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Operated by Battelle

# NEON SAE Workshop

## AGU 2018 edition



This material is based upon work supported by NSF's National Ecological Observatory Network which is a major facility fully funded by the National Science Foundation

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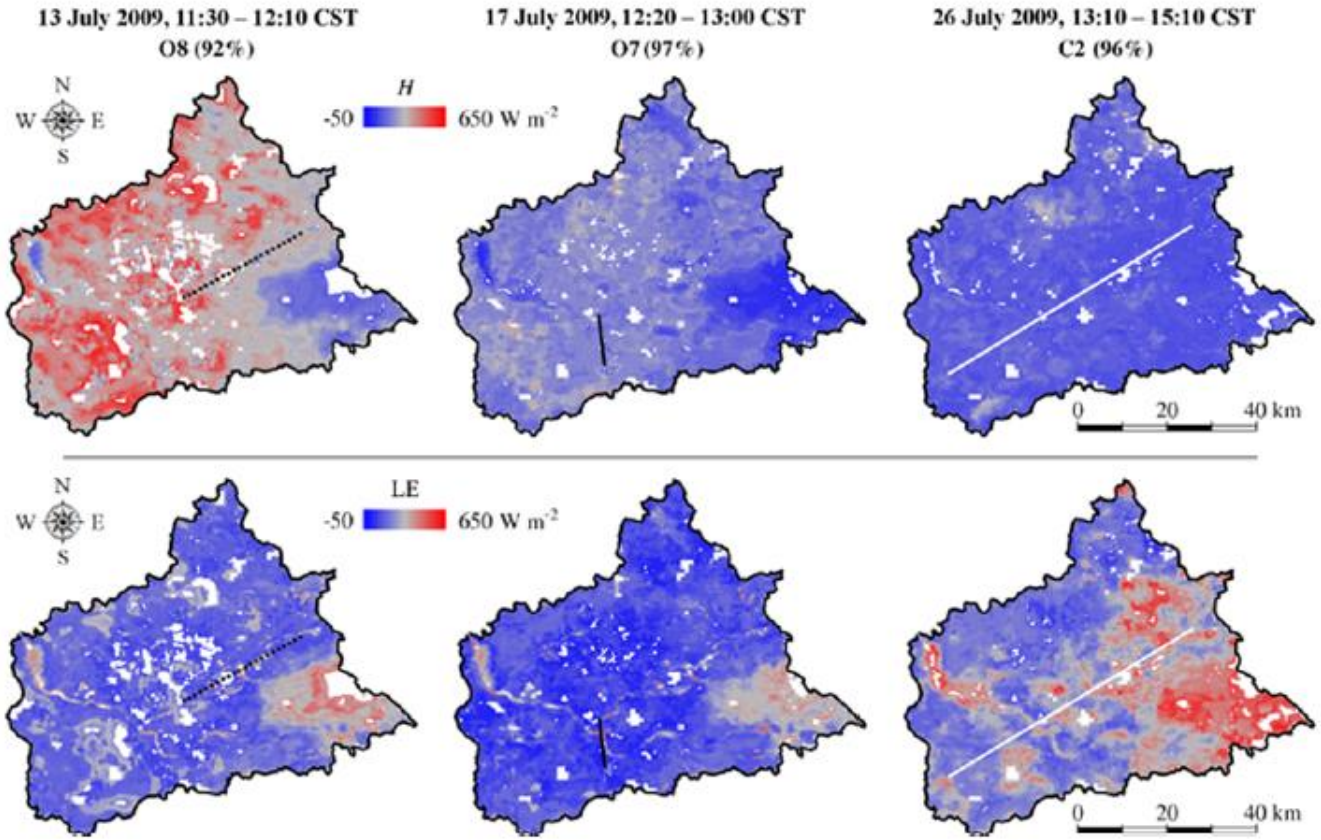


Metzger et al. (2013)

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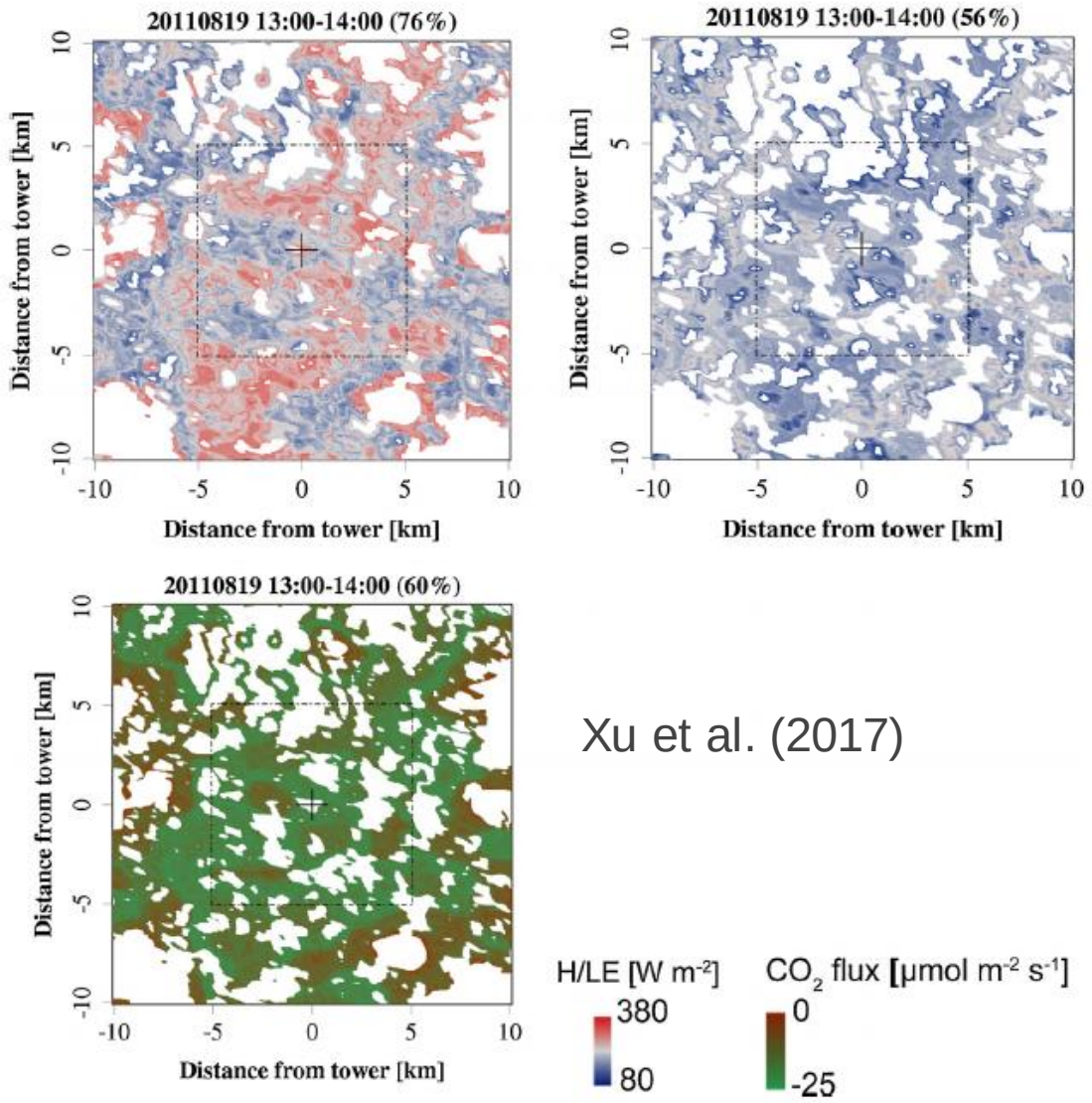
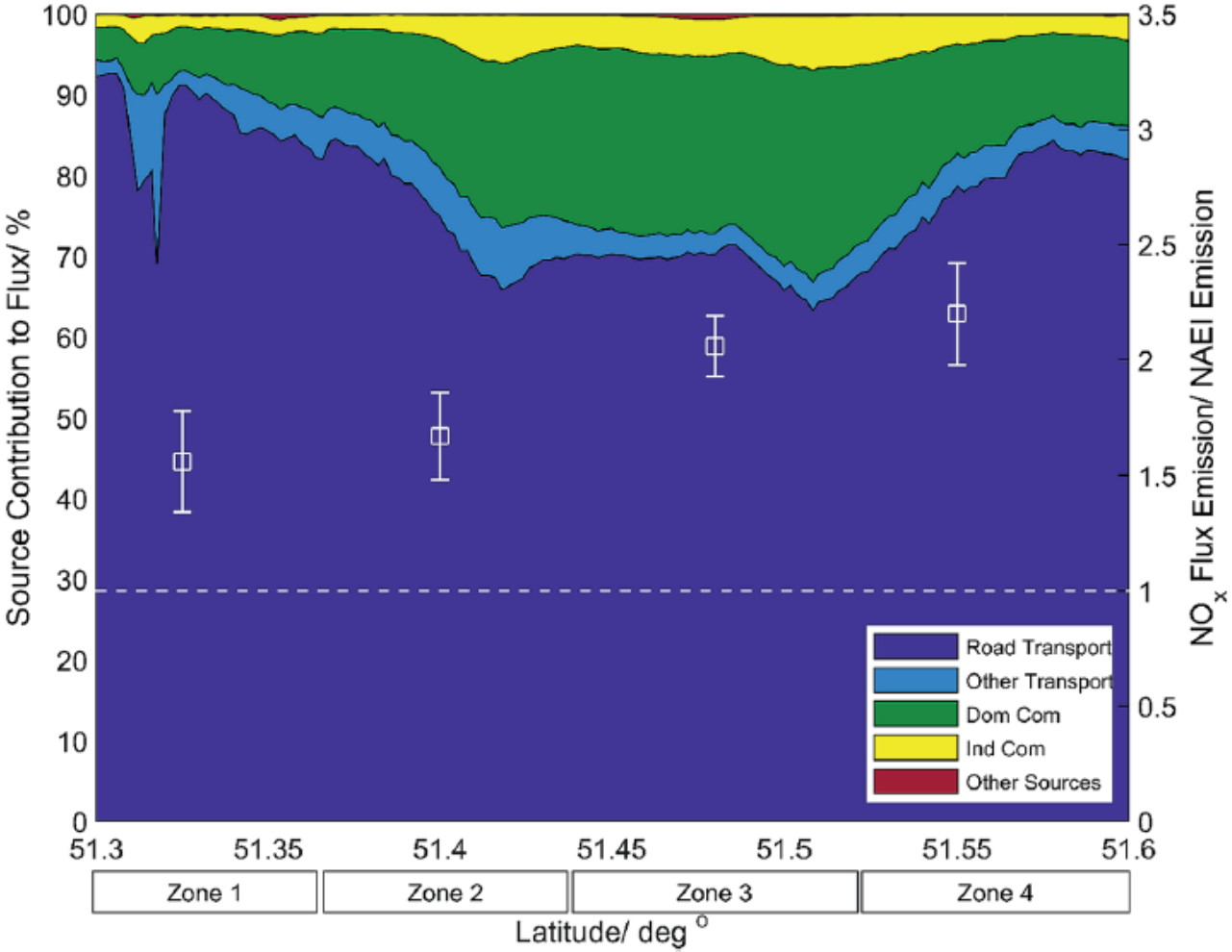



Xu et al. (2017)




Vaughan et al. (2016)

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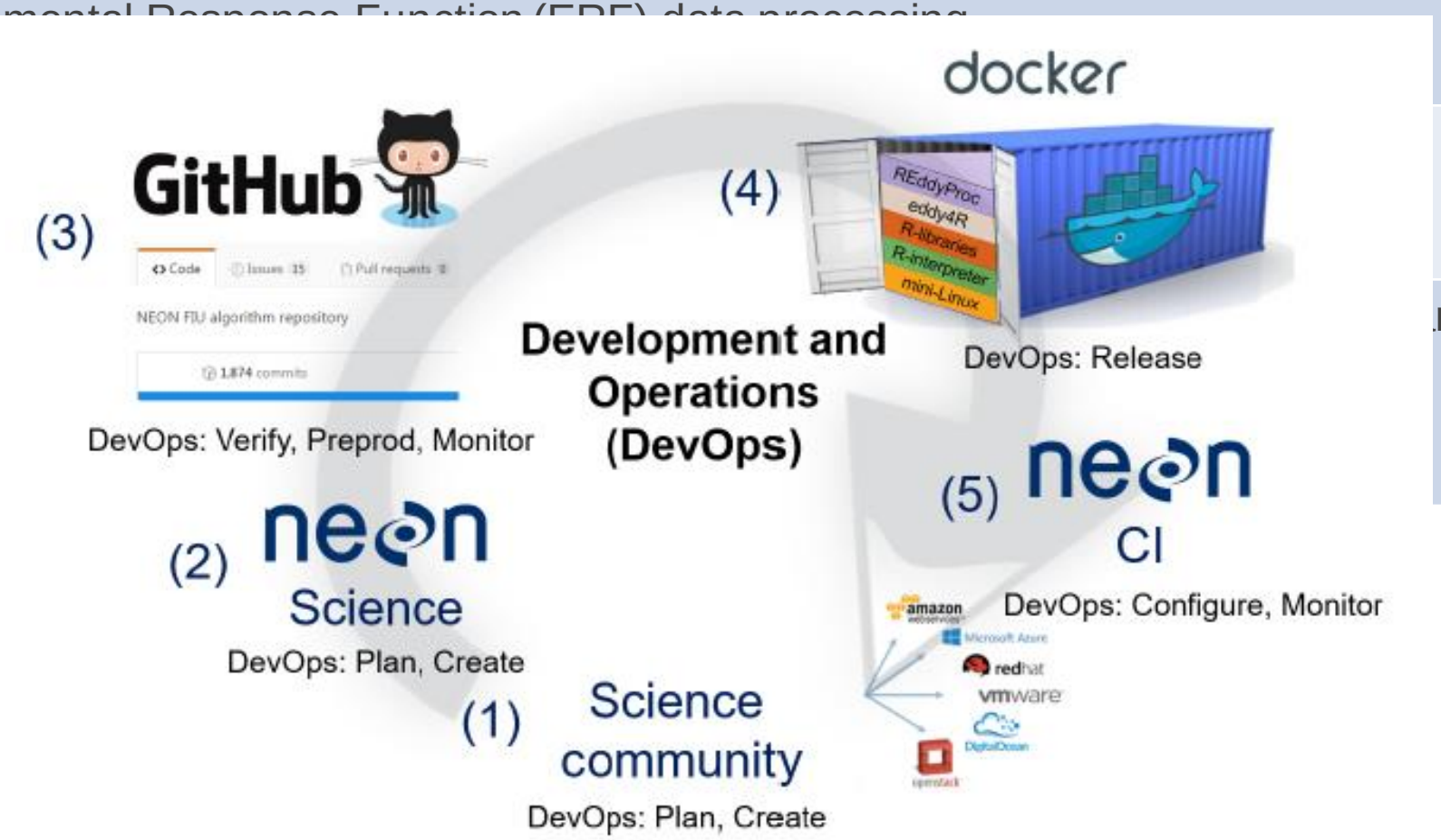


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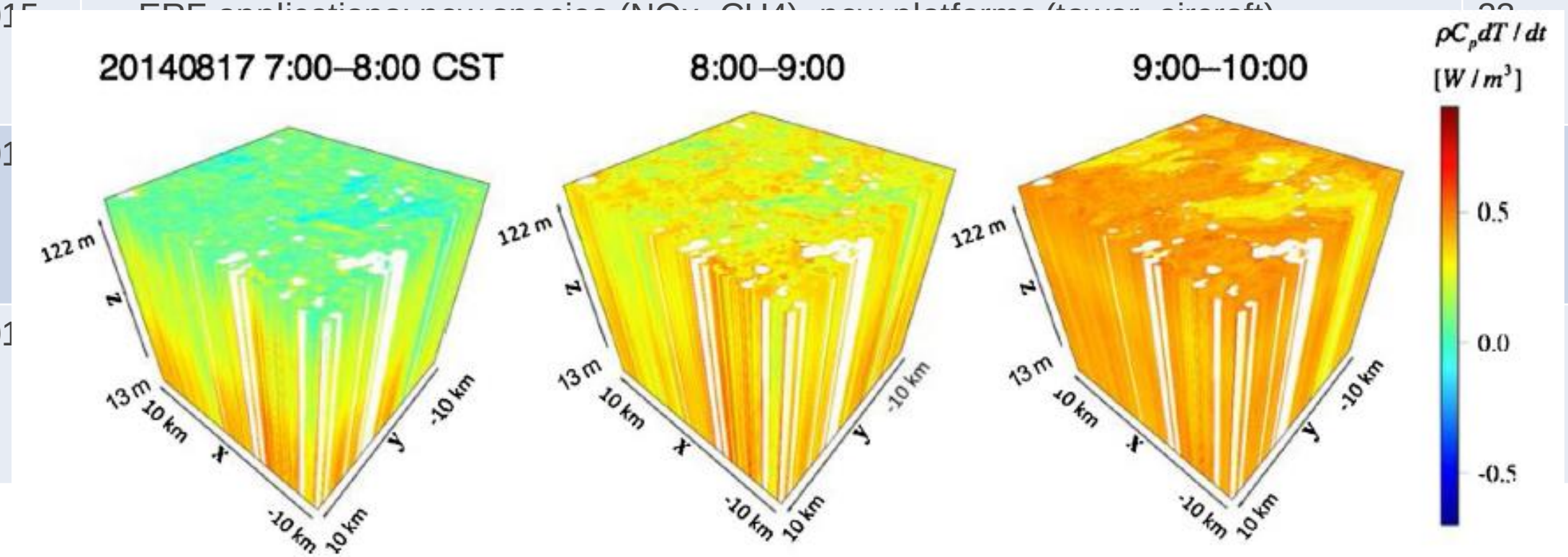


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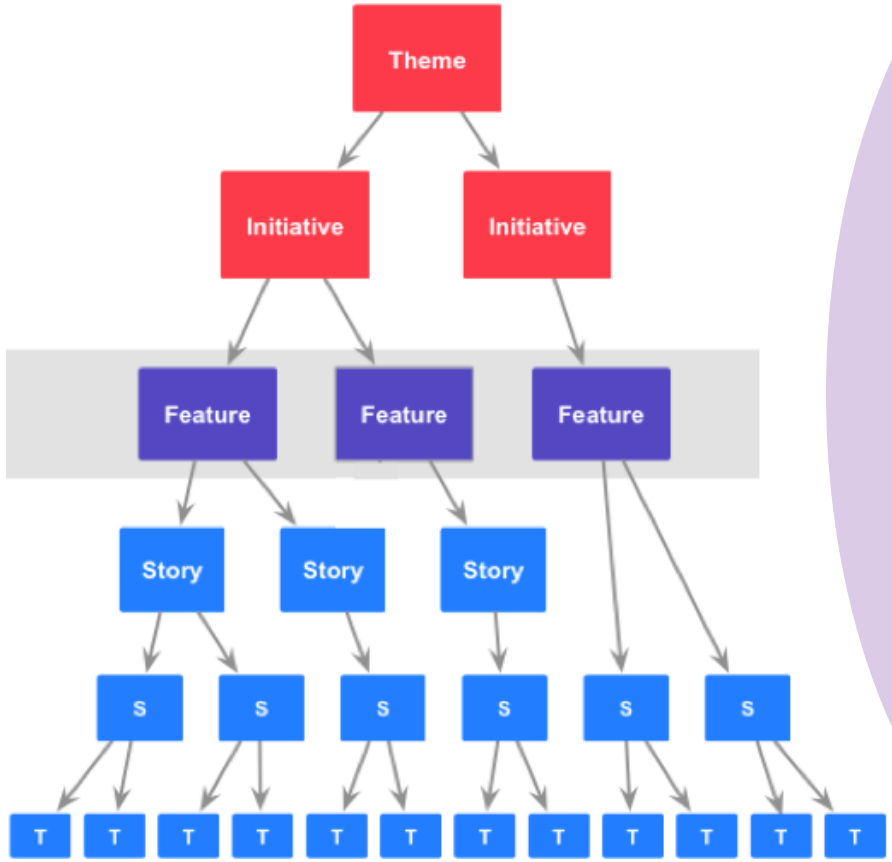
| 2018 | • Proposal: NASA SIF?<br>• … | ? |

# Workshop Attendees: NEON Community Ambassadors

## Purpose




## Role

**Annual NEON SAE User Workshop**

Technical Working Group

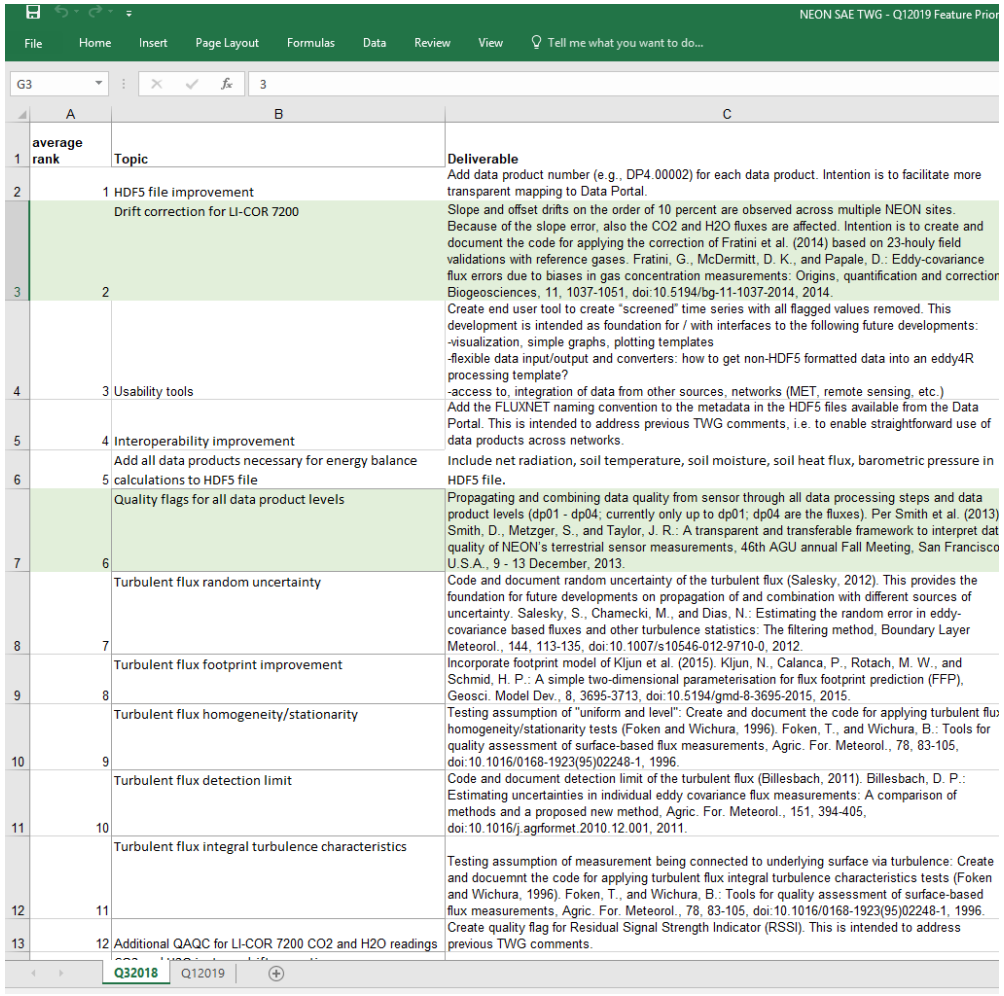
NEON SAE Group

## Function

### Example

- Theme: cross-network interoperability
- Initiative: usability and conversion tools
- Feature: AmeriFlux-NEON variable and unit mapping
- Story: create R-functions
- Task: perform regression tests

# NEON Technical Working Group Involvement



NEON SAE TWG - Q12019 Feature Prior

File Home Insert Page Layout Formulas Data Review View Tell me what you want to do...

G3 | 3

| | A | B | C |
|---|---|---|---|
| 1 | average rank | Topic | Deliverable |
| 2 | 1 | HDF5 file improvement | Add data product number (e.g., DP4.00002) for each data product. Intention is to facilitate more transparent mapping to Data Portal. |
| 3 | 2 | Drift correction for LI-COR 7200 | Slope and offset drifts on the order of 10 percent are observed across multiple NEON sites. Because of the slope error, also the CO2 and H2O fluxes are affected. Intention is to create and document the code for applying the correction of Fratini et al. (2014) based on 23-houly field validations with reference gases. Fratini, G., McDermitt, D. K., and Papale, D.: Eddy-covariance flux errors due to biases in gas concentration measurements: Origins, quantification and correction Biogeosciences, 11, 1037-1051, doi:10.5194/bg-11-1037-2014, 2014. |
| 4 | 3 | Usability tools | Create end user tool to create "screened" time series with all flagged values removed. This development is intended as foundation for / with interfaces to the following future developments: -visualization, simple graphs, plotting templates -flexible data input/output and converters: how to get non-HDF5 formatted data into an eddy4R processing template? -access to, integration of data from other sources, networks (MET, remote sensing, etc.) |
| 5 | 4 | Interoperability improvement | Add the FLUXNET naming convention to the metadata in the HDF5 files available from the Data Portal. This is intended to address previous TWG comments, i.e. to enable straightforward use of data products across networks. |
| 6 | 5 | Add all data products necessary for energy balance calculations to HDF5 file | Include net radiation, soil temperature, soil moisture, soil heat flux, barometric pressure in HDF5 file. |
| 7 | 6 | Quality flags for all data product levels | Propagating and combining data quality from sensor through all data processing steps and data product levels (dp01 - dp04; currently only up to dp01; dp04 are the fluxes). Per Smith et al. (2013) Smith, D., Metzger, S., and Taylor, J. R.: A transparent and transferable framework to interpret dat quality of NEON's terrestrial sensor measurements, 46th AGU annual Fall Meeting, San Francisco U.S.A., 9 - 13 December, 2013. |
| 8 | 7 | Turbulent flux random uncertainty | Code and document random uncertainty of the turbulent flux (Salesky, 2012). This provides the foundation for future developments on propagation of and combination with different sources of uncertainty. Salesky, S., Chamecki, M., and Dias, N.: Estimating the random error in eddy-covariance based fluxes and other turbulence statistics: The filtering method, Boundary Layer Meteorol., 144, 113-135, doi:10.1007/s10546-012-9710-0, 2012. |
| 9 | 8 | Turbulent flux footprint improvement | Incorporate footprint model of Kljun et al. (2015). Kljun, N., Calanca, P., Rotach, M. W., and Schmid, H. P.: A simple two-dimensional parameterisation for flux footprint prediction (FFP), Geosci. Model Dev., 8, 3695-3713, doi:10.5194/gmd-8-3695-2015, 2015. |
| 10 | 9 | Turbulent flux homogeneity/stationarity | Testing assumption of "uniform and level": Create and document the code for applying turbulent flux homogeneity/stationarity tests (Foken and Wichura, 1996). Foken, T., and Wichura, B.: Tools for quality assessment of surface-based flux measurements, Agric. For. Meteorol., 78, 83-105, doi:10.1016/0168-1923(95)02248-1, 1996. |
| 11 | 10 | Turbulent flux detection limit | Code and document detection limit of the turbulent flux (Billesbach, 2011). Billesbach, D. P.: Estimating uncertainties in individual eddy covariance flux measurements: A comparison of methods and a proposed new method, Agric. For. Meteorol., 151, 394-405, doi:10.1016/j.agrformet.2010.12.001, 2011. |
| 12 | 11 | Turbulent flux integral turbulence characteristics | Testing assumption of measurement being connected to underlying surface via turbulence: Create and docuemnt the code for applying turbulent flux integral turbulence characteristics tests (Foken and Wichura, 1996). Foken, T., and Wichura, B.: Tools for quality assessment of surface-based flux measurements, Agric. For. Meteorol., 78, 83-105, doi:10.1016/0168-1923(95)02248-1, 1996. |
| 13 | 12 | Additional QAQC for LI-COR 7200 CO2 and H2O readings | Create quality flag for Residual Signal Strength Indicator (RSSI). This is intended to address previous TWG comments. |

Q32018 Q12019

## Technical Working Group feature prioritization

- Each quarter, the TWG receives a short list of topics and deliverables, some of which result from community feedback during the annual AGU workshop
- Working group members place these topics in priority order, we do our best to schedule work according to the average rank of each topic

# Progress on last year's feedback

## End-to-end Usability Tools

- flexible data I/O and converters: how to get non-HDF5 formatted data into an eddy4R processing template?
  - Addressed by workflow to output in FP standard
- visualization, simple graphs, plotting templates
  - Vignette to access eddy4R output files
    - In progress, underlying tools in NEONutilities packages
- access to, integration of data from other sources, networks (MET, remote sensing, etc.)
- How to combine outputs, or combine results from other tools into the same file

# Progress on last year's feedback

- transparency: data filtering, QA/QC and uncertainty protocols
  - In progress:
    - this has been addressed by Quality Metrics added to file
- reproducibility
  - enable users to document workflow releases e.g. as metadata

# Structure of today's workshop

- Introduction (~15 min)
  - Goals
  - Recent developments
  - Workshop structure
- Topic area introduction (~20 min)
- Breakout groups (~90 min)
  - Topic area based
- Breakout summaries (~15 min)
  - Consolidate notes from breakouts (google sheet)
    - What are the goals the breakout groups suggest?
    - What can the community do to achieve goals?
    - How can NEON help achieve goals?
- Wrap-up (~10 min)
  - Use insights to steer NEON SAE developments

# Topic Area Introductions

- T1: Introduction to NEON data and usability tools [~5 min] – Chris Florian
- T2: New budgeting approach reveals source of terrestrial carbon uptake overestimation [~5 min] – Anne Griebel
- T3: Flux data fusion for ecosystem understanding– flux fusion [~5 min] – Bijan Seyednasrollah
- T4: Developing end-to-end QAQC routines for flux observations –
  - Tovi [~ 5 min] – Gerardo Fratini
  - Openeddy overview [~ 5 min] – Ladislav Sigut