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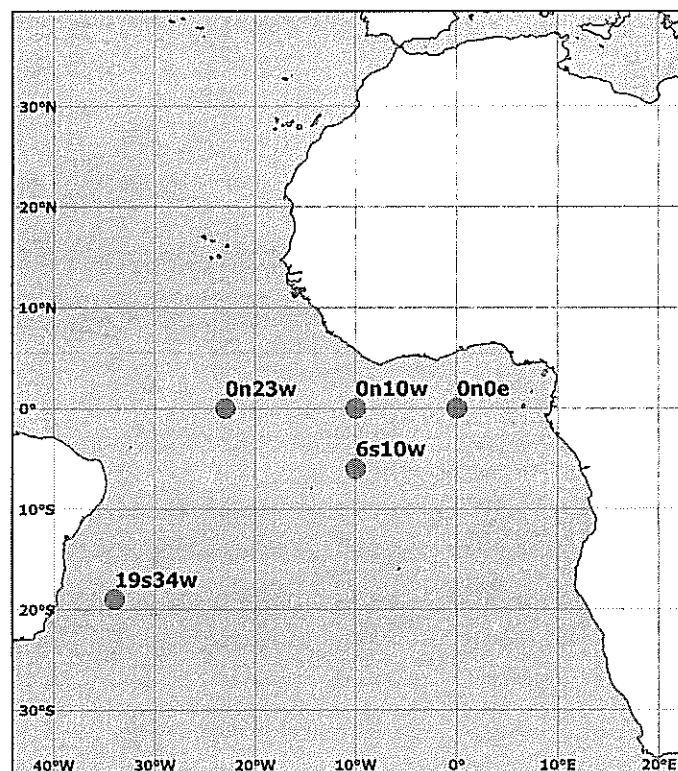


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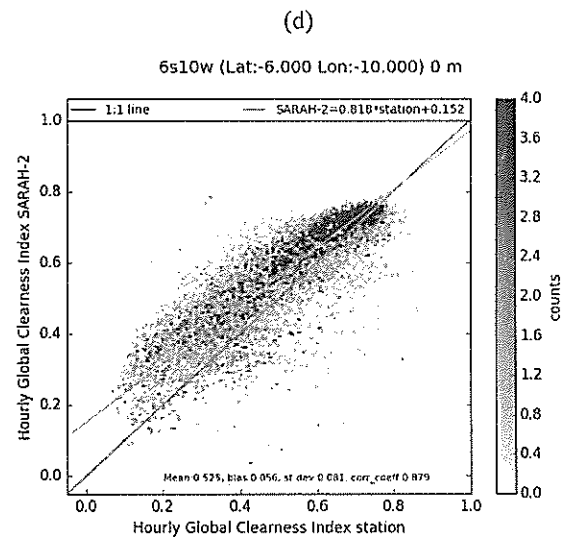
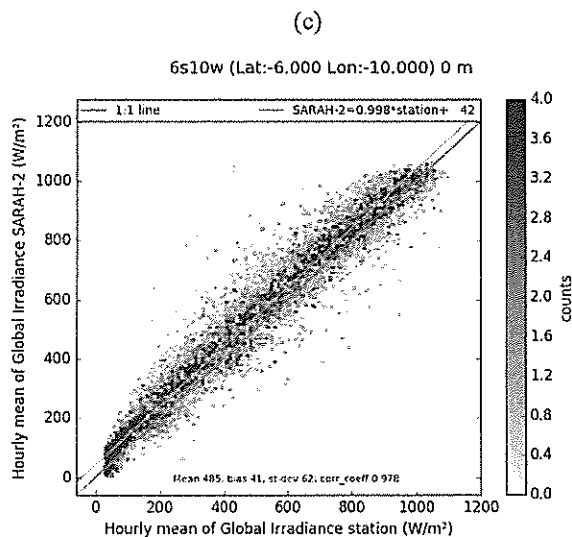
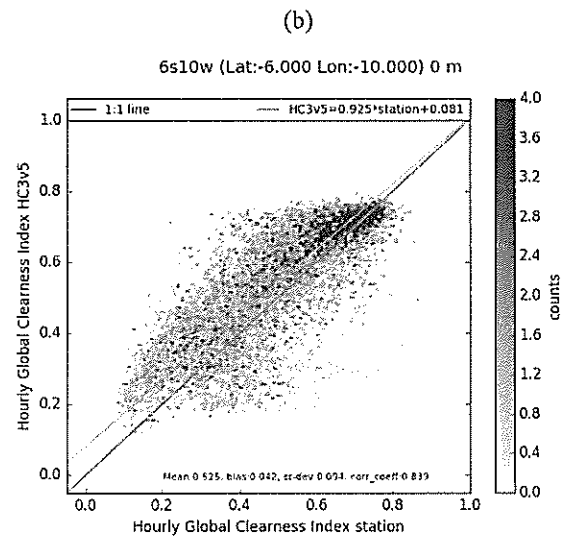
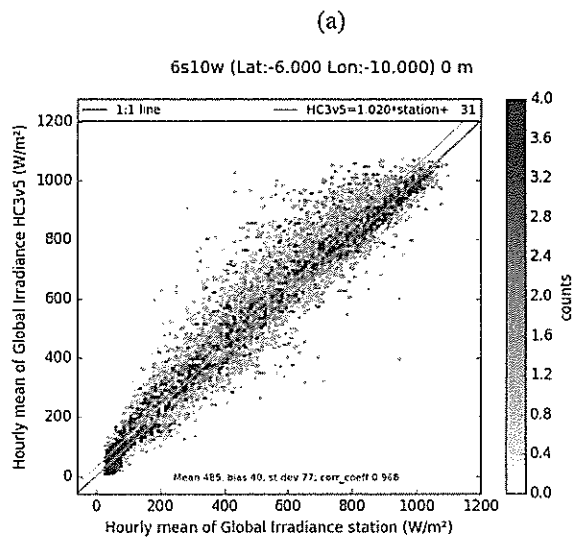
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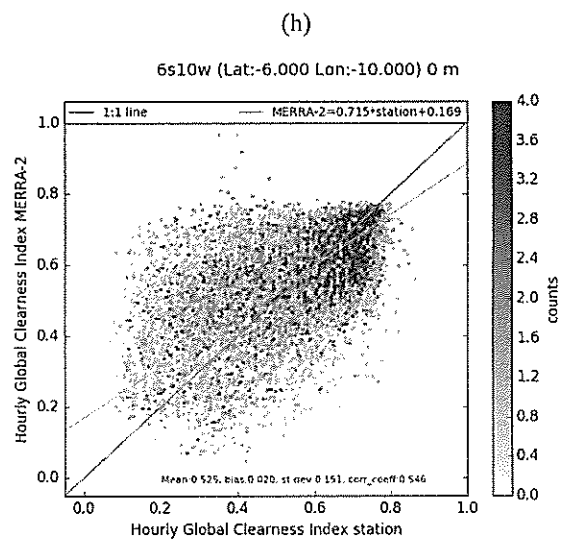
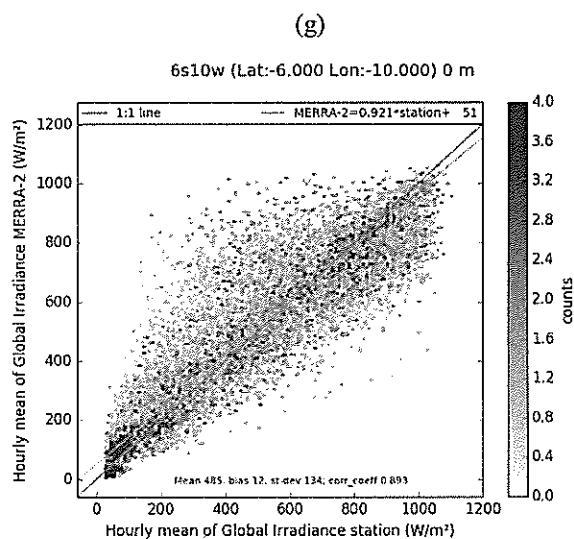
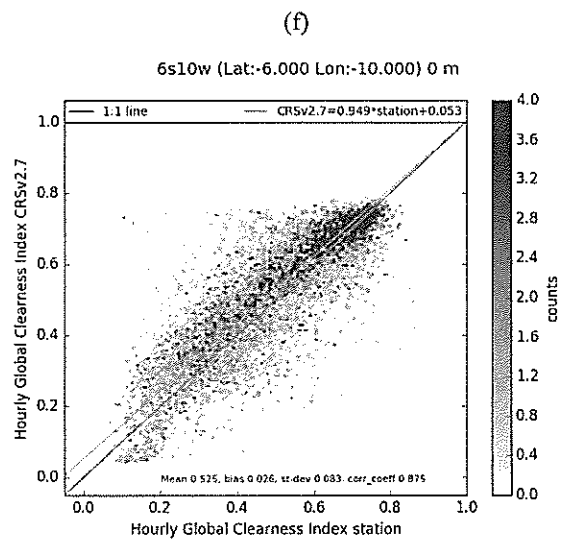
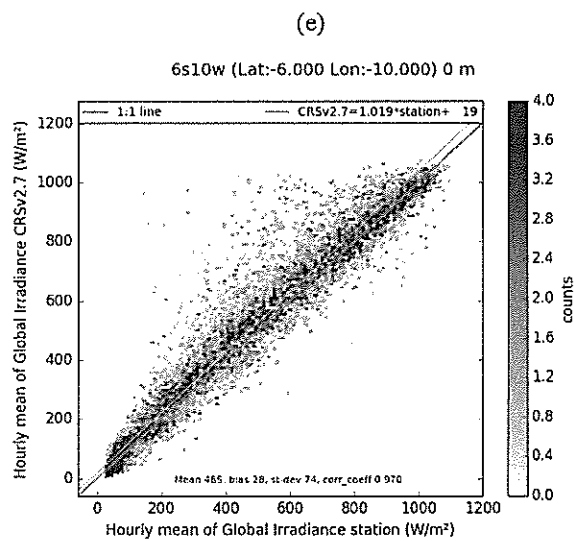
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10 Figure 1: Map showing the location of the five PIRATA buoys used in this study.





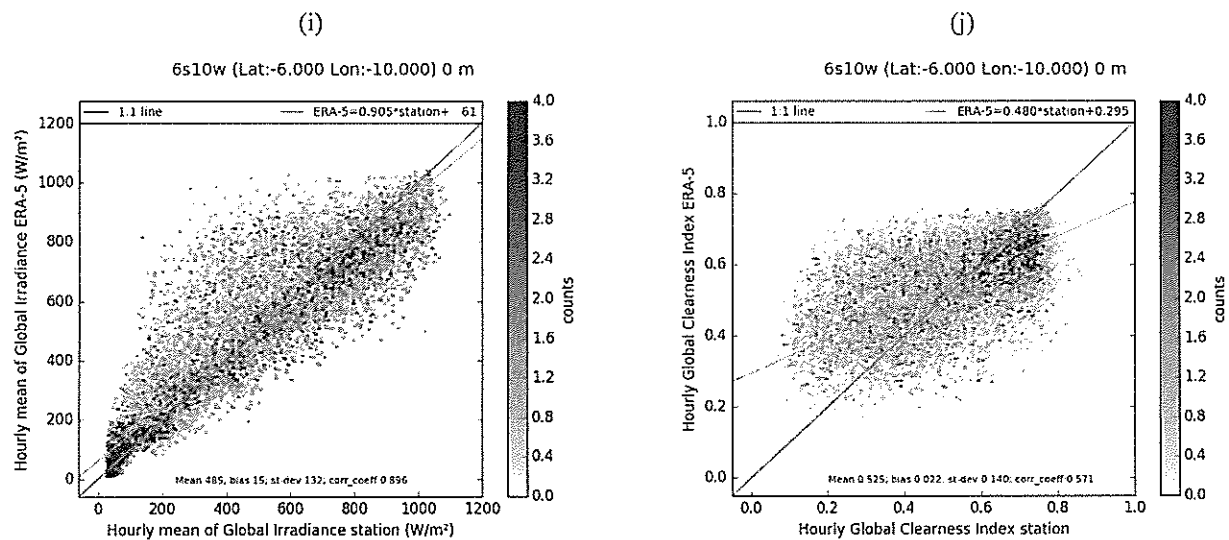
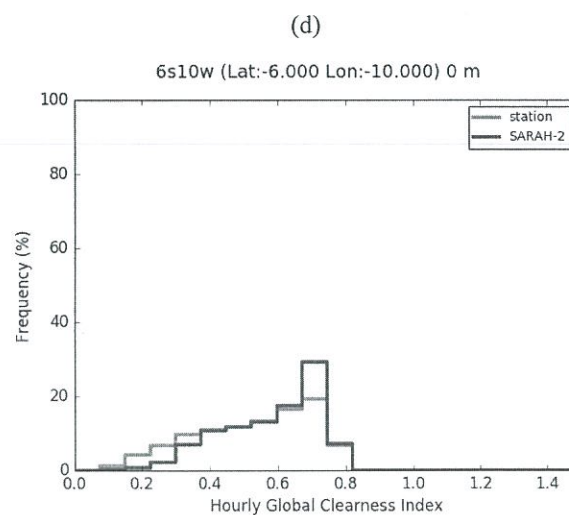
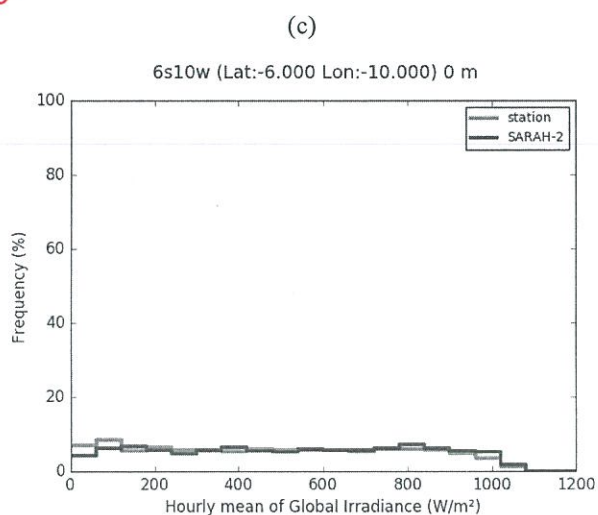
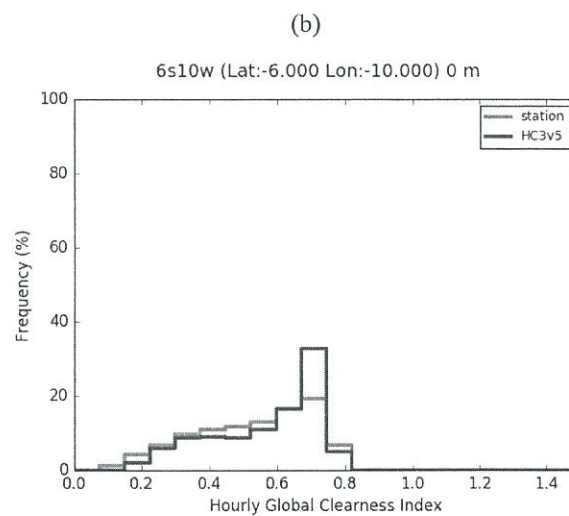
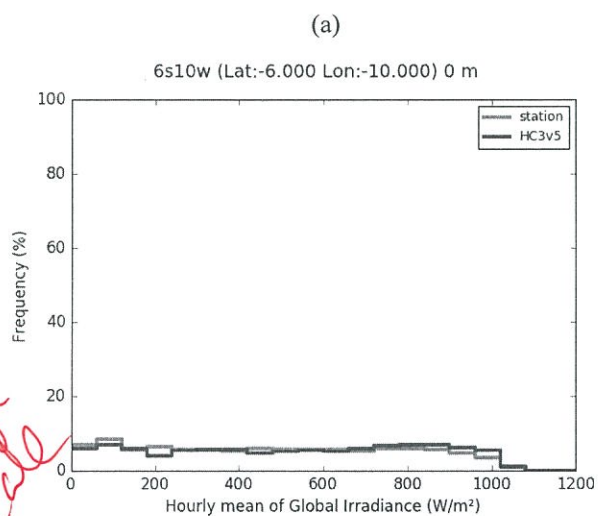


Figure 2: 2D histogram of PIRATA measurements (horizontal axis) and data sets (vertical axis) for the station 6s10w for E (left) and KT (right). HC3v5: (a), (b); SARAH 2: (c), (d); CRS: (e), (f); MERRA-2: (g), (h); ERA-5: (i), (j). Ideally, the dots should lie along the red line (1:1 line). The blue line is the affine function fitted over the points and should overlay the red line.

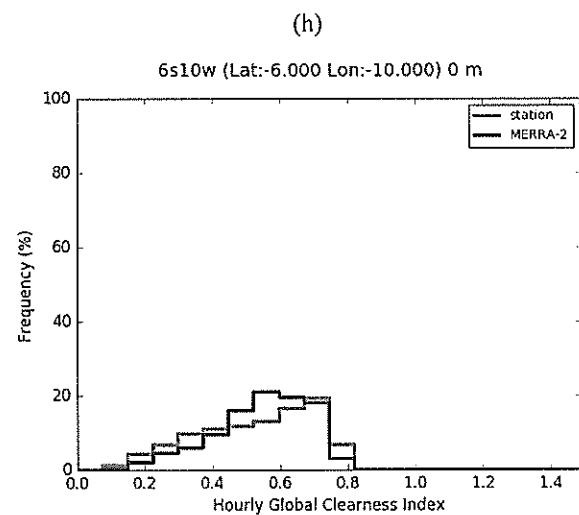
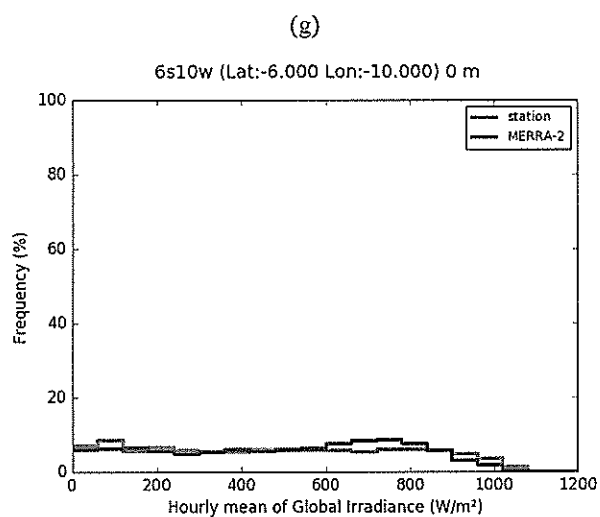
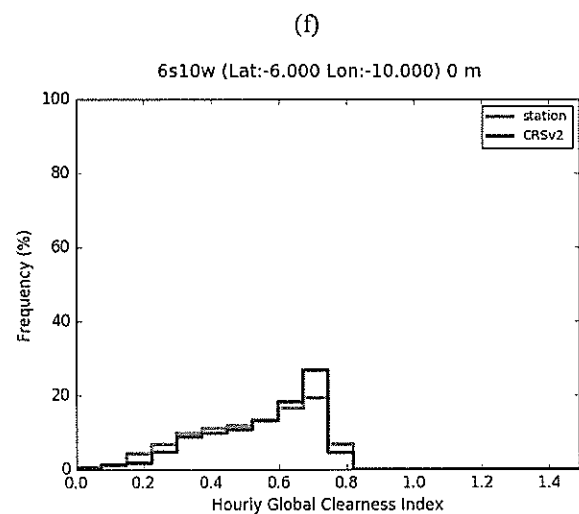
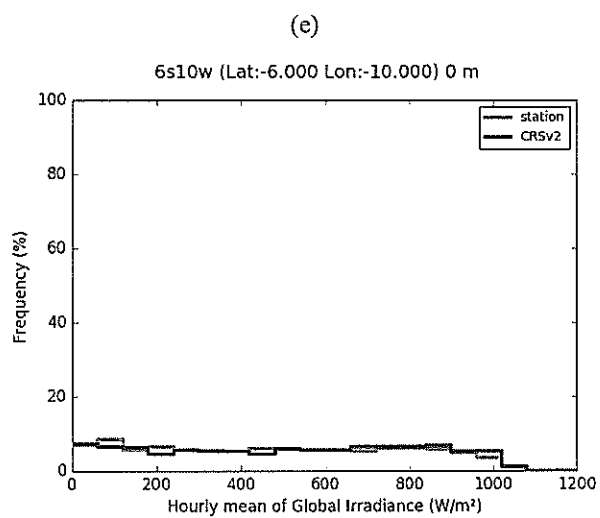
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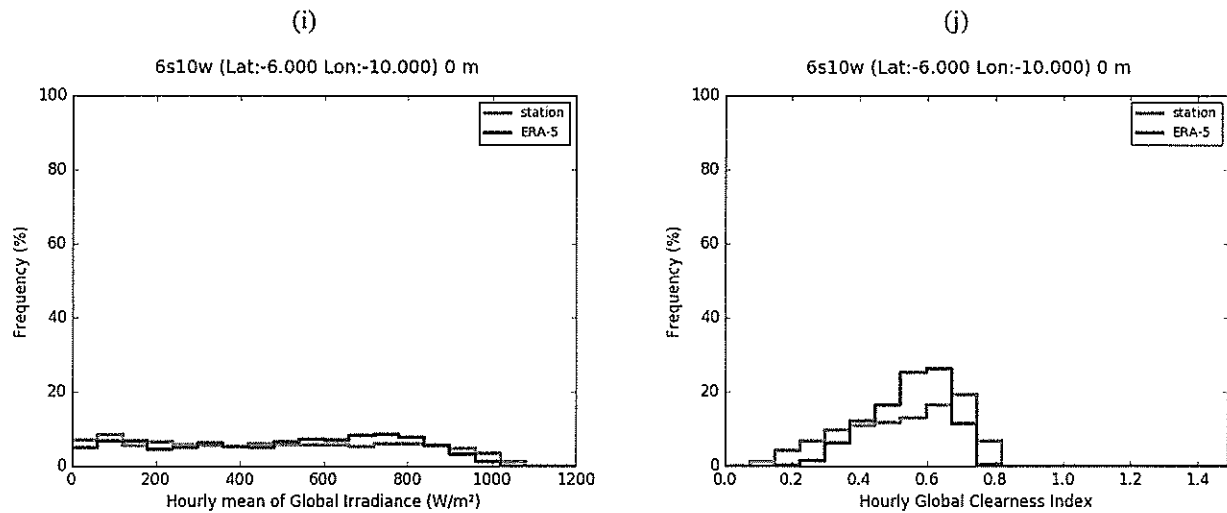
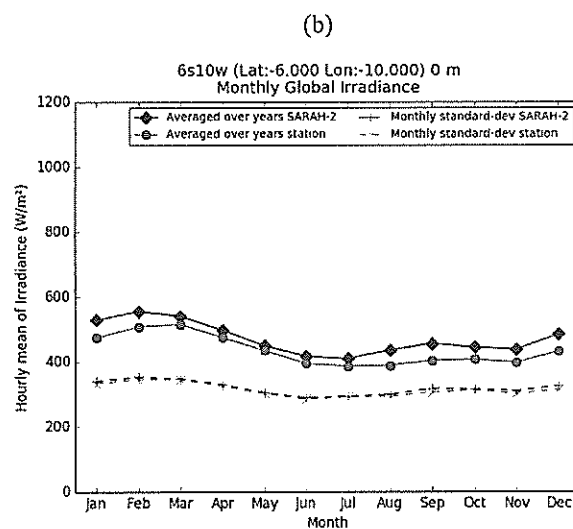
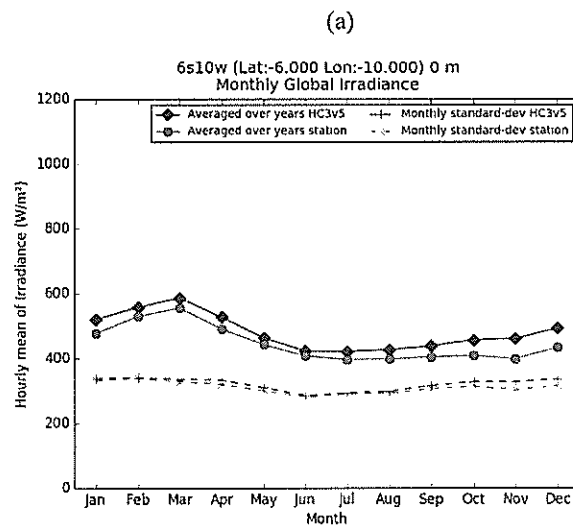
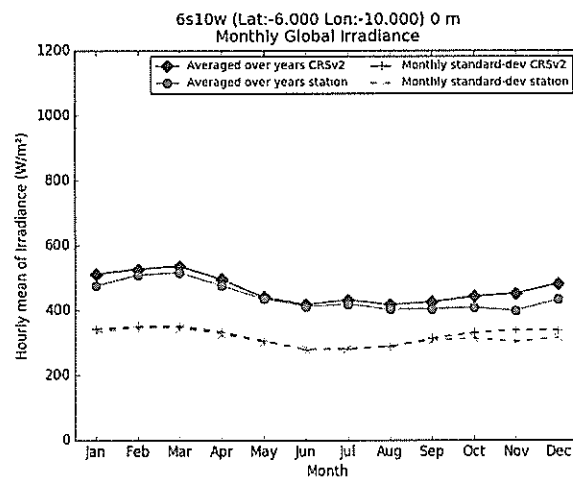


Figure 3: Frequency distributions of PIRATA measurements (red) and data sets (blue) for the station 6s10w for E (left) and KT (right). HC3v5: (a), (b); SARAH 2: (c), (d); CRS: (e), (f); MERRA-2: (g), (h); ERA-5: (i), (j). If the blue line is above, respectively below, the red one for a given sub-range of values, it means that the data set produces these values too frequently, respectively too rarely with respect to the PIRATA measurements.

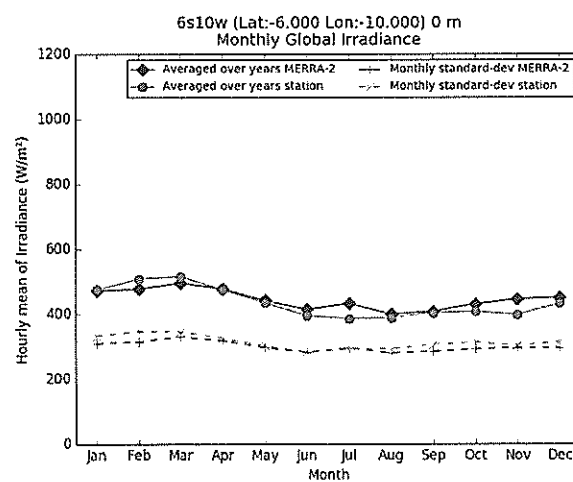




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(d)



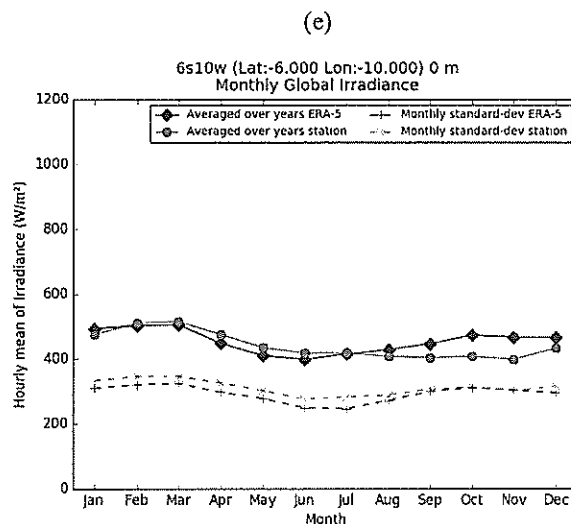
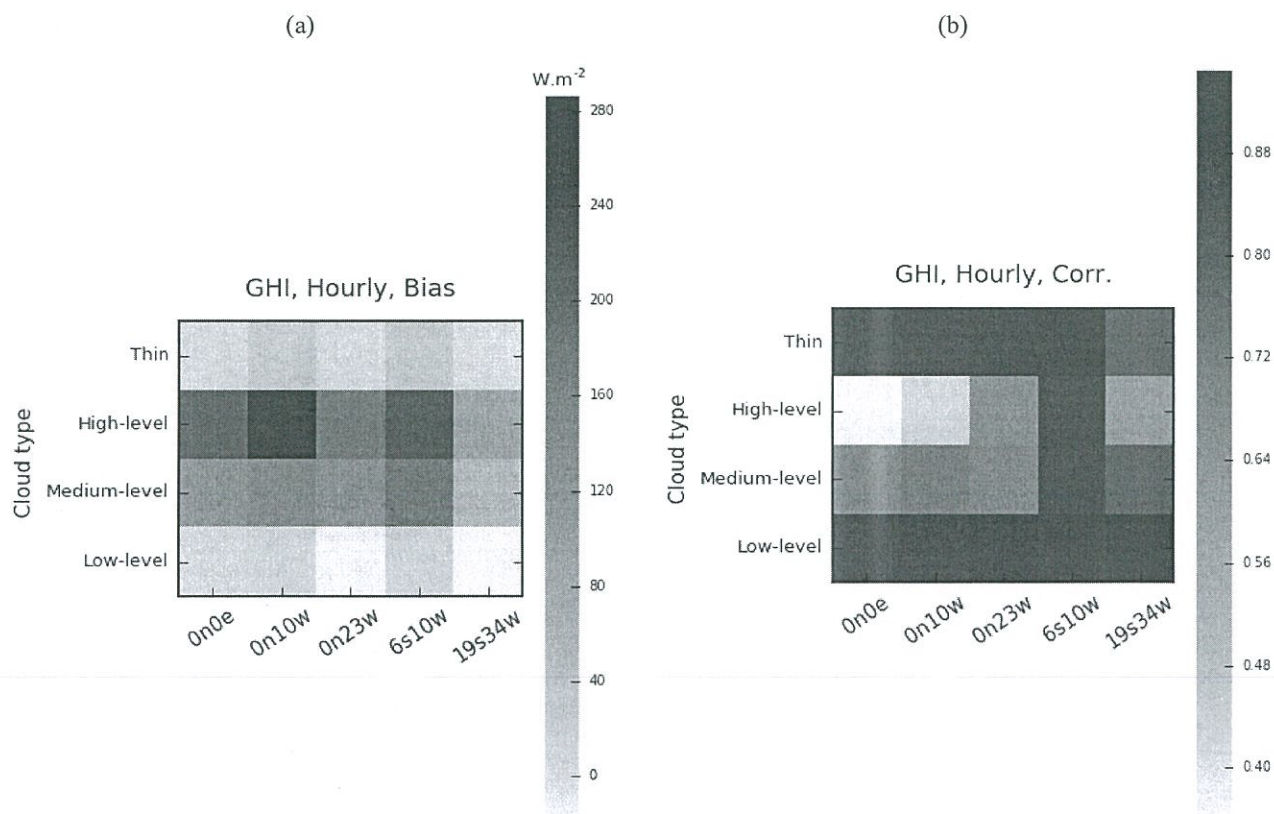


Figure 4: Monthly means (dots) and standard deviations (crosses) of hourly DSIS, in $W m^{-2}$, from PIRATA measurements (red) and data sets (blue) for the station 6s10w. HC3v5: (a); SARAH 2: (b); CRS: (c); MERRA-2: (d); ERA-5: (e). A difference between red dot (measurements) and blue diamond (data set) for a given month denotes a systematic error for this month: underestimation if the blue diamond is below the red dot, overestimation otherwise. For a given month, a blue cross above the red one means that the data set produces too much variability for this month; in the opposite case, the data set does not contain enough variability.

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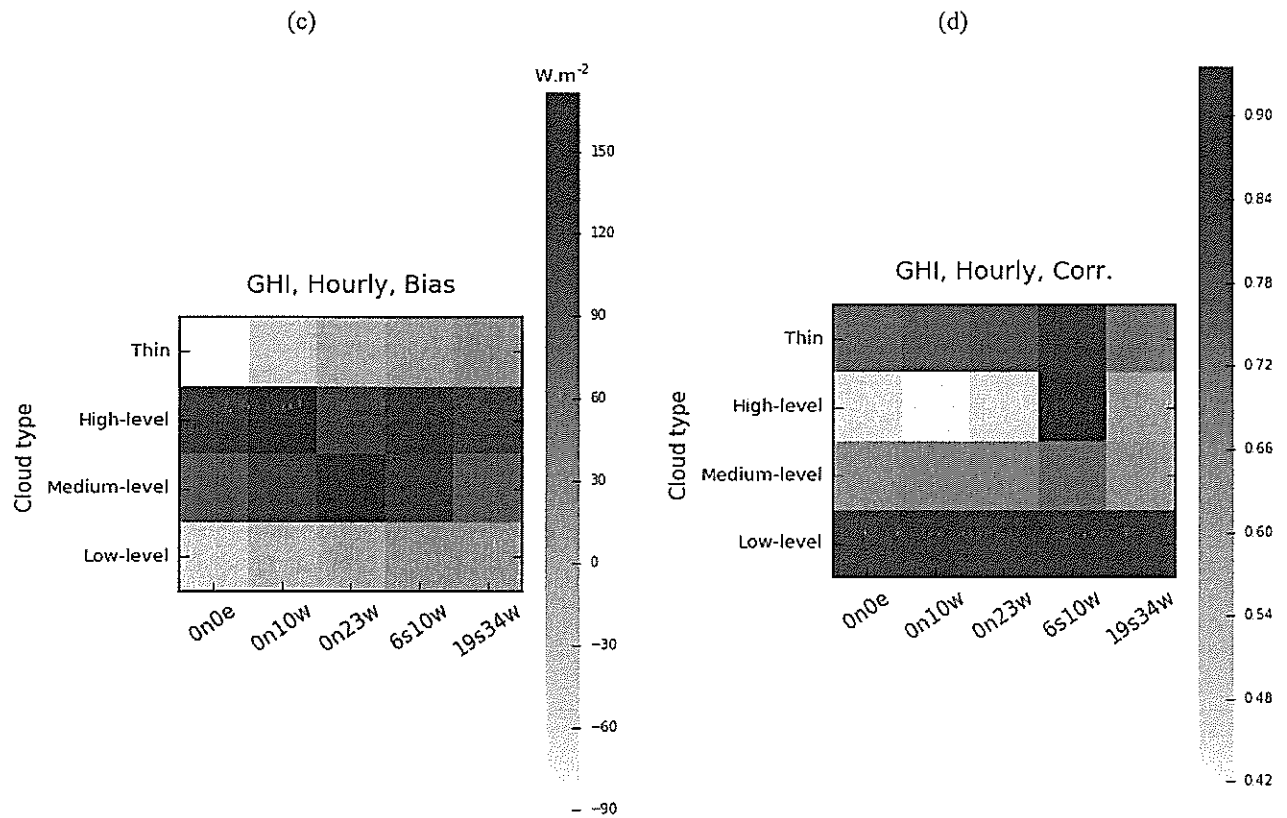


Figure 5: Bias (left, in $W.m^{-2}$) and correlation coefficient (right) as a function of the cloud type for each PIRATA station. ERA-5: (a), (b); MERRA-2: (c), (d). A plot should be uniformly colored in case of no dependency.