# PROSPECTS OF DIRECT ET MEASUREMENTS FOR THE IMMEDIATE SOCIETAL BENEFITS

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## Direct ET Measurements

Continental-scale research infrastructures and regional flux networks (e.g., AmeriFlux, AsiaFlux, ChinaFlux, ICOS, NEON, OzFlux), as well as numerous smaller GHG flux networks, and individual sites, are often focused on measuring and modeling CO2 and other GHG exchange between ecosystem and atmosphere.

Such measurements require a high-quality water vapor flux (evapotranspiration, ET) to help correctly compute the GHG and heat exchange.

Effectively, these GHG networks are also ET networks. However, the ET measurements at the GHG flux sites are rarely fully utilized, and especially so outside the academia.

The main reasons for such a limited use of the well-established high-performing academic approach are cost and complexity of running traditional flux stations.

As a result, these stations cannot be readily used outside academia to provide immediate societal benefits: agricultural water management, watershed management, water regulation and water use verification, etc.

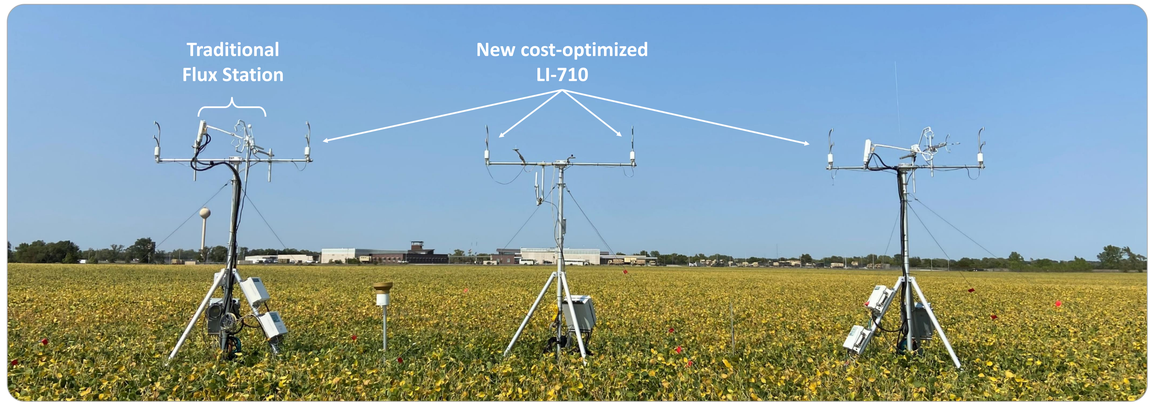
The new cost-optimized solution for direct, automated, real-time evapotranspiration measurements attempts to resolve this problem, and provides a technology transfer of the evapotranspiration measurements from academia to broader research, regulatory, and commercial applications.

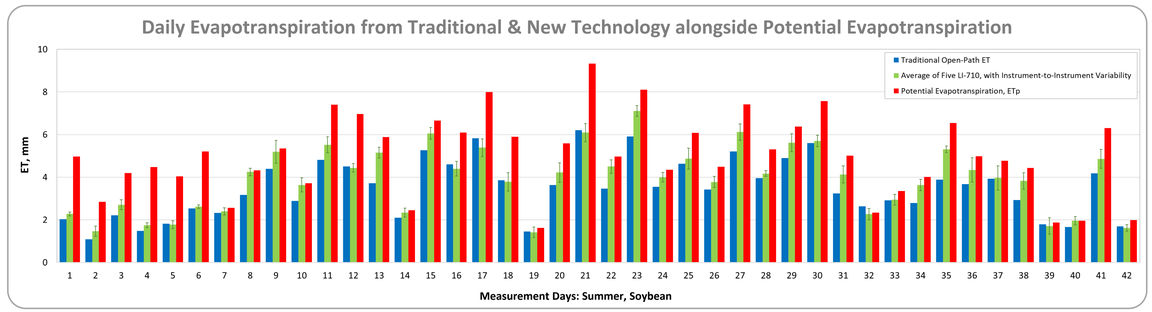
## New Cost-Optimized Instrument

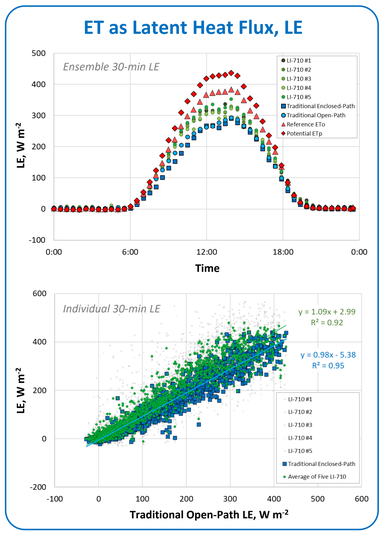
LI-710 is a simple-to-use device which directly measures ET, sensible heat, temperature, humidity, and atmospheric pressure every 30 min.

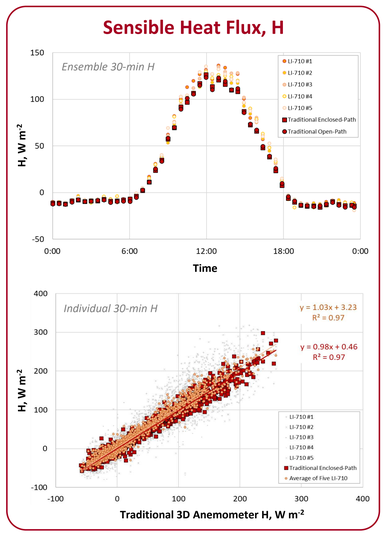
It costs about 5-10 times below typical flux station, consumes 3-15 times less power, and can be installed and used by a novice.

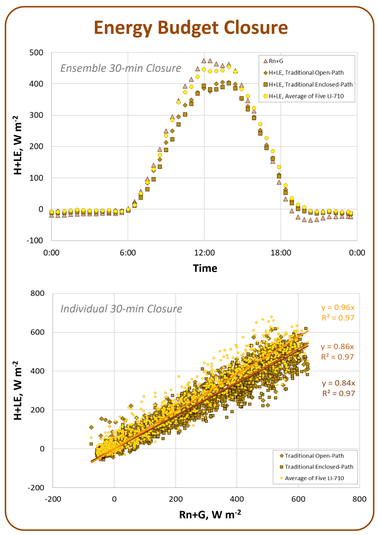
## New LI-710: Preliminary Field Test Results vs Traditional EC



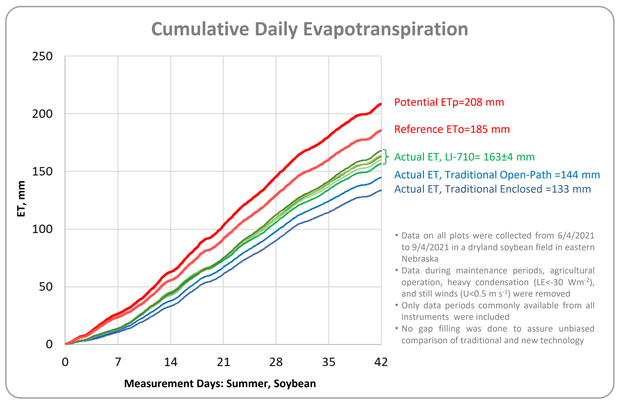




## Key Findings




The new LI-710 showed good performance across multiple weather conditions in terms of 30-min ET, and excellent performance for daily ET.

The instrument-to-instrument variability of five LI-710 models was consistently low throughout the testing period.

All five LI-710 models consistently showed improved energy budget closure versus traditional open-path and enclosed models.

The exact nature of the improved closure has not yet been investigated, but likely comes from the extremely low flow distortion design of the anemometer path of LI-710, leading to higher LE and H.

## Conclusions

A new cost-optimized instrument for direct, automated, real-time ET measurements considerably outperformed potential and reference models, when used without empirical crop coefficients.

Preliminary results suggest that the new technology may also have outperformed traditional open- and enclosed-path analyzers and 3D anemometers, resulting in slightly higher LE and H, and a much better energy budget closure.

If the ongoing tests of LI-710 in nearly 30 locations corroborate these findings, the new technology can be used for numerous applications, both academic and practical, including distributed flux measurements, agricultural water management, irrigation scheduling, watershed management, water regulation and use verification, etc.

Please see www.licor.com/env/products/LI-710 for technical details and specifications.