24th Open Forum on Crop Modeling and Decision Support Systems

Sponsored by the DSSAT Foundation

Meeting: 2021 ASA-CSSA-SSSA International Annual Meetings, Salt Lake City, Utah
Date/time: Monday night, November 8, 2021, from 7:30 – 9:00 pm at the Salt Palace Convention Center, Room 151 DEF (https://scisoc.confex.com/scisoc/2021am/meetingapp.cgi/Session/22304)

Introductions and Explanation

- Open Forum explained
- Introduction with interest in modeling and decision support systems
- The DSSAT Foundation update (www.dssat.net)

Discussion

- How to improve our crop models to address the climate change and sustainability challenges for food and nutrition security
- Access to data for model evaluation and improvement
- The FAIR Guiding Principles for scientific data management and stewardship
    - Findable, Accessible, Interoperable, Reusable (www.nature.com/articles/sdata201618)

Publications

- Advances in Crop Modelling for a Sustainable Agriculture, Ken Boote, Editor (https://shop.bdspublishing.com/store/bds/detail/workgroup/3-190-82506)
- The Journal of Agricultural Science Special Issue – iCROPM: Crop Modeling for the Future (https://www.cambridge.org/core/journals/journal-of-agricultural-science/issue/DD6427AE4484E6BB5E8EE940A3D4DEAF)

DSSAT/CSM Open Source

- GitHub (https://github.com/DSSAT)
- The 3-Clause BSD License (opensource.org/licenses) has been implemented

DSSAT Cropping System Model

- DSSAT Version 4.8 planned for release in 2021
    - Y4K weather files
    - New crops and new crop models
- Ongoing work, new features include:
    - MANIHOT-Cassava – ACAI Project, CIAT & IITA
    - NWHEAT-Wheat & NWHEAT-Teff
    - SAMUCA-Sugarcane
    - CERES-Rice-Teff
    - CROPGRO-Quinoa
    - CROPGRO-Chia
    - CROPGRO-Strawberry
    - Perennial Forage Model – Alfalfa, Bahia, Bermuda, Brachiaria
    - New crops – carinata, guar, guinea grass, hemp
    - Energy balance & canopy temperature
    - Greenhouse gas emissions
- Mixed languages: Fortran and C++
- Easier incorporation of new crops (no code changes)
- Generic pest and disease model

DSSAT Development Sprint

- To improve tools and models, including new crops, energy balance, structured evaluations, etc.
  - International Fertilizer Development Center, July 26-30, 2021 (15th Hybrid Sprint)
  - University of Florida, January 18-21, 2022
  - University of California-Davis, Summer 2022

Modeling Activities

- Ag Model Intercomparison and Improvement Project (AgMIP; www.AgMIP.org)
  - Wheat, maize, rice, potato, soybean & soybean ET, maize ET, low input, model calibration, Ozone, and other model comparison activities
- CGIAR Platform for Big Data in Agriculture (bigdata.cgiar.org)
  - GARDIAN: Global Agricultural Research Data Innovation & Acceleration Network (gardian.bigdata.cgiar.org)
  - Communities of Practice: Data-driven Agronomy, Crop Modeling, Geospatial Data, Ontologies Data, Livestock Data, Socio-Economic Data (bigdata.cgiar.org/communities-of-practice/)
- Model applications in crop genetics
  - University of Florida; dry bean phenology and vegetative growth
- USDA-NIFA-FACT project: "Agricultural Research Data Network for Modeling and Analytics" (https://agmip.github.io/ARDN/)

Other News and Resources

DSSAT 4.x

- DSSAT home (www.dssat.net). Check here for news of meetings, to post queries, etc.
- DSSAT List server: 20,100 unique contacts
- DSSAT Version 4.7, released in November, 2017
  - A total of 14,600 download requests
- DSSAT Version 4.NextGen: Mixed languages with C++

Upcoming Events

- DSSAT Training
  - DSSAT 2021 @ UGA, Griffin, Georgia, USA, May 17-22, 2021
  - DSSAT @ Technical University of Munich, Germany, August 30-September 4, 2021
  - DSSAT 2022 @ UGA, Griffin, Georgia, USA, May 16-23, 2022
  - DSSAT @ ILRI, Ethiopia
  - DSSAT @ Galway, Ireland

Software & Data News

- Soil WISE Version 3.1 soil data base with 9,613 profiles available shortly & AfSIS soil database for Africa; 3,655 profiles from WISE & 4,773 new Africa profiles, total 8,428
  - START: A data preparation tool for crop simulation models using web-based soil databases.
- NASA/POWER data set (https://power.larc.nasa.gov/)
  - 0.5 x 0.625 degree grid for daily solar, temperatures, etc.
- CHIRPS data set
  - 0.05 x 0.05 degree grid for daily precipitation.
- MarkSim GCM
  - Daily weather generated from multiple GCMs (http://gismap.ciat.cgiar.org/MarkSimGCM/)
- Spatial modeling tools
  - CRAFT in cooperation with CCAFS (https://craft.dssat.net/) Environmental Modeling & Software 115 (doi.org/10.1016/j.envsoft.2019.02.006)
  - DSSAT Pythia (https://github.com/DSSAT/pythia)

Other related activities

- Data standards, ontologies, etc.
  - ICASA Version 2.0 Data Standards, Comp & Elec Agric. 96 (doi.org/10.1016/j.compag.2013.04.003)
  - Alignment of ICASA vocabulary to Agronomy Ontology and Crop Ontology
  - USDA-ARS Greenhouse gas Reduction through Agricultural Carbon Enhancement (GRACEnet) database for modeling (www.ars.usda.gov/anrds/gracenet)
  - USDA-ARS Long-term Agroecosystem (LTAR) Network & data for modeling