. Lee, S.M. Christopherson, C.M. Cole, J.L. Kleinjan, C.G. Carlson, D.E. Clay, J. Chang, C.L. Reese, S.A. Clay, M.M. Ellsbury, and N.R. Kitchen. (2000). Soil moisture, bulk density, soil temperature, and soil sensor (Veris 3100 and Geonics EM-38) relationships. Part 1-Moody county site. Soil PR00-41. *In Soil and Water Science Research, 2000, Annual Report.* Plant Science Department, Agricultural Experimental Station, SDSU, Brookings, SD 57007.
7. Chang, J., D.E. Clay, and C.G. Carlson. (2000). Determining the Impact of Approaches to Classify Nutrient Management Zones. Precision Farming Project Progress Report, Plant Science Department, SDSU, Brookings, SD.
8. Chang, J. and D.E. Clay. (1999). Using Remote Sensing to Evaluate N Stress. Precision Farming Project Progress Report, Plant Science Department, SDSU, Brookings, SD.
9. Clay, D.E., C.G. Carlson, and J. Chang. (1999). Phosphorus Spatial Variability in 10 Fields in South Dakota. PPI Project Annual Report, Plant Science Department, SDSU, Brookings, SD.
10. Clay, D.E., J. Chang, D.D. Malo, C.G. Carlson, C. Reese, S.A. Clay, and M. Ellsbury. (1999). Using Apparent Soil Electrical Conductivity and Topography to

Locate Areas with High Olsen P. PPI Project Annual Report, Plant Science Department, SDSU, Brookings, SD.

11. Clay, D.E., J. Chang, C.G. Carlson, D.D. Malo, S.A. Clay, and M. Ellsbury. (1999). Precision Farming Protocols: Part 2. A Comparison of Sampling Approaches for Precision P Management. PPI Project Annual Report, Plant Science Department, SDSU, Brookings, SD.
12. Clay, D.E., J. Chang, S.A. Clay, M. Ellsbury, C.G. Carlson, D.D. Malo, D. Woodson, and T. DeSutter. (1997). Spatial Variability of N in Soil and Plants: Field Scale. Soil Water Science Research 1996 Annual Report. Plant Science Department, SDSU, Brookings, SD.