The Current

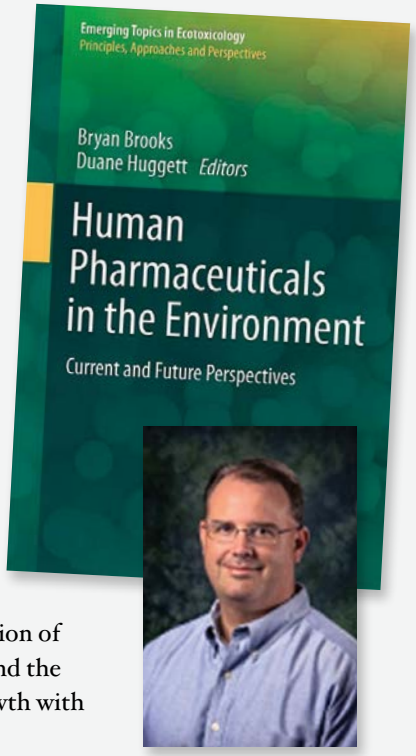
NEWS FROM WATERBORNE ENVIRONMENTAL, INC. SUMMER 2014

DUANE HUGGETT JOINS EXPANDING ECOTOXICOLGY GROUP

Waterborne is pleased to announce that Duane Huggett, PhD, has joined Waterborne Environmental in the Ecotoxicology Group. Duane is an environmental toxicologist with over 13 years of industrial, academic and regulatory science experience with Pfizer Global Research and Development, University of North Texas, and as an independent consultant. His experience includes laboratory design and management of complex in vivo and in vitro environmental toxicity studies, study monitoring of environmental and nonclinical mammalian studies, environmental risk assessment, and product defense. In particular, he has considerable experience with regulatory strategy and scientific support for product registrations to FDA, EMEA, and EFSA.

Duane has published over 50 peer-reviewed manuscripts, with the most recent focusing on pharmaceuticals, food additives, bioaccumulation assessments and endocrine disruption. He has also participated in a number of government, industry, and multi-stakeholder groups, including the ILSI Health and Environmental Sciences Institute.

The addition of Duane to the Waterborne team enhances our comprehensive ecological risk assessment capabilities. His knowledge and experience will bring additional expertise to environmental risk assessments and regulatory support for the pharmaceutical, veterinary medicine, food additives, crop protection and industrial chemical sectors. We are truly excited about the addition of Duane to our organization and the prospects for continued growth with our valued clients.



IN FOCUS: BRAZILIAN AGRICULTURE

Brazil's agricultural output has dramatically increased in the past decade. Products such as coffee, soybeans, wheat, rice, corn, sugarcane, cocoa, citrus, and beef have become an important part of Brazil's growing economy. With the increase of agricultural production, the pressure on environmental resources and concerns about water quality is growing. To address these issues, Brazil has put in place a system that evaluates the risk of using agricultural chemicals.

The Brazilian pesticide registration process is known to be one of the most complex in the world. Three federal agencies govern the registration process. The Ministry of Agriculture, Livestock and Food Supply (MAPA) is responsible for evaluating the agronomic effectiveness of pesticides, and issues the Certificate of Registration. Toxicological assessment and classification of pesticides are handled by Ministry of Health (ANVISA), and the Ministry of Environment (IBAMA) governs environmental assessment and classification of potential environmental hazards related to pesticides. Although regulations are in place, unclear criteria for product registration and the lack of standard processes often result in delays.

Over the past few years, Amy Ritter and Brian Jacobson have met with regulators, model developers, and industry partners to discuss a wide variety of topics related to pesticide registration. These meetings have increased Waterborne's familiarity with the Brazilian regulatory environment and allow us to provide expertise with modeling, site selection, and geospatial analysis in Brazil. Brian's recent trip to Brazil also included exploring partnerships with local field cooperators to provide field study support to our clients.

To address some of the challenges in the registration process and provide a standardized modeling approach, we developed the Brazilian Modeling Tool (BZMT) for CropLife International. Currently, BZMT allows users to predict environmental concentrations of pesticides in surface water using Brazil-specific scenarios based on climate, crop, management practices and soils. In the future, environmental predictions for groundwater and rice paddies can be performed with BZMT with the creation of appropriate scenarios for Brazil.

In addition to the development of modeling tools, we continue to research high

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WATERBORNE PARTNERS WITH TOXSTRATEGIES, INC. TO OFFER COMPREHENSIVE EDSP SERVICES

Waterborne has partnered with ToxStrategies, Inc., a leading toxicology consulting firm, to provide services supporting the Endocrine Disruption Screening Program (EDSP). Waterborne's Ecotoxicology Group understands the need to provide our clients with comprehensive and expert consultation to support EDSP requirements. The Ecotoxicology Group is equipped with a unique collective experience from industry, academia, contract research laboratories and consulting. Individual team members have specialized EDSP experience in method development, validation, and study conduct, as well as other scientifically-relevant information (OSRI) and weight-of-evidence (WoE) development for the ecotoxicological testing associated with EDSP. The recent addition of Duane Huggett to the Waterborne team provides added EDSP expertise, including development of laboratory biomarkers for endocrine disruption and computational toxicology. Experts at ToxStrategies have extensive experience in the conduct and interpretation of in-vitro and in-vivo mammalian EDSP assay, design and conduct of follow up studies for determination of mode of action, as well as preparation of OSRI and WoE assessments.

Together, the collaboration between Waterborne and ToxStrategies will offer our clients a comprehensive consulting team for expertise in all Tier 1 assays and future Tier 2 testing requirements, as well as OSRI and WoE development. At a time where EDSP milestones are approaching and further test orders are on the horizon, we are excited to announce this partnership and expert service offering to our clients.

The EDSP was established by USEPA to identify the potential of chemicals to act as endocrine disruptors (disrupting normal endocrine activity, specific to estrogen, androgen or thyroid hormones), determine adverse effects and dose-responses, and assess and ultimately manage the risk. The EDSP is mandated to use validated methods for the screening and testing of chemicals to accomplish this task, and has adopted a two-tiered testing approach for screening and assessment of adverse effects and dose-response.

Tier 1 screening includes a battery of 11 in-vivo and in-vitro assays designed to screen for potential endocrine disruptors. If OSRI exists, it may be submitted to USEPA for consideration of Tier 1 test waivers. Following a thorough technical review of the Tier 1 data, a WoE evaluation will be made to determine if Tier 2 testing is required. Tier 2 testing, for the assessment of adverse effects and dose-response, will involve complex two-generation studies with avian, mammalian, amphibian, fish and invertebrate species. The results generated from the Tier 2 data evaluation will be integrated directly into the risk assessments supporting registration review and new registration actions.

USEPA issued the first list of chemicals for Tier 1 testing in 2009 and is conducting a technical review of the data. In June 2013, the revised second list of chemicals for Tier 1 screening assays was issued. This list consists of 109 chemicals, comprised of 41 pesticide active ingredients and 68 chemicals identified under the Safe Drinking Water Act. These testing orders are expected to be issued beginning in 2014. Testing orders for Tier 2 studies are also expected, as the review of the first Tier 1 assay data is conducted.

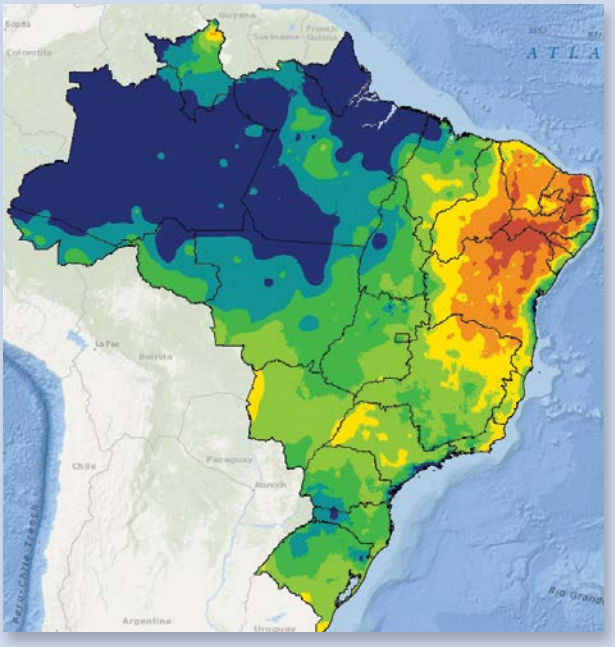
Additional information on EDSP can be found on the USEPA website at www.epa.gov/scipoly/oscpendo/.

PRAESS BEING TESTED BY CHINESE REGULATORS

Last November a training course on pesticide environmental risk assessment was held by the Nanjing Institute of Environmental Sciences in conjunction with ICAMA, the administrative department of pesticide registration in the People's Republic of China. At the meeting, the Pesticide Risk Assessment Exposure Simulation Shell (PRAESS) was introduced to participants from different regional pesticide registration administration units. All participants showed strong interest in PRAESS, which was developed by Waterborne. PRAESS has subsequently been used in the assessment of several new chemicals during their registration process.

BRAZIL *continued from page 1*

resolution datasets for modeling and geospatial assessment to determine crop growing areas, conduct groundwater vulnerability analysis, and site selection. As our knowledge of Brazilian agriculture and required datasets continues to grow, our ability to assist clients with projects related to Brazilian agriculture will expand.



Distribution of average total annual rainfall in Brazil (dark blue is highest rainfall, dark orange is least).

UPCOMING PRESENTATIONS

248TH ACS NATIONAL MEETING, IUPAC CONGRESS OF PESTICIDE CHEMISTRY SAN FRANCISCO, CA • AUGUST 10–14, 2014

All of the presentations below will be given at the San Francisco Marriot Marquis.

- Washoff potential of pyrethroid products from external building materials and driveway concrete under indoor simulated rainfall conditions. Jennifer R. Trask*, Paul Hendley, Russell L. Jones, Christopher M. Harbourt, Joseph R. Chepega, Megan Cox, Paul Miller. Poster presentation. Monday, August 11, 1:00 pm. Yerba Buena Salon 7/8.
- Modeling potential pyrethroid transport to surface water via runoff/erosion and drift from multiple crops: National distributions based on crop-specific field scale data. Christopher M. Holmes*, Joshua J. Amos, Amy M. Ritter, Mark Cheplick, Dean A. Desmarteau, Paul Hendley, Russell Jones, Scott Jackson, Russell Underwood, Jeffrey Giddings. Platform presentation. Tuesday, August 12, 10:40 am. Nob Hill C/D
- Use of LEACHP modeling to evaluate the effects of upward movement and time-dependent sorption on field soil dissipation of a pesticide. Gerco Hoogeweg*, Natalia Peranginangin, Dazhi Mao, Wenlin Chen. Platform presentation. Tuesday, August 12, 11:20 am. Room: Nob Hill C/D.
- Evaluation of Freundlich sorption and time-dependent sorption of pesticide in soil with field data. Amy M. Ritter, Gabriel Olchin, J. Mark Cheplick*, Michael-Xiao Huang, Natalia Peranginangin, Patrick L. Havens, Qingli Ma, Robin Sur, Timothy Negley, Wenlin Chen. Poster presentation. Wednesday, August 13, 9:40 am. Yerba Buena Salon 7/8.
- iSTREEM®: A web-based river chemical concentration estimation model for consumer pesticide product chemicals. Christopher M. Holmes*, Paul C. DeLeo, John A. Weeks, Katherine E Kapo. Poster presentation. Wednesday, August 13, 1:00 pm. Yerba Buena Salon 7/8.
- Refining pyrethroid aquatic exposure assessments by incorporating measured landscape and environmental variability using probabilistic approaches, III: Characterizing the probability of wind speeds and direction across multiple insecticide applications within a season. Amy M. Ritter*, William Northcott, Paul Hendley, Megan L. White. Poster presentation. Wednesday, August 13, 1:00 pm. Yerba Buena Salon 7/8.
- Refining pyrethroid aquatic exposure assessments by incorporating measured landscape and environmental variability using probabilistic approaches, II: Characterizing nationwide landscape vulnerability for several pyrethroid crops. Christopher M. Holmes*, Paul Hendley, Amy M. Ritter, Dean A. Desmarteau. Poster presentation. Wednesday, August 13, 1:00 pm. Yerba Buena Salon 7/8.
- Identification of the sensitivity of estimated aquatic exposure concentrations from PRZM and AGRO-2014 modeling to variation in chemical, field application, and receiving water body input parameters for synthetic pyrethroid agricultural use patterns. Dean Desmarteau*, Amy M. Ritter, Paul Hendley. Poster presentation. Wednesday, August 13, 1:00 pm. Yerba Buena Salon 7/8.

*Presenter

RECENT PRESENTATIONS

- Pesticide Surface Water Monitoring: Bias Factors to Estimate Peak Concentrations and PRZM-Hybrid to Complete Measured Chemographs. Wenlin Chen, Clint Truman, Paul Mosquin, Paul Miller and Mike Leggett. 9th National Monitoring Conference. Cincinnati, OH. April 28–May 2, 2014.
- The Need for More Realistic Aquatic Exposure Predictions: Opportunities for Improved Modeling Approaches. Mike Winchell and Nathan Snyder. CropLife America/RISE Spring Conference, Crystal City, VA. April 9–11, 2014.
- Pyrethroid Monitoring: Lower American River, CA, USA. Chris Harbourt, Stephen Clark, Greg Goodwin, Todd Albertson, Michael Dobbs, Kevin Henry, and Gary Mitchell. CropLife America/RISE Spring Conference, Crystal City, VA. April 9–11, 2014.
- Use of the OCED ENASGIPS Tool in US Settings. Gerco Hoogeweg, Shelby Zelonis, Cecilia Mucha Hirata and Nathan Snyder. EPA Exposure Modeling Public Meeting (EMPM). Arlington, VA. March 24, 2014.
- Comparing Groundwater Models—Why are There Differences? Nathan Snyder, Mark Cheplick, Ishadeep Khanijo, and Daniel Perkins. EPA Exposure Modeling Public Meeting (EMPM). Arlington, VA. March 24, 2014.

For presentations given at the 2013 SETAC North America conference, visit our website at www.waterborne-env.com.

NEW PUBLICATIONS

- W. Martin Williams is the co-author of three chapters in: Giesy, John and Solomon, K. (Eds.) Reviews of Environmental Contamination and Toxicology, Vol. 23. Ecological Risk Assessment for Chlorpyrifos in Terrestrial and Aquatic Systems in the United States. 2014, 269 p. DOI: 10.1007/978-3-319-03865-0.
- Hodges, J.E.N., Vamshi, R., Holmes, C., Rowson, M., Miah, T. and Price, O. R. (2014), Combining high-resolution gross domestic product data with home and personal care product market research data to generate a subnational emission inventory for Asia. Integr Environ Assess Manag, 10: 237–246. doi: 10.1002/ieam.1476
- Winchell, M.F. and N.J. Snyder. Comparison of Simulated Pesticide Concentrations in Surface Drinking Water with Monitoring Data: Explanations for Observed Differences and Proposals for a New Regulatory Modeling Approach. J. Agric. Food Chem., 2014, 62 (2), pp 348–359. doi: 10.1021/jf4036996.
- Davidson, P.C., Jones, R.L., Harbourt, C.M., Hendley, P., Goodwin, G.E. and Sliz, B.A. (2014), Major transport mechanisms of pyrethroids in residential settings and effects of mitigation measures. Environmental Toxicology and Chemistry, 33: 52–60. doi: 10.1002/etc.2411.
- Trask, J. R., Harbourt, C. M., Miller, P., Cox, M., Jones, R., Hendley, P. and Lam, C., Washoff of cypermethrin residues from slabs of external building material surfaces using simulated rainfall. Environ Toxicol Chem 2014;33:302–307. doi: 10.1002/etc.2432.
- Kapo, K. E., Holmes, C.M., Dyer, S. D., de Zwart, D. and Posthuma, L. (2014), Developing a foundation for eco-epidemiological assessment of aquatic ecological status over large geographic regions utilizing existing data resources and models. Environmental Toxicology and Chemistry, 33: 1665–1677. doi: 10.1002/etc.2557

WHO KNEW...

...that Waterborne provides such a diverse array of services related to risk assessments for pesticides, veterinary medicine, and pharmaceuticals? Even clients who have been with us throughout our 20-year history may not know that we offer:

DEGRADATION KINETICS MODELING

Our staff is well versed in both European and US kinetics modeling. Using an iterative approach and tools like ModelMaker, KINGUI and CAKE we help our clients to determine the appropriate degradation parameters and associated endpoints for use in the groundwater and surface water models. We can help provide solutions for issues including country specific kinetics guidance, new EFSA guidelines, complex degradation pathways, pH dependent compounds, and more. We are also experienced with NAFTA kinetics tools and guidelines including the IORE model that is used by USEPA and PRMA for kinetic evaluations. For more information, contact Isha Khanijo (khanijoi@waterborne-env.com) or visit our website: www.waterborne-env.com/environmental_kinetics.asp.

WEB MAP HOSTING

We now host several secure (limited access) and public web applications such as the Acetochlor Registration Program soil map viewer, the American Cleaning Institute iSTREEM® application, and the Co-occurrence of Pesticide and Endangered Species tool. Using web maps is a cost efficient way to relay large volumes of data to a widespread audience. All our map services come with hosting, maintenance, and an ever expanding set of user tools. For more information, contact Gerco Hoogeweg (hoogewegg@waterborne-env.com) or visit www.waterborne-env.com/map-gallery.asp.

WATERBORNE HOSTS VFSMOD WORKSHOP

On June 25th, Waterborne hosted a modeling workshop in Leesburg, Virginia focusing on the Vegetative Filter Strip Modeling System (VFSMOD). The workshop was instructed by Dr. Rafael Muñoz-Carpena from the University of Florida, co-developer of the modeling system, and was attended by several modelers from the USEPA Office of Pesticide Programs. Also in attendance was Oscar Perez-Ovilla of Bayer CropScience (former PhD student of Dr. Muñoz-Carpena), an exposure modeler experienced with VFSMOD. VFSMOD is a computer simulation model created to study hydrology, sediment and pollutant transport through vegetative filter strips and has become widely used. During the workshop, Amy Ritter of Waterborne also presented a tool she developed for the use of VFSMOD with regulatory models. The collaboration between the instructors and attendees sparked interesting discussions regarding the design of vegetative filter strips, the mechanics of the model and the application of VFSMOD within a regulatory setting. Additional information regarding the model can be found at http://abe.ufl.edu/carpena/vfsmod/.

WATERBORNE FUNDS PROSTHESIS FOR HONDURAN MAN

In November 2013, Waterborne donated funds for an Open Socket prosthesis, developed by engineering students at the University of Illinois and manufactured by Bump Nonprofit Design Studio. The prosthesis was then transported to San Pedro Sula, Honduras, along with five other Open Socket prostheses, by a team of Rotarians, led by Mike Hirschi.

Mike, along with Rotary colleagues Alejandra Coronel and Eric Luedtke, had been trained to fit the Open Socket prosthesis to patients. Candidates had been identified in Honduras in conjunction with work the Champaign West Rotary Club had been doing with the Ministerios de Fe Vida Nueva Children's Home. Orthopedic Surgeon Dr. Luis Boquin of the Usula Rotary Club in San Pedro Sula joined the Rotarians from Illinois to advise on fitting the prostheses.

The recipient, Hector, had lost part of his right arm, including his hand, below the elbow in a fireworks accident. He was eight at the time and is now 26. The first thing he wanted to do with his new prosthetic was to write his name. With very little practice, he was using his new device.

Mike Hirschi (center) assists with fitting Hector with his new prosthesis.

NEW HIRES

Roy Boykin is working part-time as a Senior Scientist. He has a BS in Biology from the College of Charleston and a Master's and PhD in Entomology with a minor in Crop Science and Plant Pathology from NC State University. He previously worked for Syngenta for 30 years in the agricultural crop protection field. Roy has been invaluable in applying his considerable agronomic expertise and professional connections with growers to support ongoing Waterborne studies.

Jennifer Collins joined Waterborne in February as a Project Scientist and is working for our Ecotoxicology Group in Massachusetts. She has a BS in Cell and Molecular Biology from Bridgewater State College and a Master's degree in Biology from Saint Joseph College. Her master's coursework focused on toxicology, pharmacology, biostatistics, and animal behavior.

Rohith Gali joined Waterborne's Illinois office as a Project Engineer in June. He has a BS in Agricultural Engineering from A.N.G.R.A. University (India) and a Master's degree in Biological and Agricultural Engineering from Kansas State University. He recently received his PhD in Agricultural Engineering from Iowa State University. His PhD dissertation titled "Assessing Monitoring and Modeling Approaches to Improve Water Quality in the Hickory Grove Lake" emphasized the TMDL development process in achieving water quality goals and restoring impaired water bodies.

Stephanie Herbstritt joined the Modeling Group in June as a Staff Engineer in the Virginia office. She has a Bachelor's in Biological Engineering from Penn State and a Master's in Agricultural and Biological Engineering from the University of Illinois. Her Master's thesis focused on Environmental Tradeoffs of Denitrifying Woodchip Bioreactors. She grew up on a small farm in Central Pennsylvania raising sheep, cows, horses and chickens and growing fruits, vegetables and grains.

Eric Coronel was hired in April as an Intern working part-time in the Illinois office. Corey Davidson has been working part-time in the Illinois office as a Technician since December. Joshua Hartsock joined the Fayette, MO team in May as a Technician.

PROMOTIONS

Isha Khanijo has been promoted to Senior Environmental Engineer. She has been working for Waterborne Environmental since 2008 after obtaining her Master's degree in Agricultural and Civil Engineering at Iowa State University. She has been a key modeler in the modeling group and was the main modeler involved with our first veterinary medicine project for Pfizer/Zoetis.

Jacob Mitchell has been promoted to Project Agricultural Engineer. Jacob is an engineer, field study principal investigator, and accomplished field equipment specialist who has been with Waterborne since 2007. Jacob's engineering and database background is very important to the Field Studies team, specifically TFD instrumentation setup, data organization, and automation.

Raghu Vamshi has been promoted to Senior GIS Specialist. Raghu joined Waterborne in February 2006. He received his BS in Agriculture from University of Agricultural Sciences, Bangalore, India and MBA in MIS and GIS from Texas Tech University in 2003. As part of the Data Technologies team, Raghu has worked on a wide variety of projects with a focus on GIS analysis, data management/geoprocessing and developing applications for the desktop and the web.

Lauren Weissenborn has been promoted to Project Environmental Scientist. Lauren came to Waterborne in 2005 after finishing an internship with the USEPA. She received her BS degree from Virginia Tech in Environmental Science. As part of the Field Studies team, Lauren has been involved in many projects including groundwater and surface water projects across the country, field-scale runoff studies, and urban monitoring issues.

WATERBORNE MARRIAGES

Rachel Busch and Steve Jones were married on Saturday, May 10th.

Kendall Price and Philip Jones were married Saturday, June 14th.

Megan White and Jose Antonio Guevara Ojeda were married Friday, June 13th.

WATERBORNE BABIES

Alex Gibbs and his wife Kristen are the proud parents of a new baby boy, Curtis Hunter. He was born December 2, 2013 weighing 7 lbs 7 oz and 19.75 inches long.

Jacob Mitchell and his wife Kelly are enjoying their new daughter, Allie Grace. She was born October 30, 2013 at 5:18 pm, weighing 7 lbs 12 oz and 19 inches long.

Jessie Prenger and her husband Kaustubh welcomed their baby boy Aaron Kaustubh on May 12th, 2014, weighing 7 lbs 13 oz and 20.5 inches long.

Raghu Vamshi and his wife Prathima Murthy are the proud parents of baby boy Tanav. He was born on March 13, 2014 weighing 7 lbs 4 oz and 21 inches long.

Luke Zwilling and his wife Amanda have a new baby girl. Lydia Marie was born November 5, 2013 at 3:45 pm, weighing 7 lbs 7 oz and 20 inches long.

HEY, DON'T CALL IT DIRT!

Dirt! Every time someone talks about dirt, the soil scientist in me cringes. Dirt is misplaced soil, a teacher once told me. Somehow this little factoid just stuck. Nonetheless, it is appropriate to refer to soil as dirt when you find it back on your shoes, pants, and hands—especially after a great gardening session or field study.

In the past year, new and better soil datasets have been released in the US and Europe. In the fall of 2013 the USDA NRCS released the long-awaited gridded SSURGO database. This new SSURGO database covers most of the US (the one notable exception being tribal lands) and is provided as 10m resolution data. The SSURGO user should be aware that many areas have undergone revisions. New map units and soil polygons have been added. One advantage of this new grid-based dataset is that it will allow us to process the information faster. Having done lots of national and regional assessments at the 10m scale this SSURGO dataset with matching spatial resolution is a welcome addition.

Meanwhile in Europe, a new version of the European Soil Database (ESDB) was released for use in modeling efforts. In late 2009 I first learned about this new dataset which would be released at a scale of 1:250,000. It was disappointing to see that ESDB was instead released at the 1:1 million scale in 2013. At first glance this new dataset looks promising as it now has actual values for soil properties. An assessment of various layers revealed some areas of concern, particularly organic carbon percentage in the topsoil. This appears to be lower compared to the topsoil organic carbon layer. Just this change has the potential of making all areas more vulnerable to leaching of chemicals.

In reviewing the data lineage of the ESDB dataset, I noticed something that resembles a circular reference. ESDB is based in part on the harmonized world soils database, which in turn is based in part on SOTER, which gleaned information from FAO and ESDB. Yikes! Given all the data manipulation and cross references between all these datasets, the Europeans should take a hard look at what the US has done and develop a solid continental-level dataset. Many EU countries have fantastic soil information which someone should obtain and build a suitable 1:250,000 or higher resolution dataset for modeling. Although the current efforts are commendable, the results are starting look a lot like…dirt.

Gerco Hoogeweg, Ph.D.

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