

Returning the Scientific Horse to in Front of the Technical Cart

Breakout session by **Joseph K. Berry**

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...the **Technical Car** has been
in front of the **Scientific Horse**

Most of Precision Agriculture's recent growth has been in its capabilities as a "technical tool" for corralling vast amounts of data and providing near instantaneous access to remote sensing images, GPS navigation, interactive maps, geo-queries and awesome visual displays. But PA as an "analytical tool" hasn't experienced the same meteoric rise— in fact it might be argued that the analytic side of precision agriculture has somewhat stalled over the past decade. Its future, however, is poised to move well beyond mapping to a broader and more active role providing entirely new and valuable information through map analysis and modeling that engages the agricultural research community and directly interacts with policy formation, planning, regulation and management decisions. The shifting emphasis from "data-centric tools" (*Where is What*) to "application-specific analyses" involving prescriptive mapping (*Why, So What and What If*) infuses consideration of spatial patterns and relationships within problem-solving contexts. The missing link in large part has been the recognition by the science community of grid-based map analysis and modeling as a true "map-matics" supporting spatially-based scientific inquiry and analysis that will get the

scientific horse back in front of the technical cart. *This breakout session describes a comprehensive framework for map analysis and modeling concepts and procedures as direct spatial extensions of traditional mathematics and statistics that aligns the scientific, technological and producer communities.*

Online References:

- **Beyond Mapping Compilation Series** is an online compilation of Beyond Mapping columns appearing in GeoWorld magazine 1989 to 2013 with many addressing Precision Ag topics. <http://www.innovativegis.com/basis/BeyondMappingSeries/>
- **Making a Case for SpatialSTEM: Spatial Considerations in Science, Technology, Engineering and Mathematics Education**, is a white paper describing a framework for grid-based map analysis and modeling concepts and procedures as direct spatial extensions of traditional mathematics/statistics. http://www.innovativegis.com/basis/Papers/Other/SpatialSTEM/SpatialSTEM_case.pdf
- **Math/Stat Framework for Map Analysis**, in the Beyond Mapping Compilation Series, Book IV, Topic 9, Basis Press 2013. J.K. Berry. http://www.innovativegis.com/basis/BeyondMappingSeries/BeyondMapping_IV/Topic9/BM_IV_T9.htm
- **SpatialSTEM Workshop: A Mathematical/Statistical Framework for Understanding and Communicating Map Analysis and Modeling**, Geospatial Conference of the West (GeCo West), Laramie, WY, September 2013. Half-day intermediate workshop. J.K. Berry. <http://www.innovativegis.com/Basis/Courses/SpatialSTEM/>
- **Math/Stat Classification of Spatial Analysis and Spatial Statistics Tools** (*Spatial Analyst* by Esri), a white paper listing Spatial Analyst module operations by traditional mathematics and statistics categories, ESRI Forestry 2012 Conference. J.K. Berry. http://www.innovativegis.com/basis/Papers/Other/Esri_Forestry2012/SA_SS_Operations_SpatialAnalyst.pdf
- **A Mathematical Structure for Analyzing Maps**, Environmental Management, Springer-Verlag, Vol 11, No. 3, pp. 317-325, 1986. J.K. Berry. http://www.innovativegis.com/basis/Papers/Other/MathematicalStructure_1987/MathematicalStructure_1987.pdf



Joseph K. Berry is a leading consultant and educator in the application of Geographic Information Systems (GIS) technology. He is the principal of BASIS, consultants and software developers in GIS technology and the author of the "Beyond Mapping" column for GeoWorld magazine for twenty five years. Since 1976, he has written more than two hundred papers on the theory and application of map analysis techniques, and is the author of the popular books *Beyond Mapping*, *Spatial Reasoning*, *Map Analysis and GIS Modeling*. He has been writing, teaching and consulting in Precision Ag for over fifteen years. Dr. Berry holds a B.S. degree in forestry from the University of California, Berkeley, a M.S. degree in business management and a Ph.D. emphasizing remote sensing and land use planning from Colorado State University.