Fruitful studies on exchanges of energy, water and carbon dioxide between the atmosphere and terrestrial ecosystem has been produced under a global network (http://fluxnet.ornl.gov). The exchange is defined by a flux, in traditional it is estimated by eddy covariance EC method as a mean flux $F$ for 1-hr or 30-min, because a technique has been established for a direct measurement of a momentary flux itself. Therefore, an analysis of the exchange with $F$ is to pay attention to calculating its spatial or temporal mean, because the $F$ estimated by EC has a different uncertainty in one another according to different micrometeorological and ecophysiological conditions when it is measured, even if $F$ is measured by the same instrument.

To overcome this issue, we propose the weighted mean $F_w$ using a relative sampling error, namely an arithmetic mean flux $F$ and an uncertainty $u$ of $F$.

$$F_w = \frac{\sum F_i \cdot u_i}{\sum u_i^2}$$

where $F_i$ is the flux measured at site $i$ and $u_i$ is the uncertainty of the flux measurement at site $i$.

Relative sampling error of mean diurnal variation of one month:

$$\frac{F_w - F_{mean}}{F_{mean}} \times 100$$

where $F_{mean}$ is the mean of the fluxes measured at each site.

### RESULTS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>Error</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_{mean}$</td>
<td>3.10 ± 0.89</td>
<td>0.083</td>
<td>0.071</td>
</tr>
<tr>
<td>$F_{max}$</td>
<td>3.93 ± 0.83</td>
<td>0.092</td>
<td>0.080</td>
</tr>
</tbody>
</table>

### DISCUSSION

Relative sampling uncertainty $\epsilon$ was validated in figure 2 with $\phi$ called an integral turbulence characteristics ITC (Turnell 1972) which is one of the classic scale parameters for QCQA of EC measurement for $F$ based on MOST (Foken et al. 2004). As the result, the positive relationship of $\epsilon$ to $\phi$ is suggested significantly with different sensitivity according to $\phi$, namely the sensitivity of $\epsilon$ to $\phi$ is slightly higher when $\phi$ approaching to stable (light gray to white) or to unstable (dark gray to black) atmospheric condition. This result plainly shows that $\epsilon$ is not a merely statistical parameter but a considerable quantitative uncertainty one.

The mean diurnal variation MDV of the flux integration presented by Falge et al. (2001) was estimated considering the weighted mean of the atmospheric similarity function for MCHE. The filtering strategy is used in Table 1.

### MATERIALS & METHODS

- **Experimental Site**: TJE06
- **Tangerine orchard at Jeju, Korea**: 33°30’28.47”N 126°40’51.29”E
- **Analyzed data**: July 2010 - June 2013
- **Instrumentation**
  - **Sonic anemometer**: CSAT3, Campbell Scientific
  - **Open-path gas analyzers**: LI7500, LI-COR
  - **Measurement height**: 3 m
- **Key Equations**
  - **Relative sampling error:**
    $\epsilon = \frac{1}{\epsilon} \left[ \sum \frac{\gamma(p)\gamma(q)}{\sqrt{N}} \right]
  - **Weighted average for mean diurnal variation of one month:**
    $F_w = \frac{\sum F_i \cdot u_i}{\sum u_i^2}$

### REFERENCES