

NEON's storage flux measurements of CO₂ and H₂O, processing and data products



Hongyan Luo¹, Natchaya Pingingtha-Durden¹, Andy Fox^{2,3}

[1]: National Ecological Observatory Network, Fundamental Instrument Unit, Boulder, Colorado, USA

[2]: Arizona State University, Tucson, Arizona, USA

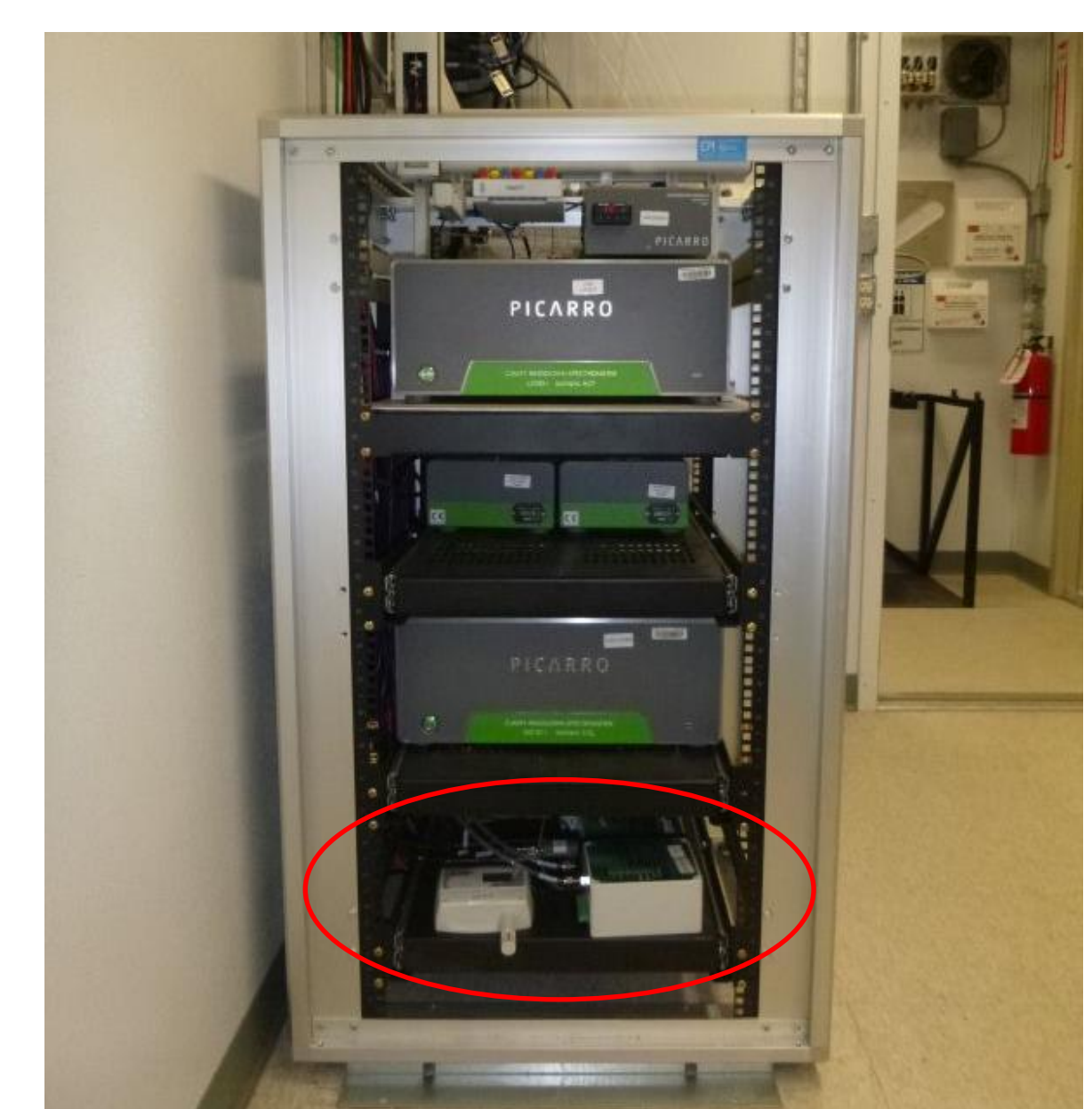
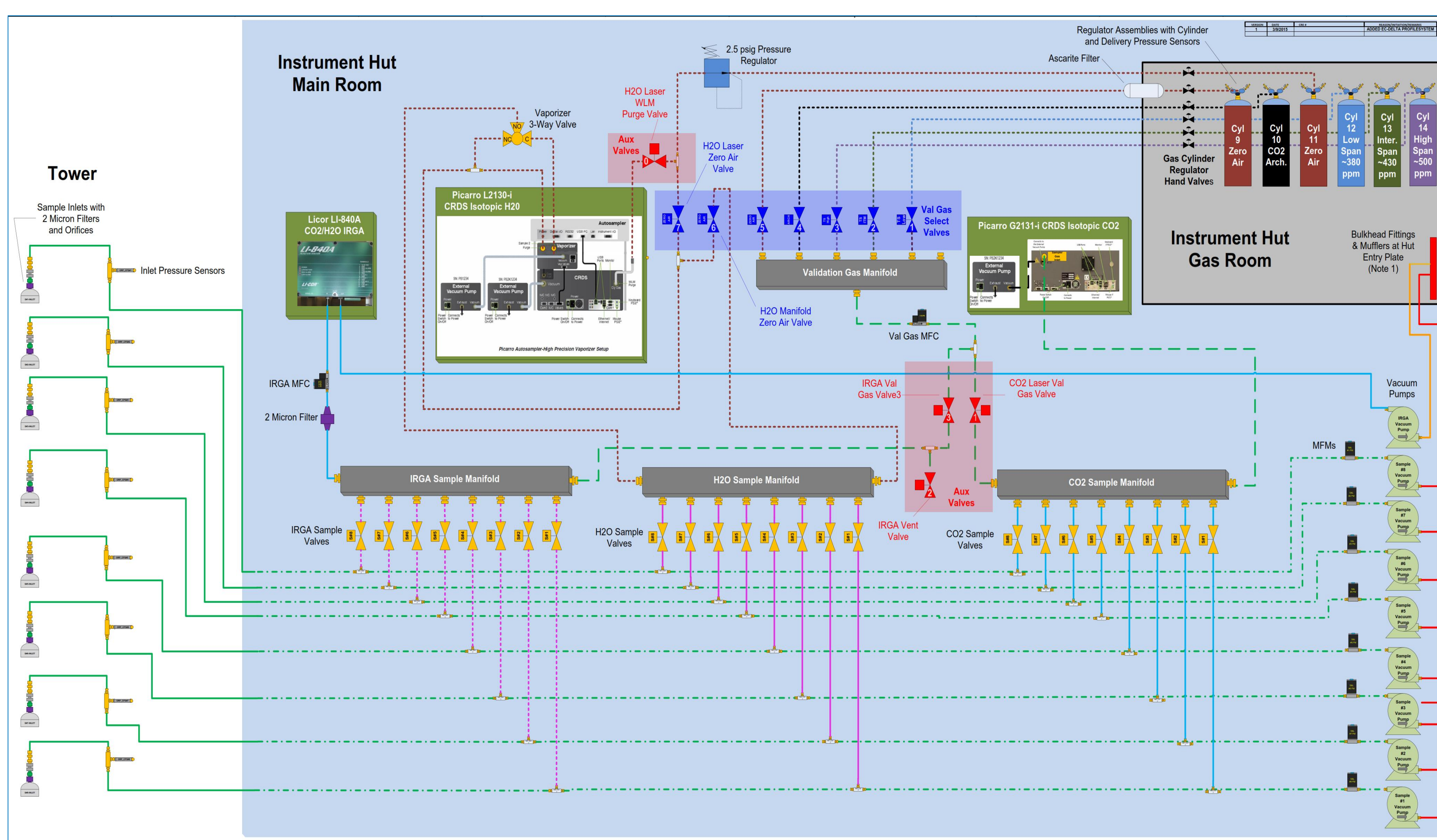
[3]: National Center for Atmospheric Research (NCAR), Boulder, Colorado, USA.

INTRODUCTION

NEON's eddy-covariance flux measurements and data products encompass two principal components: turbulent fluxes and storage fluxes. This poster will focus on the latter component.

The storage fluxes of CO₂ and H₂O will be integrated from vertical profile measurements of CO₂ and H₂O concentration. Specifically, the CO₂ and H₂O concentrations from different levels are measured using a single infrared gas analyzer (IRGA) located in a climate controlled instrument hut. Instead of manually calibrating the IRGA in the field, an automatic field validation is performed on a daily basis.

STORAGE FLUX SYSTEM DESIGN



Storage flux system design: schematic drawing (left); implementation on the tower (middle); sensor location inside instrument hut (right-top and right-bottom)

DATA PROCESSING AND RESULTANT DATA

- **First level:** Uncorrected 2-min average of dry and wet molar fraction of CO₂ and H₂O for each measurement level
- **Second level:**
 - CO₂ and H₂O data corrected with field validation;
 - aggregation to 30-min average data for each measurement level
- **Third level:** Spatial interpolation to vertical profile
- **Fourth level:** Time differentiation and vertical integration to produce storage flux

CHALLENGES

- Application of daily field validation results to the reported observations;
- Allocation of the observations to the correct measurement level and their temporal aggregation;
- Spatio-temporal interpolation of measurements occurring at different times for the different levels;
- Determination of the storage flux "net" footprint from various measurement levels that each source from a different area;
- Adaptive applicability of the algorithm across diverse ecosystems, terrain slope etc.

OPPORTUNITIES

- Stable isotope measurements of $\delta^{13}\text{C}$ in CO₂, $\delta^{18}\text{O}$ and $\delta^2\text{H}$ in H₂O at the same measurement levels as the storage flux profile
- Correcting stable isotope data using existing field validation data
- Partition NEE into ecosystem photosynthesis and respiration, as well as to partition ET into soil evaporation and ecosystem transpiration
- Postdoc opportunity to work on NEON turbulent flux and storage flux data products

Contact Information: hluo@BattelleEcology.org