Guidelines to Populate the GRACEnet Database Template[6]

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This appendix summarizes the database structure, data dictionary, the data entry template, data quality control, and data access policies.

DATABASE STRUCTURE

Data tables are partitioned into 5 categories describing location, characterization, management, plot level measurements, and aggregated measurements.

Location Tables – describe geographical site attributes, soil taxonomy, experimental layout, nesting of plots and treatments, factors manipulated, management history, etc.

Characterization Tables – report site level weather data, plot level static soil data.

Management Tables – report management event information including crop rotations, timing, type and amount of amendments, cultivation type and intensity, residue management, etc.

Measurement Tables – report required and optional measured or monitored plot level data, e.g., crop yields, trace gas flux, soil carbon changes, etc.

Aggregation Tables – report required and optional measured or monitored treatment level data, e.g., crop yields, trace gas flux, soil carbon changes, biomass quantities, etc.

DATA DICTIONARY

For each data entry field in the tables described above, the data dictionary specifies the following: table category, table name, column title, entry description, parameter description, entry domain, entry units, if the entry is nullable, data type, precision for integer and decimal variables, scale for decimal variables, and maximum length for character variables.

DATA ENTRY TEMPLATE

The data entry template is an EXCEL spreadsheet designed to organize data based on the database structure described above and to ensure uniform reporting of data. Each data entry cell address corresponds with a specified variable in the appropriate data table as described in the data dictionary. The following are specified for each type of data entry variable: column title from the appropriate table in the data dictionary, if the variable is

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optional or required, units for quantities, input message with instructions, and a drop down menu for appropriate character variables. Plot and or treatment level data can be reported.

There is one tab of instructions, 2 tabs for Location tables, 3 tabs for Characterization tables, 5 tabs for Management tables, and 5 tabs for Measurement tables, and 3 tabs for Aggregation tables. The following describes the data in the different tabs and shows how the tabs are grouped into the tables:

Location Tables
> GNet_Locations tab**:** site identification and contact information, geographical
> > data, soil taxonomy, site history, literature citations
> DB_GnetPlots tab: plot and treatment information, GRACEnet scenario

Characterization Tables
> chr_Weather_Daily tab: daily max/min temperatures and precipitation (required),
> > wind speed, humididty, etc. (optional)
> chr_Weather_Station tab: location of weather station and distance from field plots
> chr_SoilHorizon tab: soil texture and hydraulic properties by horizon

Management Tables
> mgmt_Operations tab: describe farm operation events (plant, harvest, tillage,
> > amendments)
> mgmt_Energy tab: fuel used and tractor speed for farm operation events
> mgmt_Amendments tab: amount, timing, and placement of amendments
> mgmt_Grazing tab: animal type and stocking rate
> mgmt_GrowthStages tab: crop type and growth stage

Measurement Tables
> plt_GHGflux tab: plot level greenhouse gas fluxes (N_2O, CO_2, CH_4)
> plt_Harvest tab: plot level grain yield, residue harvest, above and below ground
> > biomass
> plt_GrazingPlants tab: plot level species mix, biomass quantity, and growth stage
> > of vegetation
> plt_SoilTseries tab: plot level required soil organic carbon and nitrogen data
> plt_Soil_Tseries tab: plot level optional soil inorganic carbon nitrogen,
> > phosphorous, potassium, soil aggregate data

Aggregation Tables
> trt_GHGflux tab: treatment level greenhouse gas fluxes (N_2O, CO_2, CH_4)
> trt_Harvest tab: treatment level grain yield, residue harvest, above and below
> > ground biomass
> trt_GrazingPlants tab: treatment level species mix, biomass quantity, and growth
> > stage of vegetation

DATA QUALITY CONTROL

A prototype SAS program was developed to read all tables for a single experiment and check for completeness and consistency of data, including whether treatments are correctly specified. This program can be adapted to specific experiments and also serves as a possible framework for exporting data in alternative formats, such as required for a given simulation model.

DATA ACCESS POLICIES

GRACEnet data provided in this data entry template are intended to be freely available and were furnished by individual GRACEnet member scientists who encourage their use. Please inform in writing or e-mail the appropriate GRACEnet scientist(s) of how you intend to use any data obtained through GRACEnet and of any plans to publish such data or analyses that incorporate such data. Please cite the data source using the "correct citation" format, which will accompany the data. If the GRACEnet scientist(s) feel that they should be acknowledged or offered participation as authors, they will contact you and if appropriate, advise you of any potentially conflicting or overlapping analyses that might compromise the originality of either group's efforts. GRACEnet assumes that an agreement on such matters will be reached before publishing and/or use of the data for publication. If your work infringes substantially on analyses being pursued by the GRACEnet scientist(s), they may request the opportunity to submit their manuscript before you submit one that uses their data. In addition, when publishing please acknowledge the support of "GRACEnet project of the USDA Agricultural Research Service"; if GRACEnet data are a substantial portion of the total data used in the publication, please specifically mention "GRACEnet" in the abstract. Finally, we request that anyone publishing papers using GRACEnet data provide reprints to the GRACEnet scientist(s) providing the data.

ACCESS OF THE DATA ENTRY TEMPLATE

The data entry template is available at the public GRACEnet webpage:
http://www.ars.usda.gov/research/GRACEnet

The GraceNet_data_entry_template.xls excel file available on the public GRACEnet webpage includes instructions, tabs, and drop down menus for different types of model driver and testing data but is not populated with any data.

The data entry template, data dictionary, and the data management schema are available at the protected GRACEnet Sharepoint site:
https://arsnet.usda.gov/sites/NPA/GRACEnet/default.aspx

Beginning in April, 2011, excel spreadsheets populated with data from selected ARS units will appear on the protected GRACEnet Sharepoint site.

REFERENCE INFOMATION

Steiner, J.L., E.J. Sadler, J.L. Hatfield, G. Wilson, D. James, B. Vandenberg, J.D. Ross, T. Oster and K. Cole. 2009. Data management to enhance long-term watershed research capacity: context and STEWARDS case study. Ecohydrol. 2: 391–398, DOI: 10.1002/eco.89.

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