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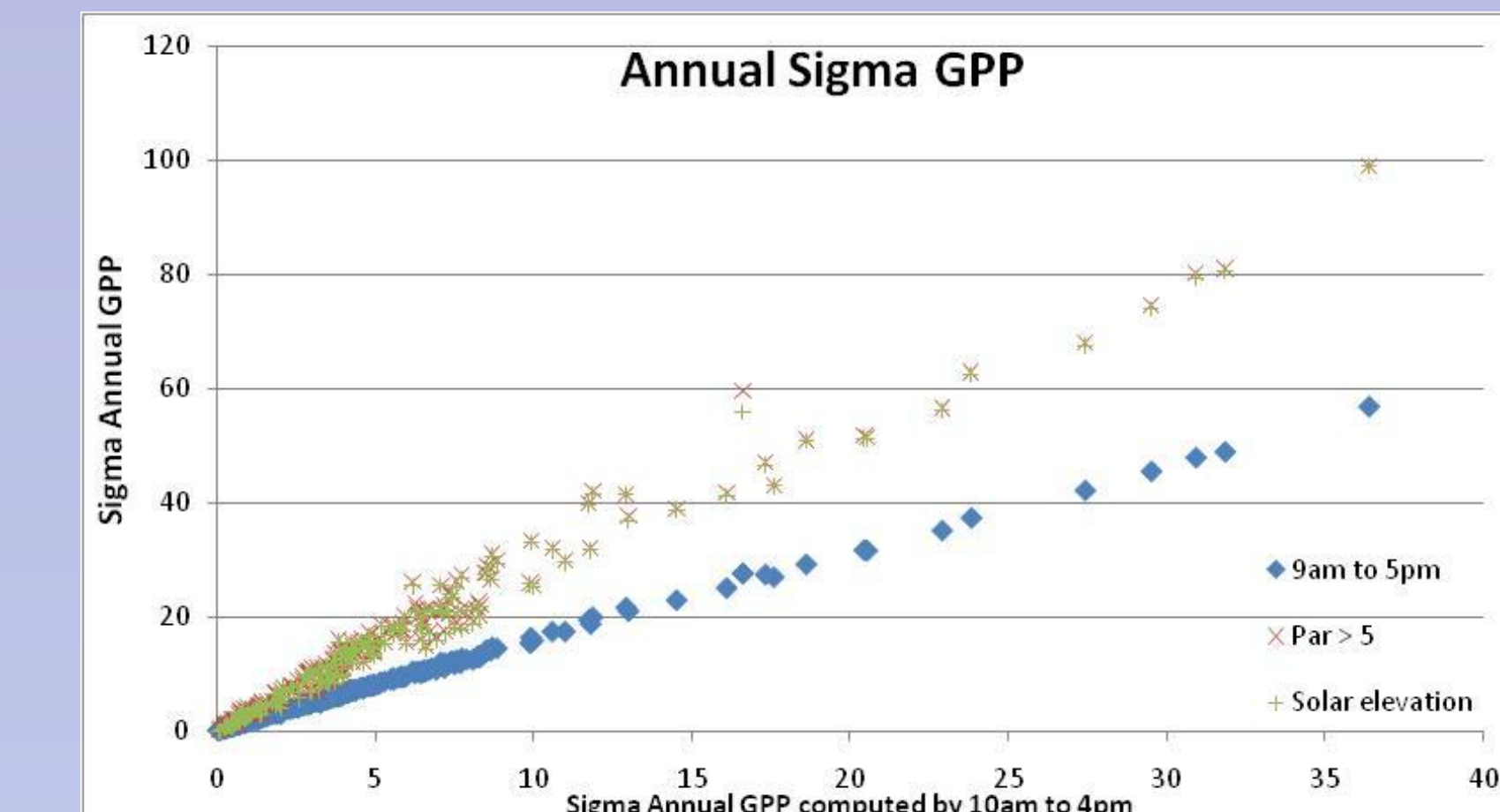
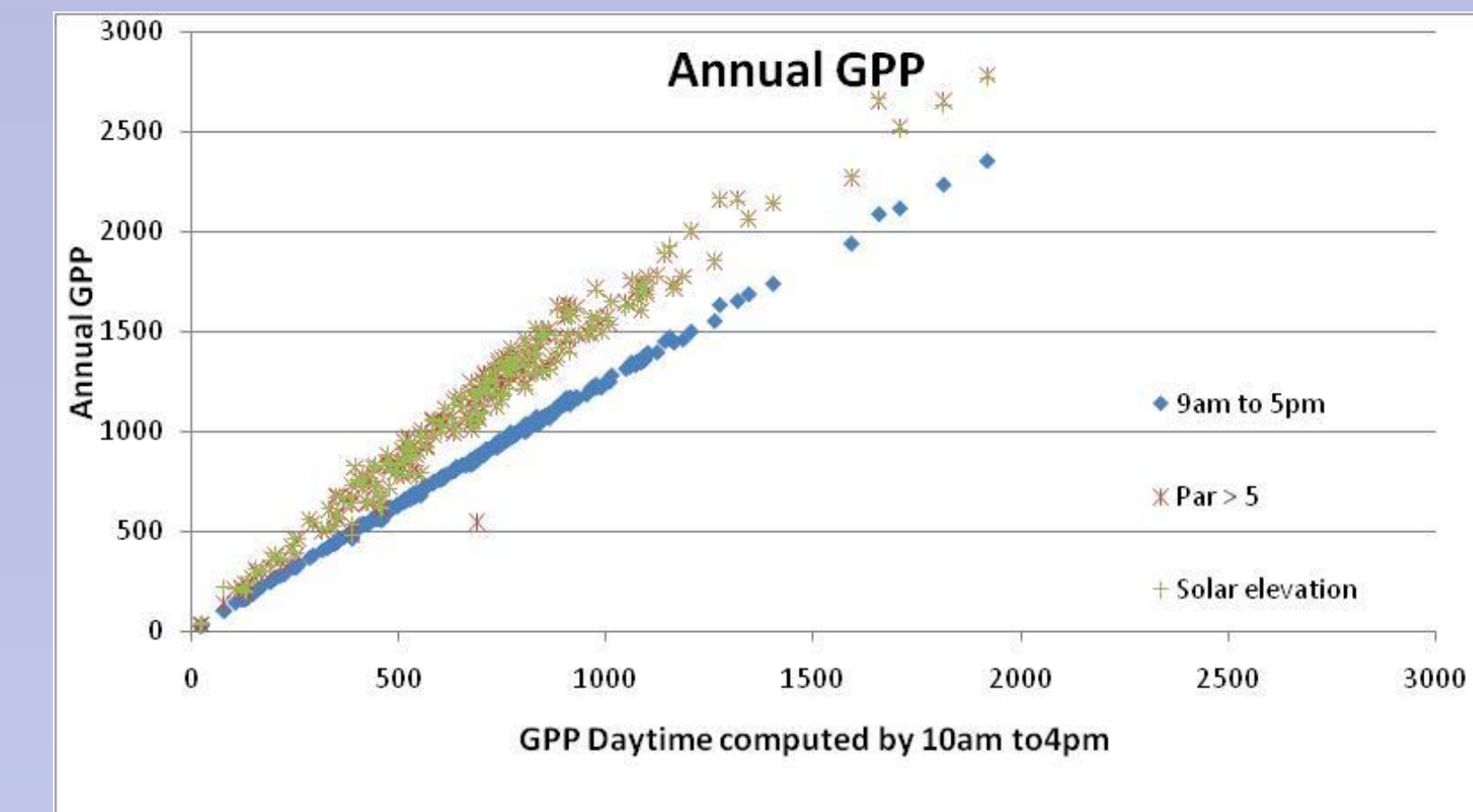
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Abstract

A gap-filled, quality assessed eddy covariance dataset has recently become available for the AmeriFlux network. This dataset uses standard processing and produces commonly used science variables. This shared dataset enables robust comparisons across different analyses. Of course, there are many remaining questions. One of those is how to define "during the day" which is an important concept for many analyses. Some studies have used local time – for example 9am to 5pm; others have used thresholds on photosynthetic active radiation (PAR). A related question is how to derive quantities such as the Bowen ratio. Most studies compute the ratio of the averages of the latent heat (LE) and sensible heat (H). In this study, we use different methods of defining "during the day" for GPP, LE, and H. We evaluate the differences between methods in two ways. First, we look at a number of statistics of GPP. Second, we look at differences in the derived Bowen ratio. Our goal is not science per se, but rather informatics in support of the science.



203 site-years of data from 53 AmeriFlux sites were used in this study



The daytime values computed with local time daytime differ from those computed with PAR > 5 or solar elevation. The computed daytimes always give a higher value of GPP.

Example computations of daytime GPP over a site year.

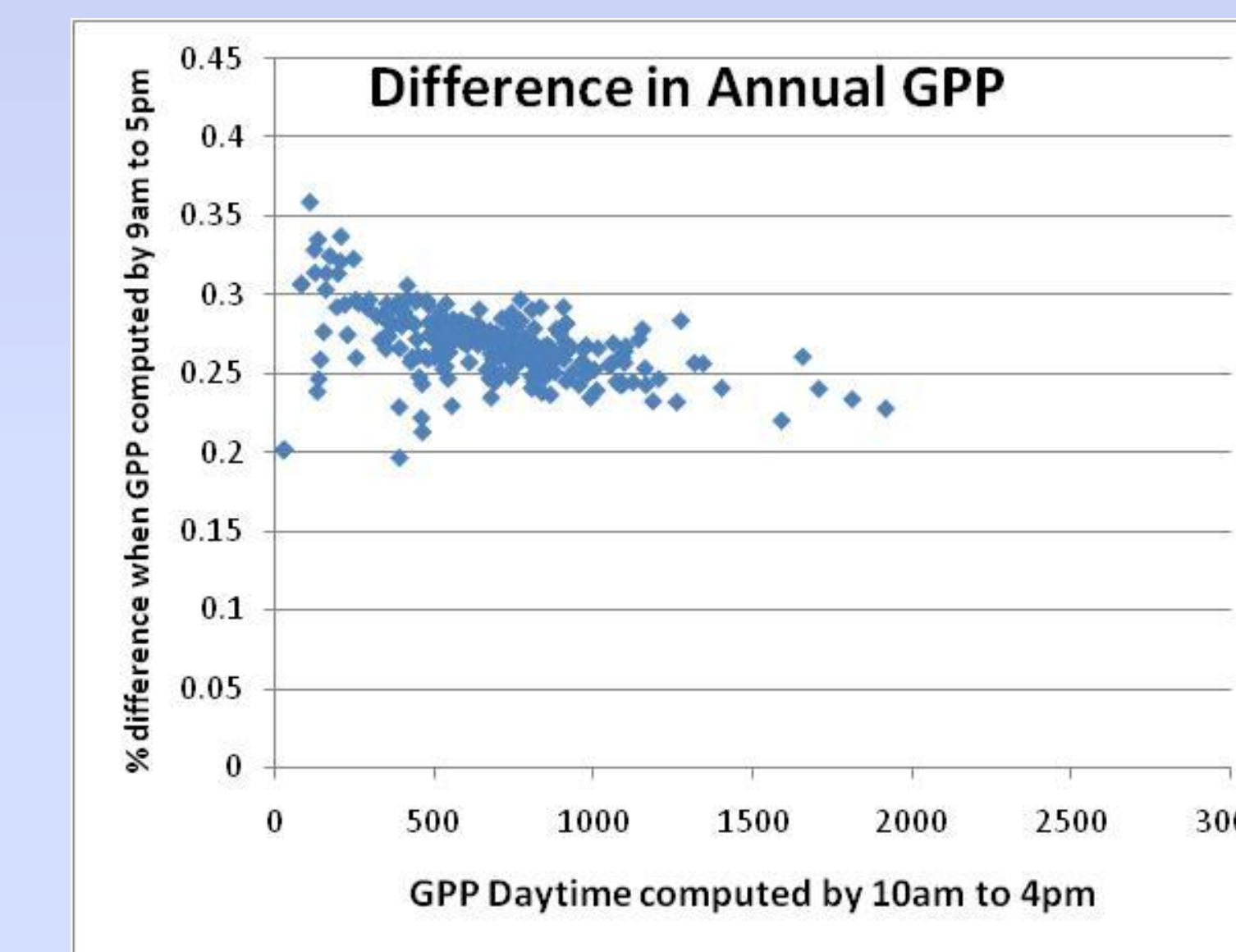
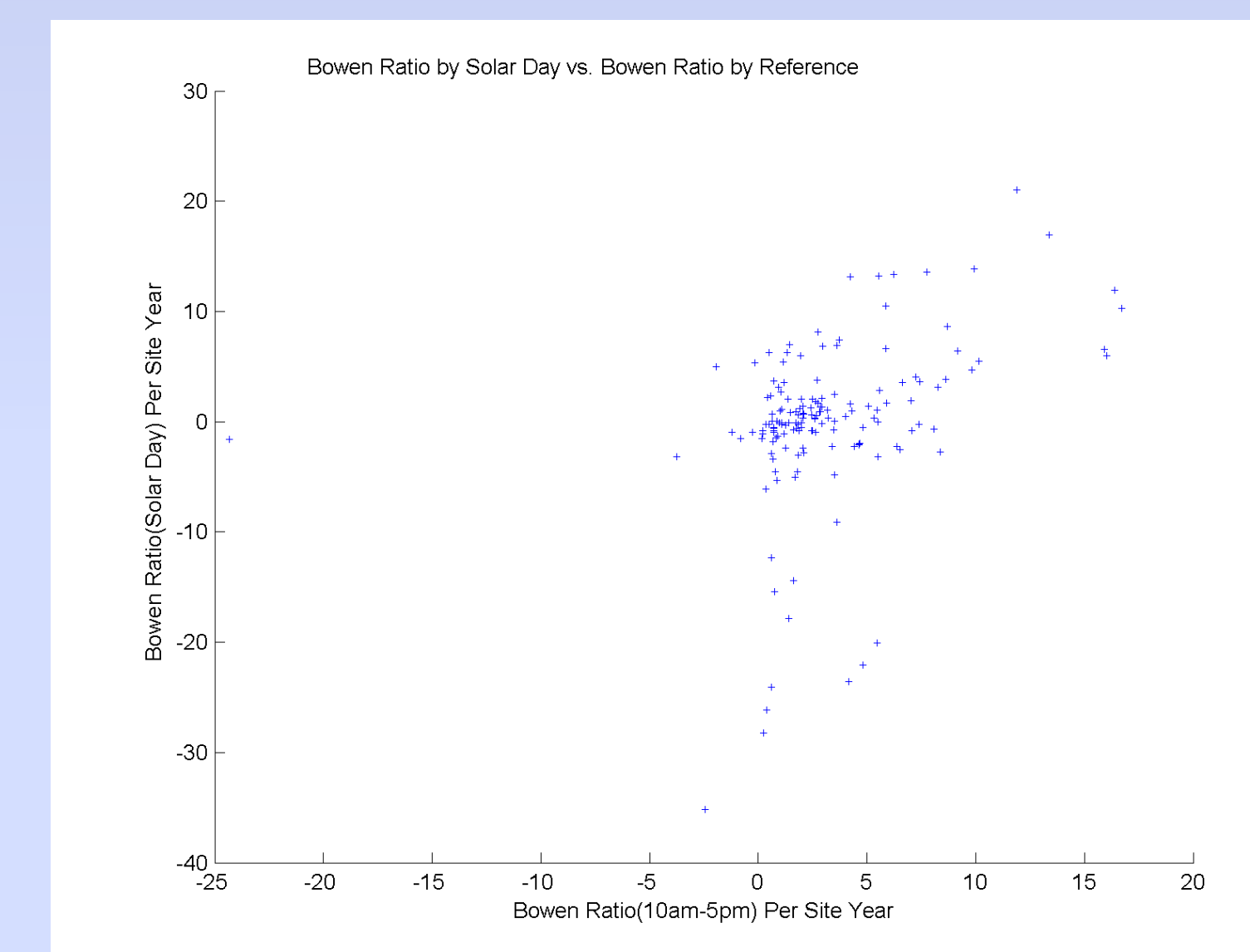
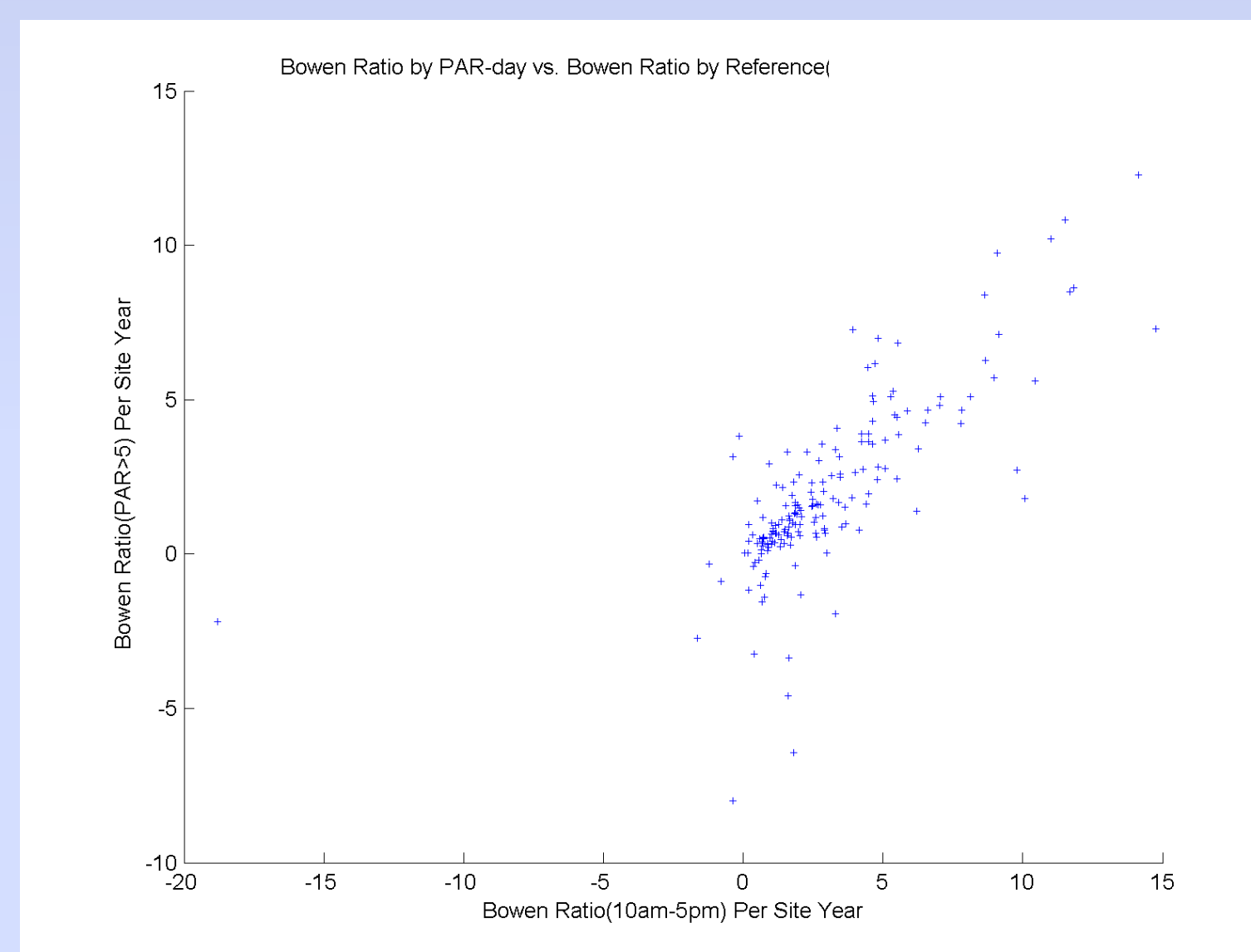
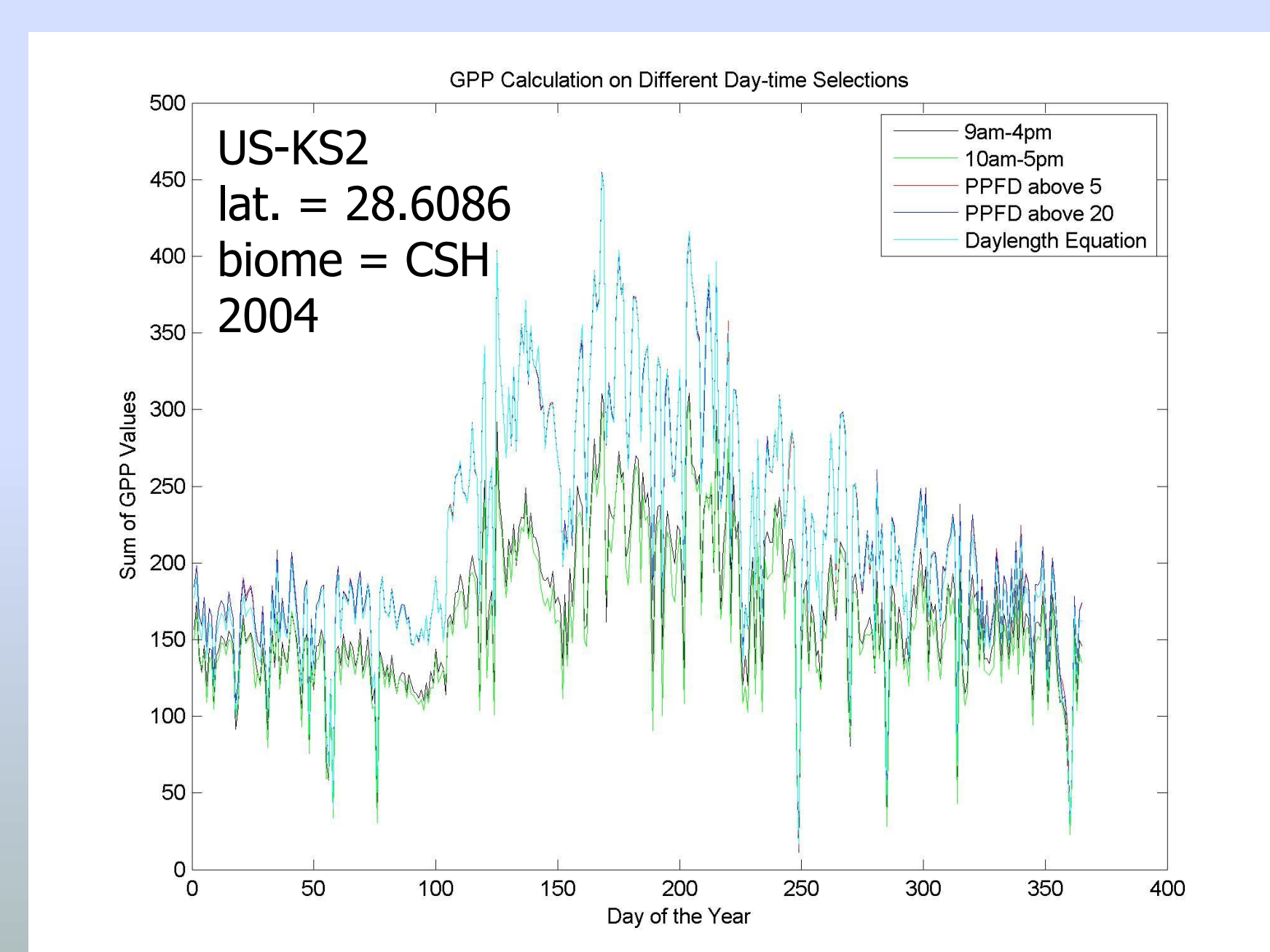
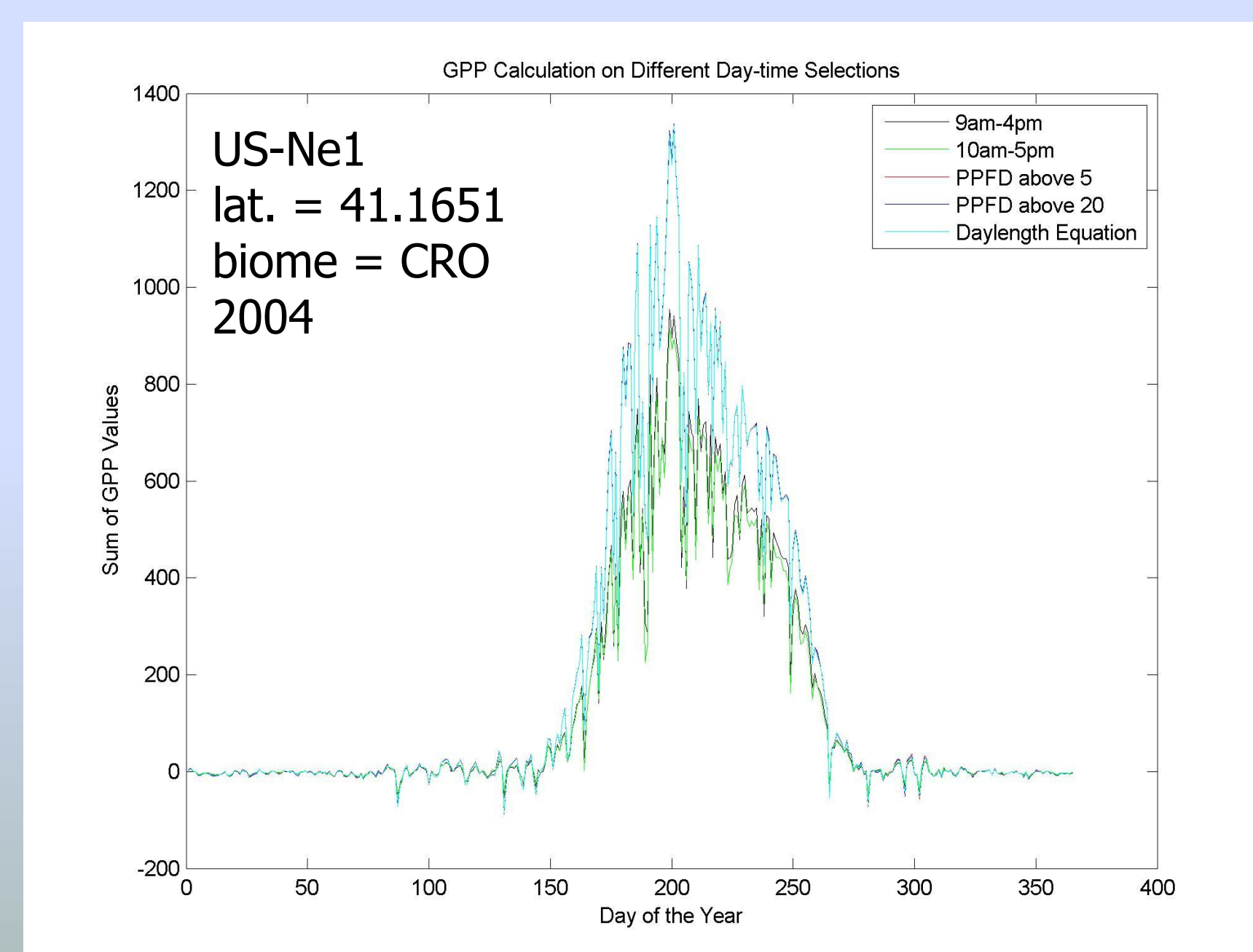
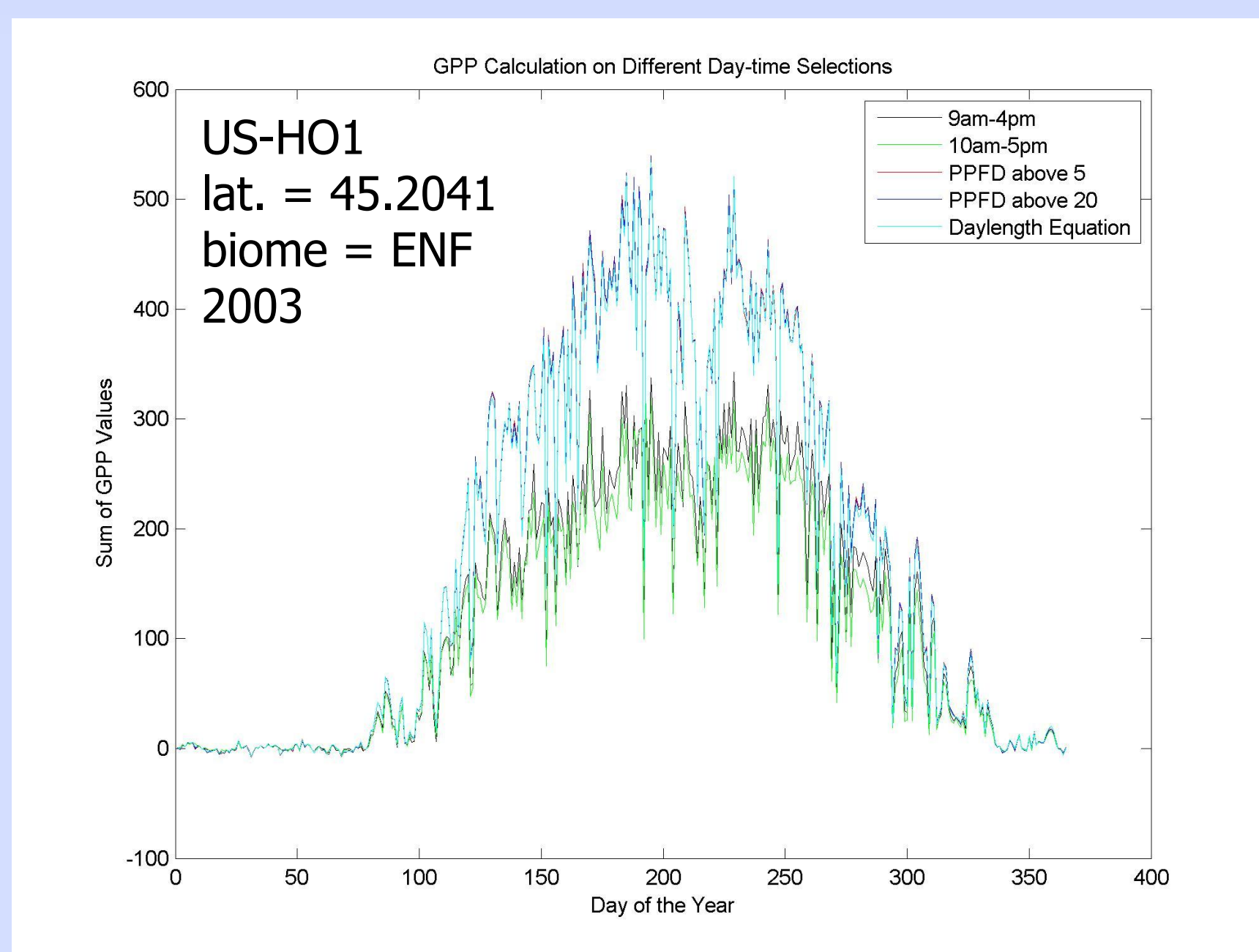
Local time based daytimes are simple time windows of 9am to 5pm and 10am to 4pm.

PAR (or PPFD) daytime uses the observed photosynthetic active radiation flux data. "Daytime" is when PAR > is above 5 or above 20.

Solar elevation (or daylength equation) daytime is centered at local noon with a length of day (Daylength) computed as:

Declination = 23.5 * cos(2π * (DayOfYear - 172) / 365)

Daylength = acos(-tan(π * Latitude / 180) * tan(π * Declination / 180)) * 2 / 15 * 180 / π

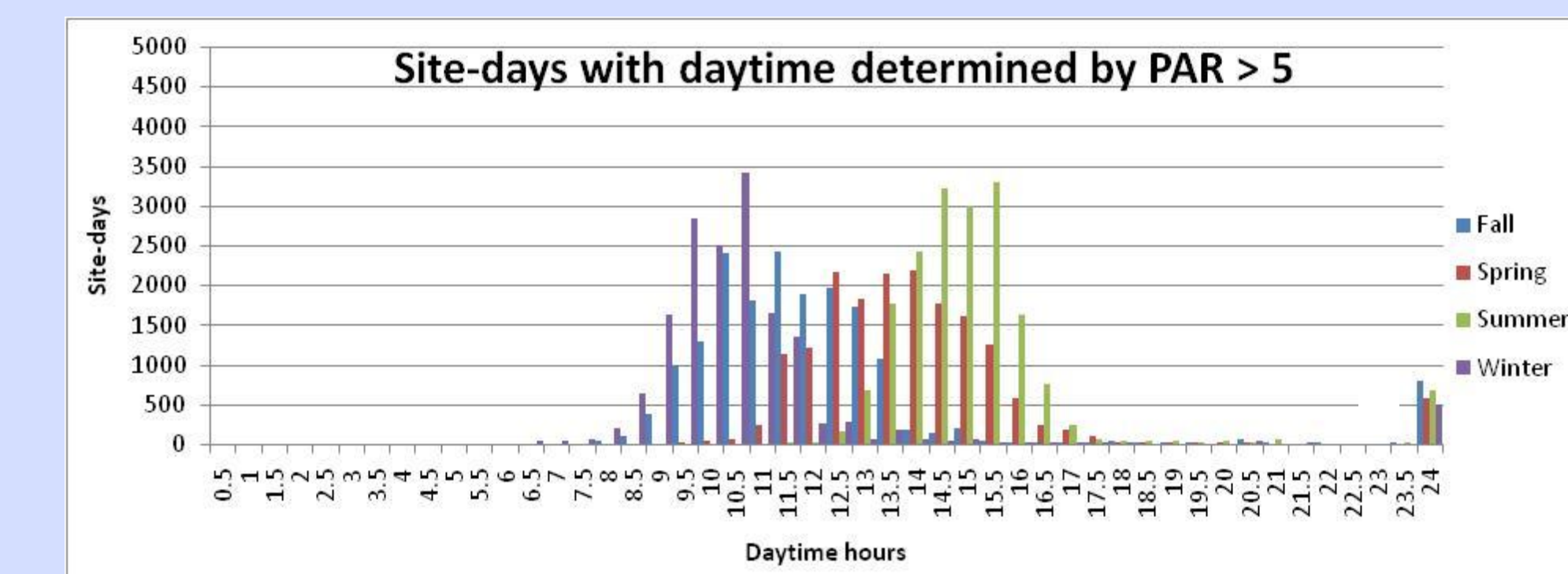


Annual values of GPP computed with local time daytime tend to be consistent. The 9am to 5pm daytime values tend to be 25% larger – a bit less than simple linear scaling of the time window. The differences are larger with smaller annual GPP values.

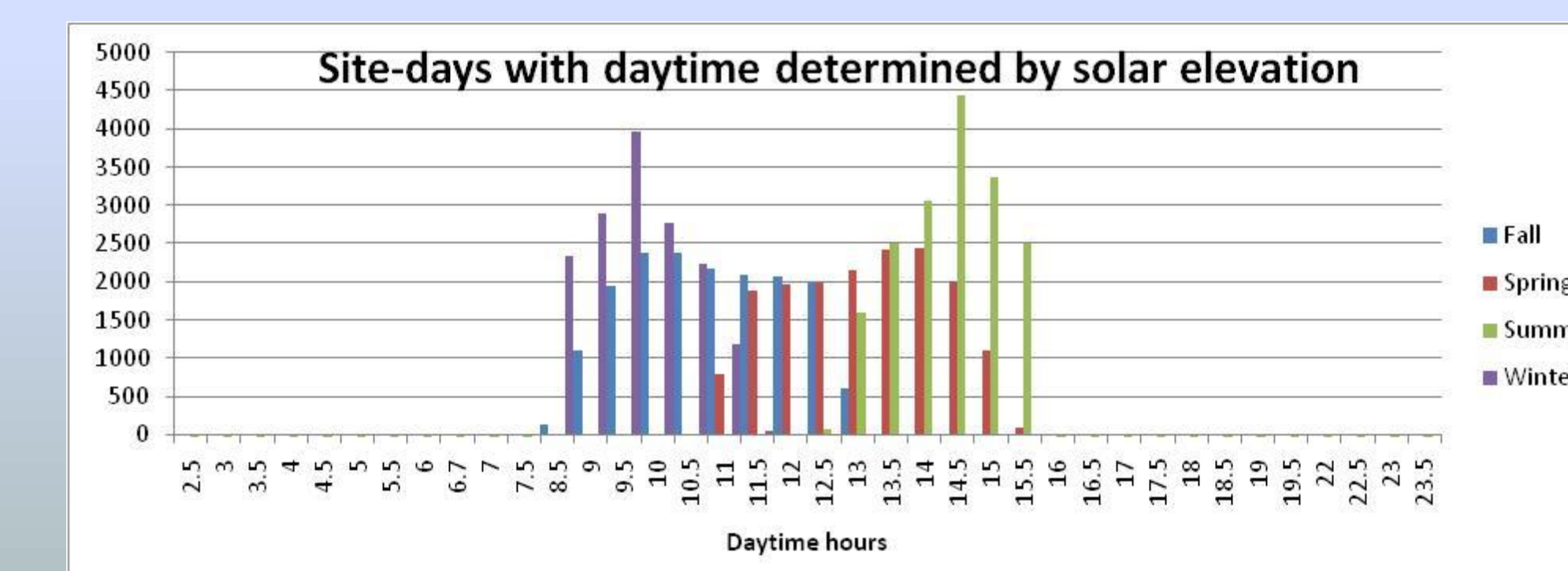
Daytime values of Bowen Ratio computed by solar elevation and PAR>5 differ more than the daily GPP values. We're don't yet know why.

Table with 3 columns: site ID, Name, Tower PI, PI E-Mail. It lists 53 AmeriFlux sites with their respective names, tower primary investigators, and contact emails.

While the annual values of GPP computed with the PAR > 5 and solar elevation tend to be the same, the actual duration of the "daytime" are different.



The plots at left show the number of site-days with a given length of daytime. Season are defined with 3 month duration; winter begins in December.



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