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Supplement of

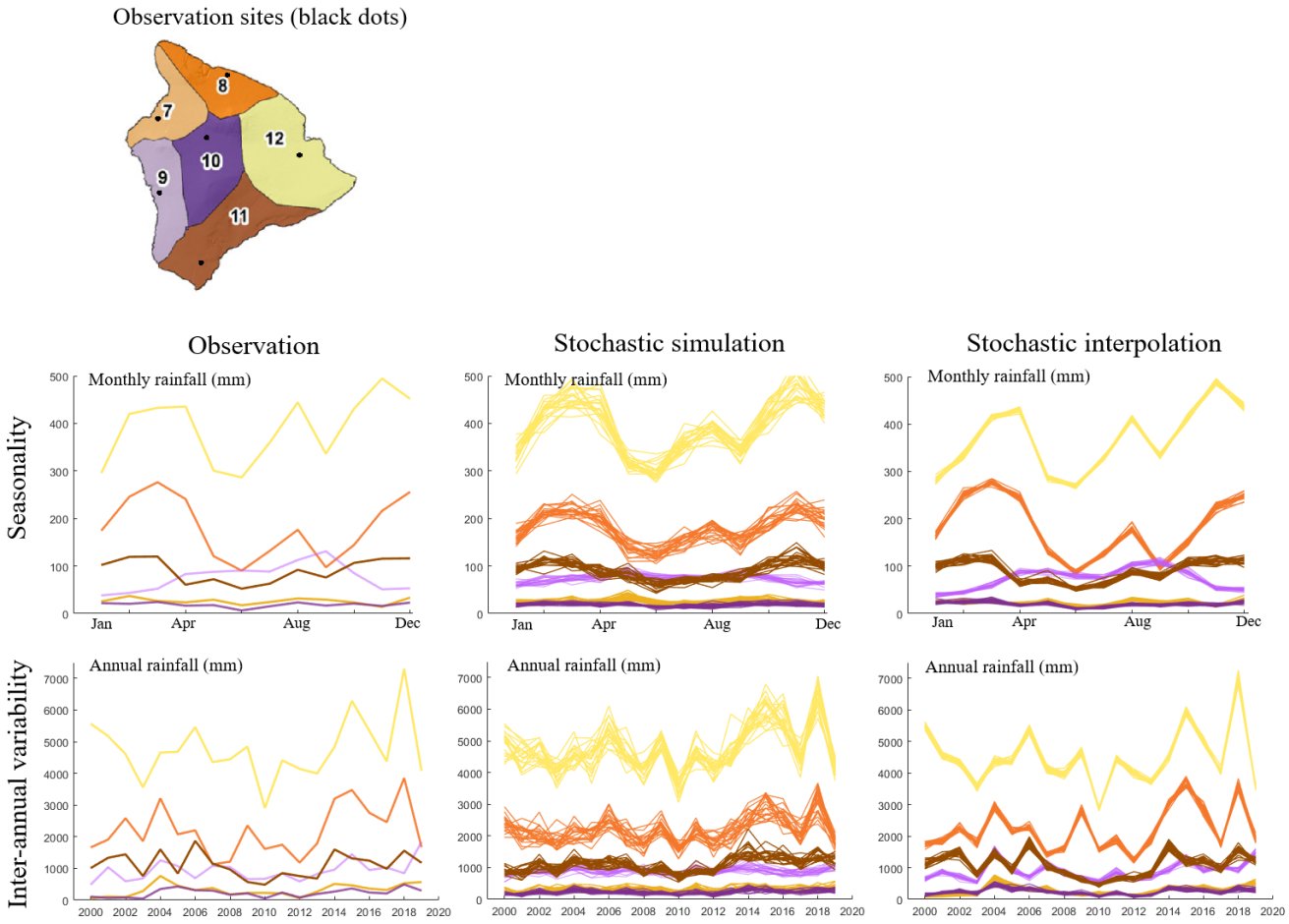
A non-stationary trans-Gaussian model for daily rainfall over complex topography

Lionel Benoit et al.

Correspondence to: Lionel Benoit (lionel.benoit@inrae.fr)

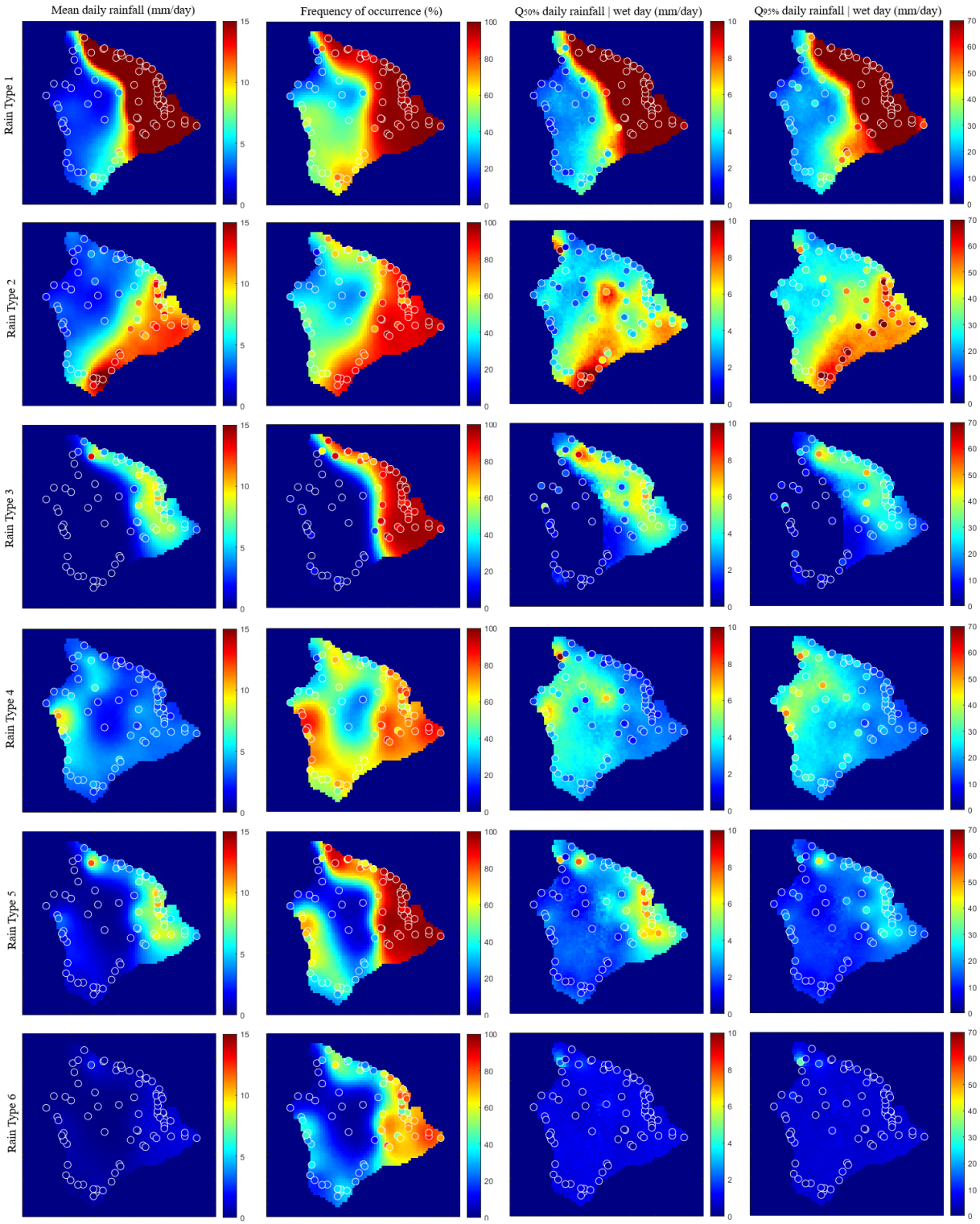
Section S1:

Seasonality and inter-annual variability of rainfall for 6 rain gauges spread in the different climate divisions of the Island of Hawai‘i (gauge locations are denoted by black dots in the upper left panel, and the time series are color-coded with the color of the climate divisions).
From left to right: observations, stochastic simulation (i.e., synthetic rainfall generation conditional to the observed rain-type time series), and stochastic interpolation (i.e., the result of a leave-one-gauge-out cross-validation where the stochastic interpolation is conditioned to: (1) the observed time-series of rain types, and (2) daily rainfall observations at all rain gauges except the one located at the target location).

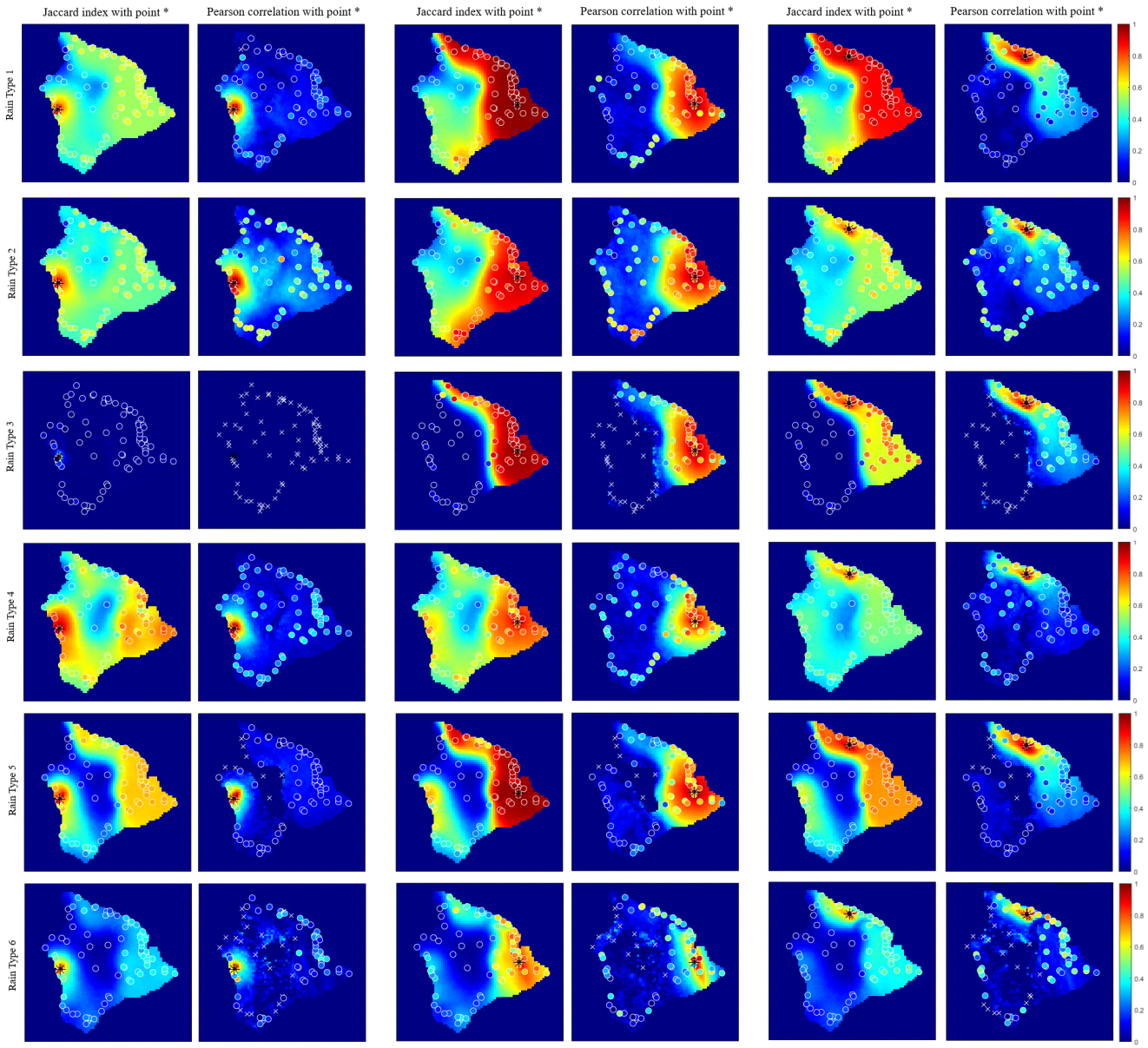


Section S2:

Statistical signature of rainfall for each rain type, derived from observations (dots) and stochastic simulations performed by the NSTG model (background color). The first column displays the mean daily rainfall, column 2 displays the frequency of rainfall occurrence, and columns 3 and 4 display the quantiles 50% and 95% of daily rainfall during wet days.

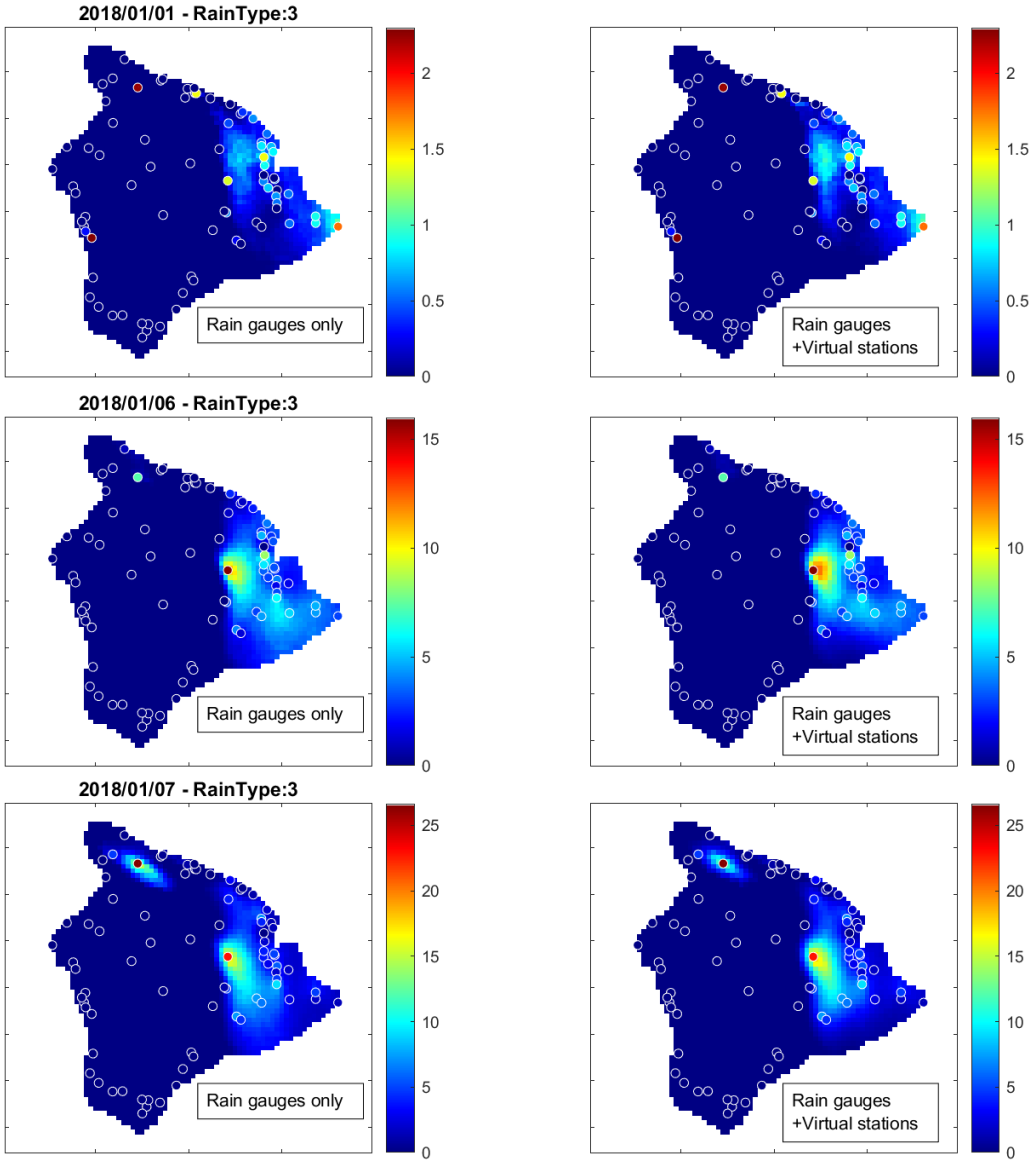


Statistical signature of rainfall for each rain type, derived from observations (dots) and stochastic simulations performed by the NSTG model (background color). Columns 1, 3 and 5 display the Jaccard Index of rainfall occurrence (JI-RO) with respect to three locations denoted by a star (*), and the columns 2, 4 and 6 display the Pearson Correlation Coefficient of rain intensity evaluated solely on wet days (PCC-RI) with respect to the same locations. White crosses denotes rain gauges with rainfall occurrence <10%, where the Pearson correlation is expected to be unreliable and is therefore not computed.

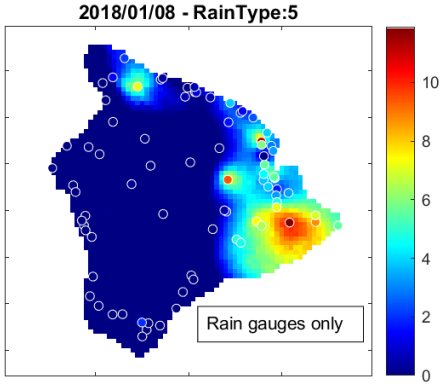


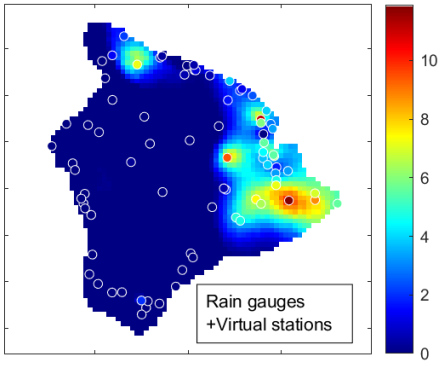
Section S3:

Daily rainfall maps for the month of January 2018 obtained by stochastic simulations conditioned to rain gauges only (column 1) and conditioned to rain gauges and 200 virtual stations (column 2). The colored dots denote rain gauge observations and the background color is the rainfall map. For each day the rain type is given in addition to the date. Note that the color scale changes from day to day to accommodate the temporal variation of daily rainfall intensity, and that January 2, 3, 4 and 5 are not displayed here because they were dry throughout the island.

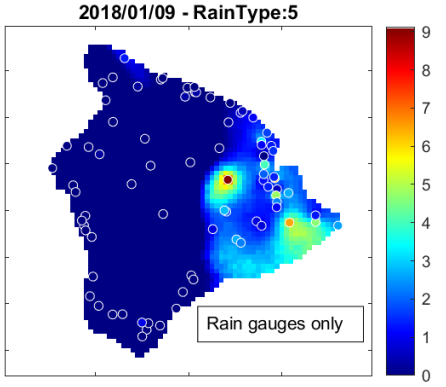


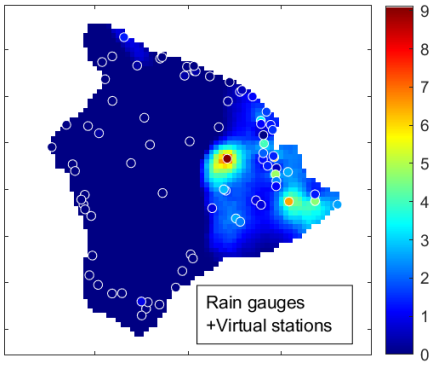
2018/01/08 - RainType:5



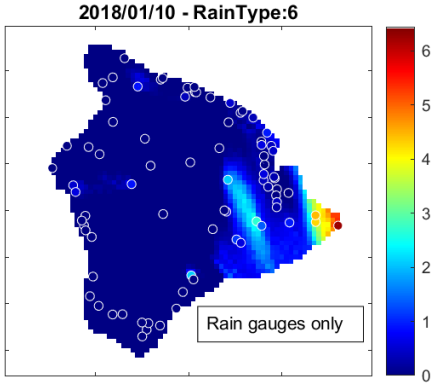


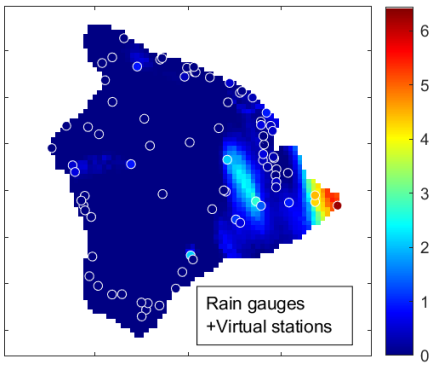
2018/01/09 - RainType:5



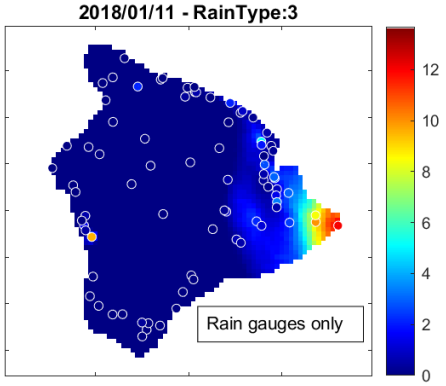


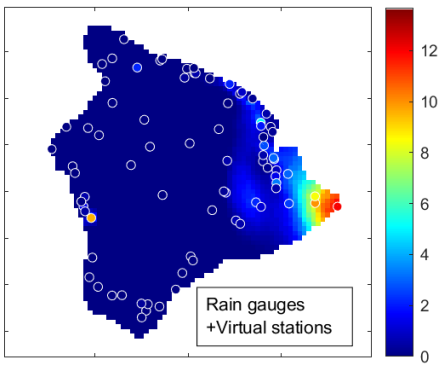
2018/01/10 - RainType:6

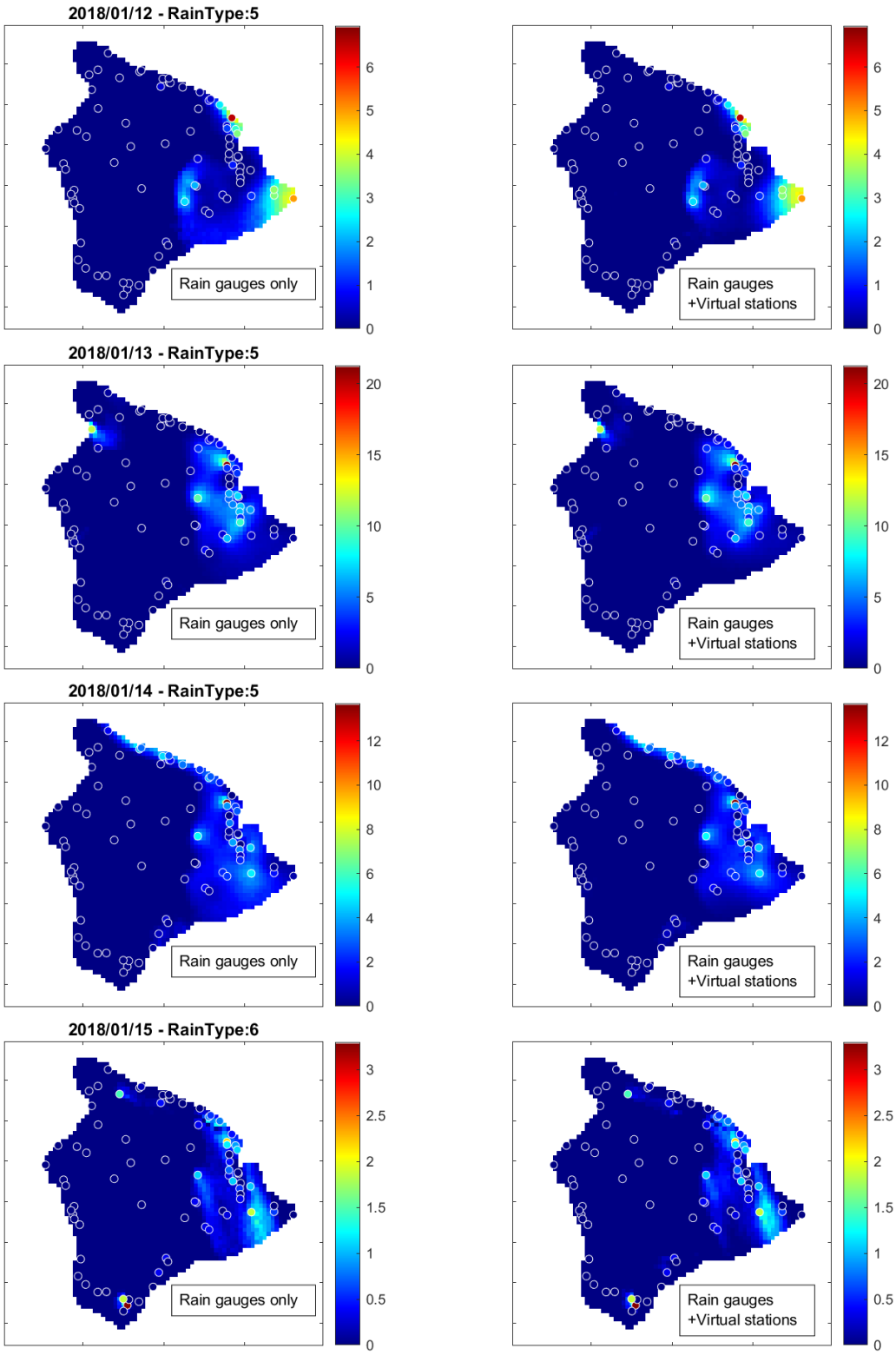




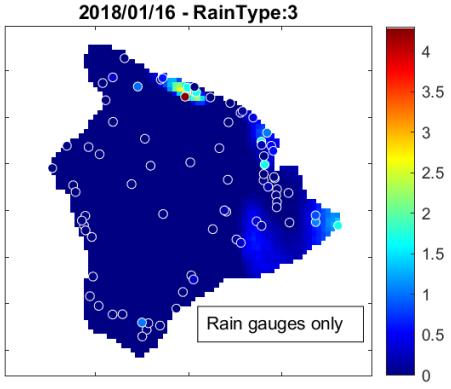
2018/01/11 - RainType:3

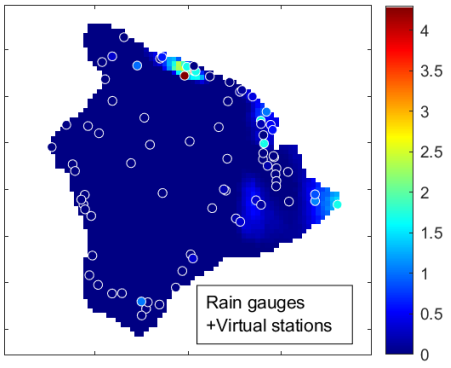




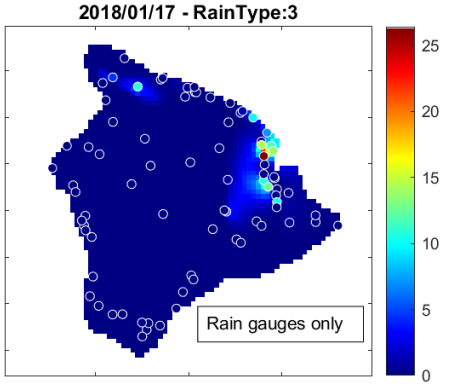

2018/01/12 - RainType:5
Rain gauges only
Rain gauges
+Virtual stations
2018/01/13 - RainType:5
Rain gauges only
Rain gauges
+Virtual stations
2018/01/14 - RainType:5
Rain gauges only
Rain gauges
+Virtual stations
2018/01/15 - RainType:6
Rain gauges only
Rain gauges
+Virtual stations

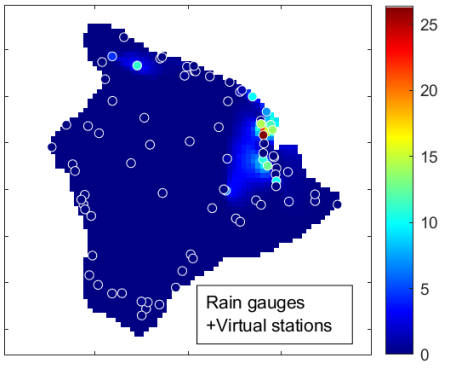
2018/01/16 - RainType:3



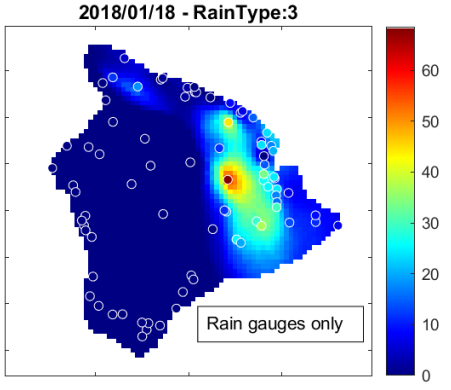


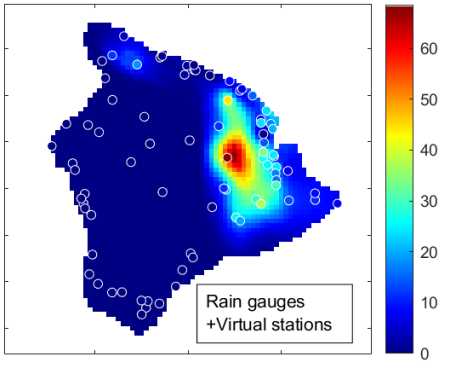
2018/01/17 - RainType:3



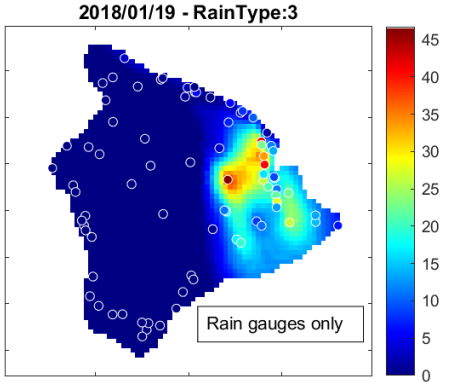


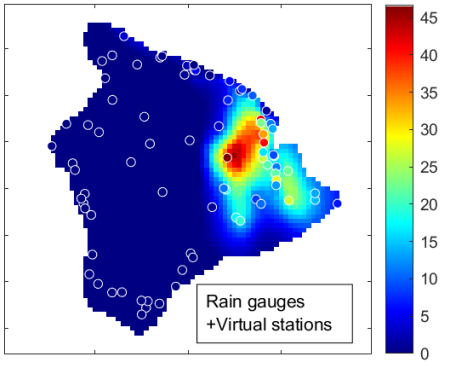
2018/01/18 - RainType:3



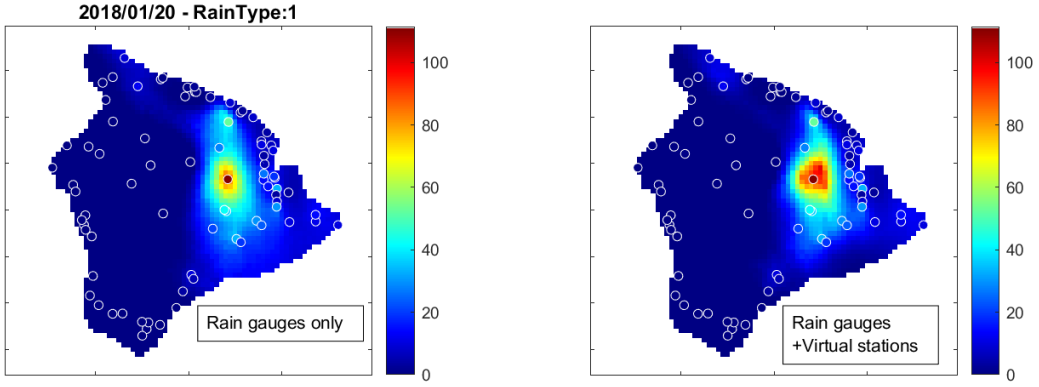


2018/01/19 - RainType:3

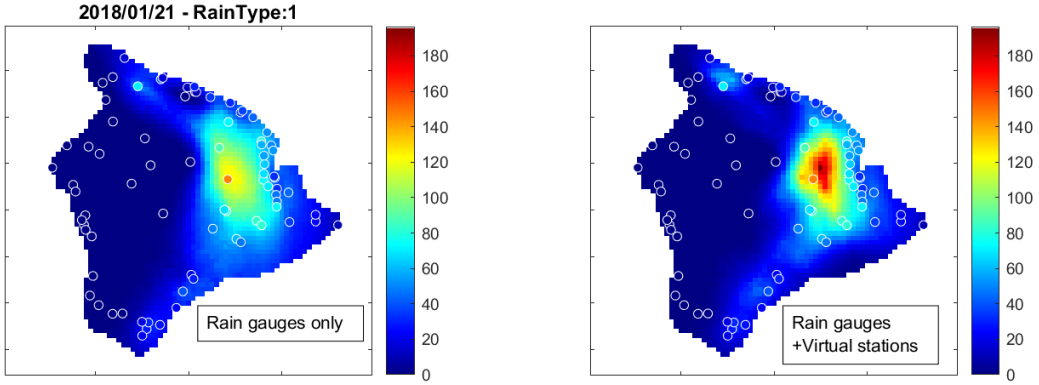




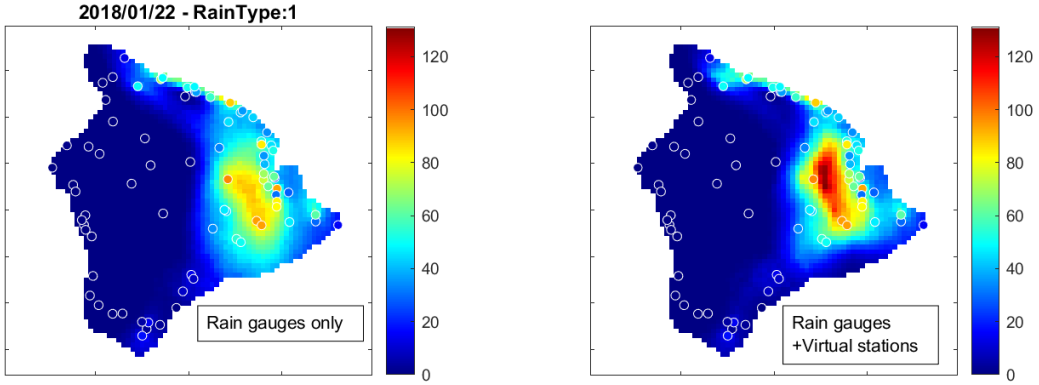
2018/01/20 - RainType:1



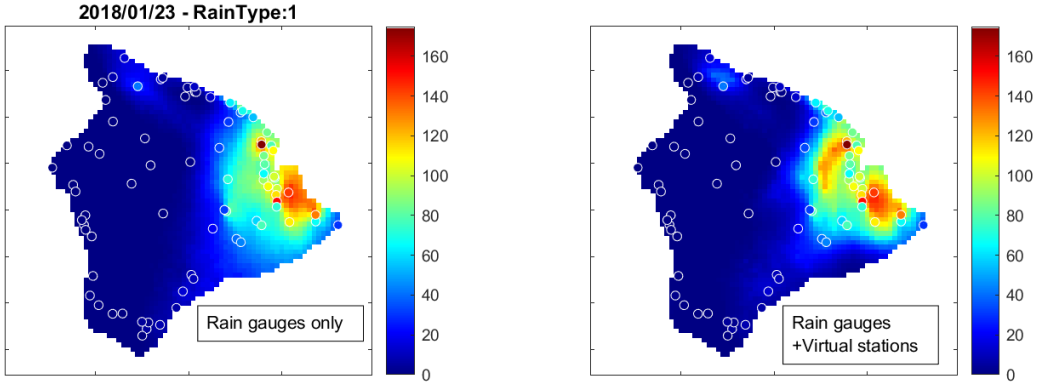
2018/01/21 - RainType:1



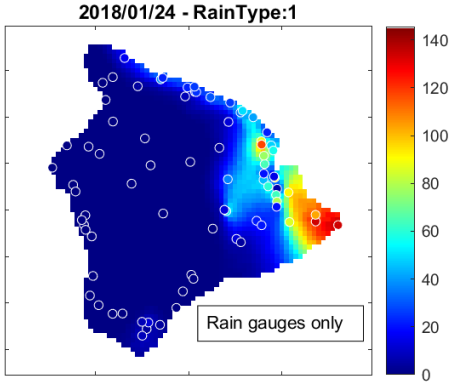
2018/01/22 - RainType:1

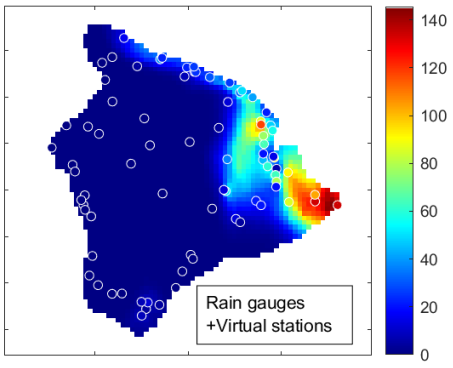


2018/01/23 - RainType:1

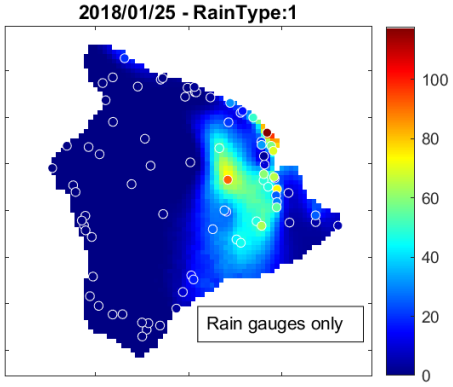


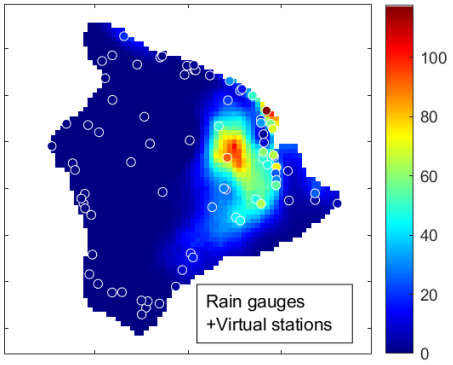
2018/01/24 - RainType:1



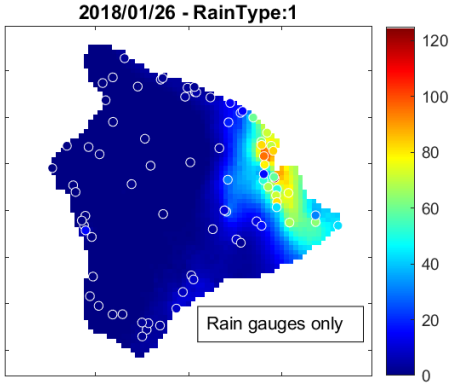


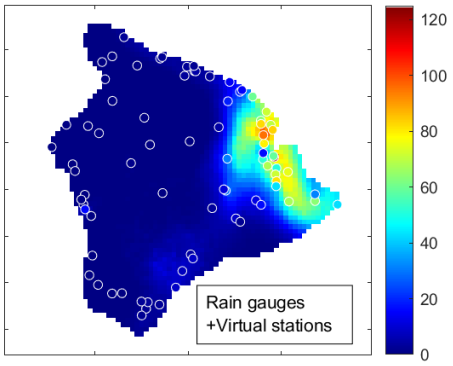
2018/01/25 - RainType:1



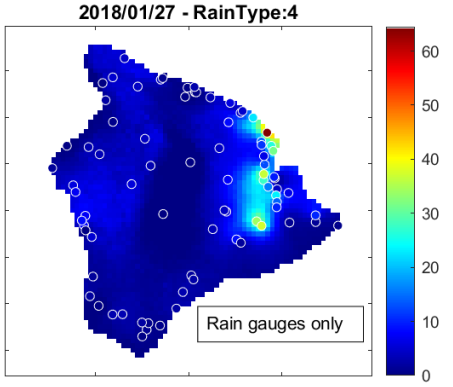


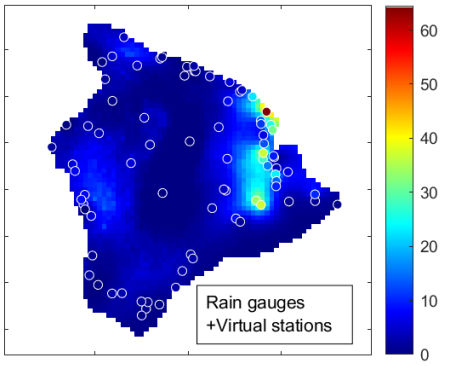
2018/01/26 - RainType:1



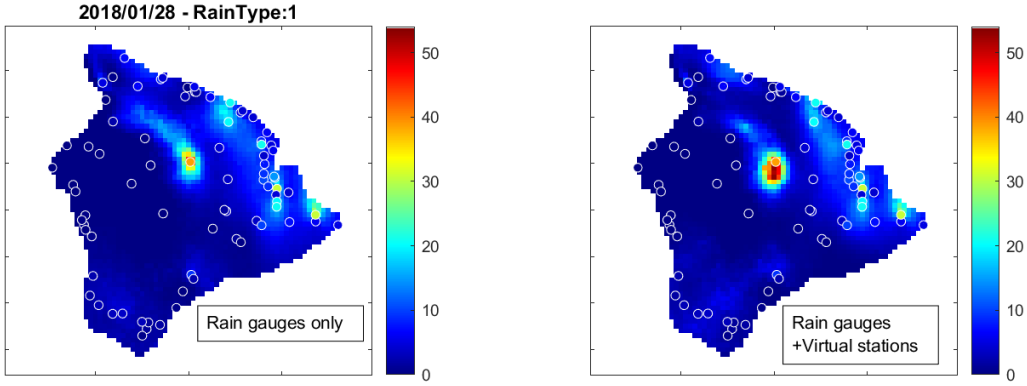


2018/01/27 - RainType:4

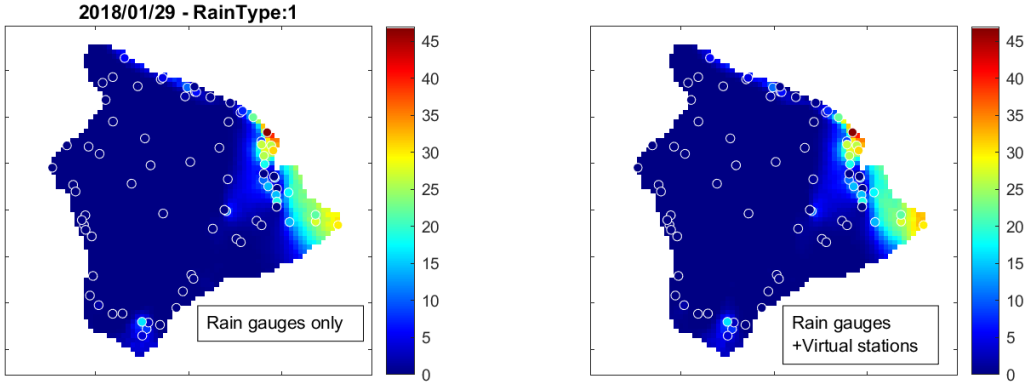




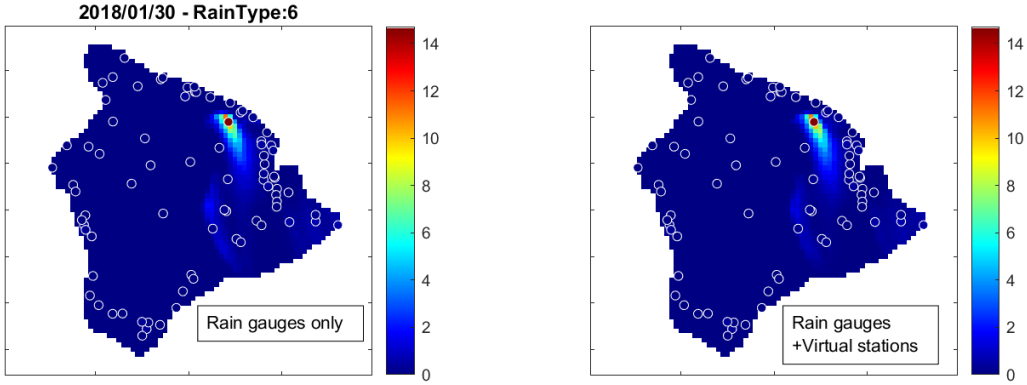
2018/01/28 - RainType:1



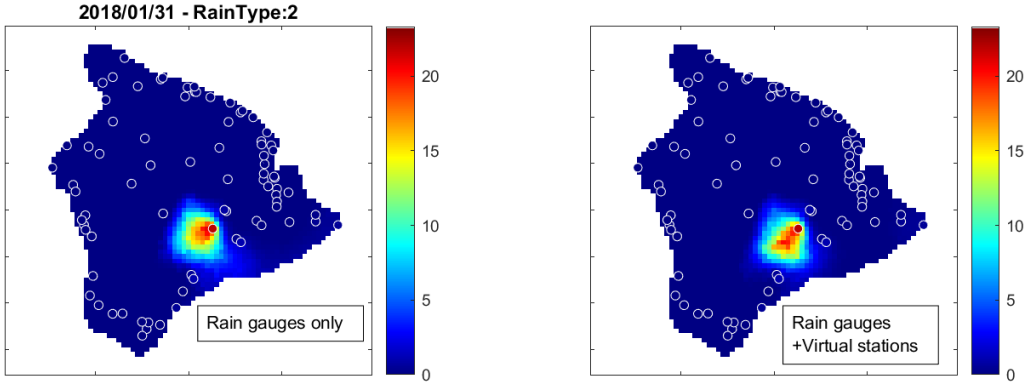
2018/01/29 - RainType:1



2018/01/30 - RainType:6

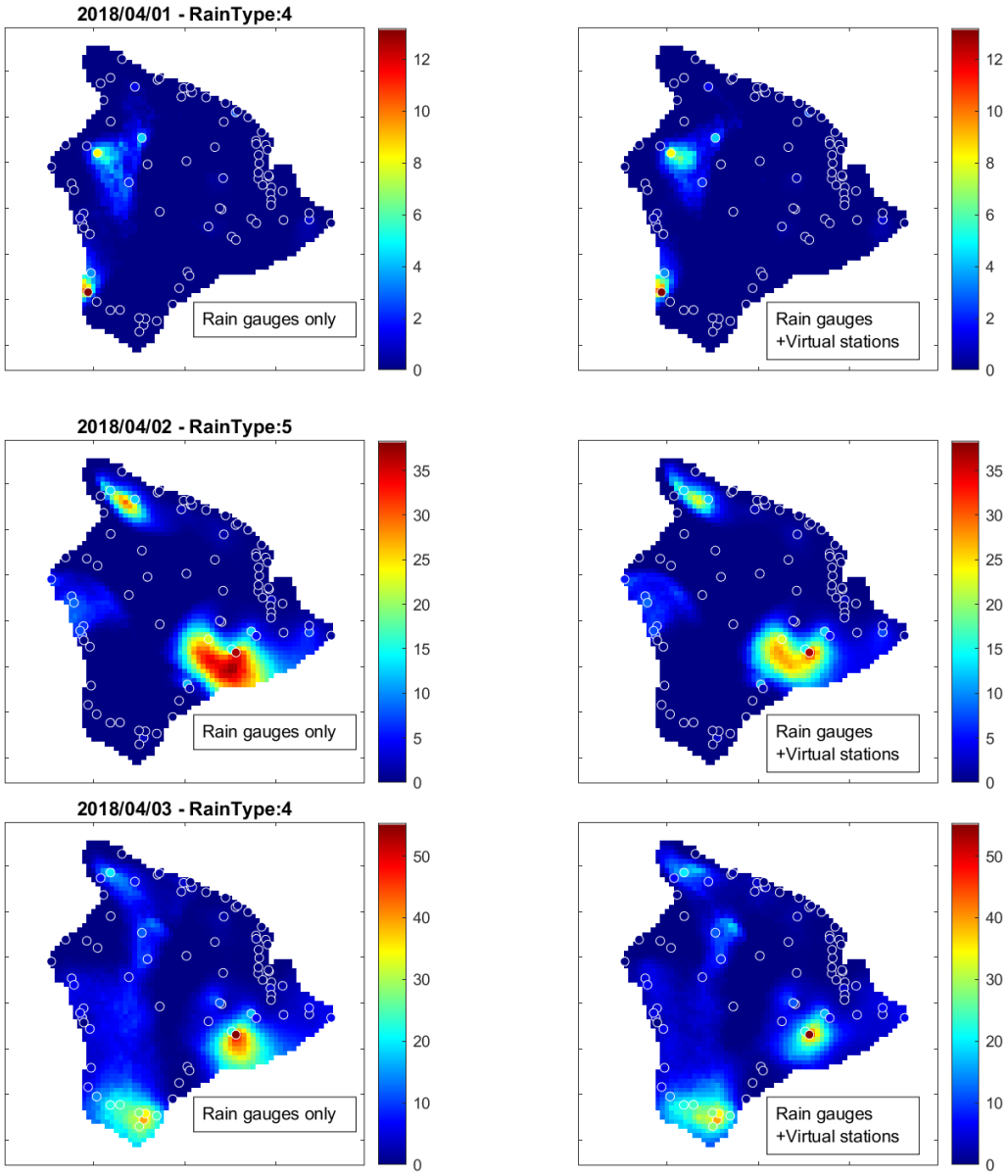


2018/01/31 - RainType:2

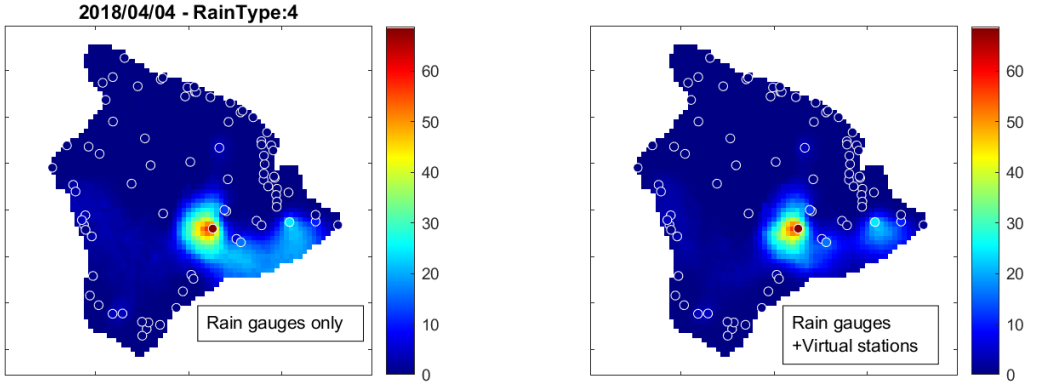


Section S4:

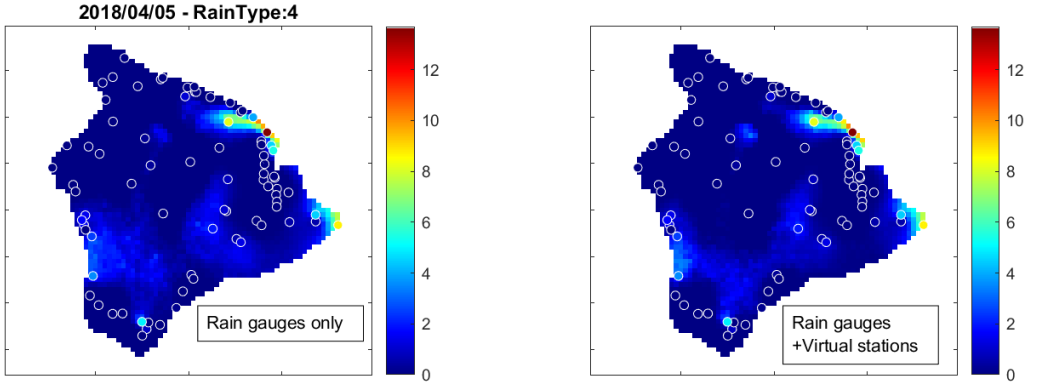
Daily rainfall maps for the month of April 2018 obtained by stochastic simulations conditioned to rain gauges only (column 1) and conditioned to rain gauges and 200 virtual stations (column 2). The colored dots denote rain gauge observations and the background color is the rainfall map. For each day the rain type is given in addition to the date. Note that the color scale changes from day to day to accommodate the temporal variation of daily rainfall intensity.



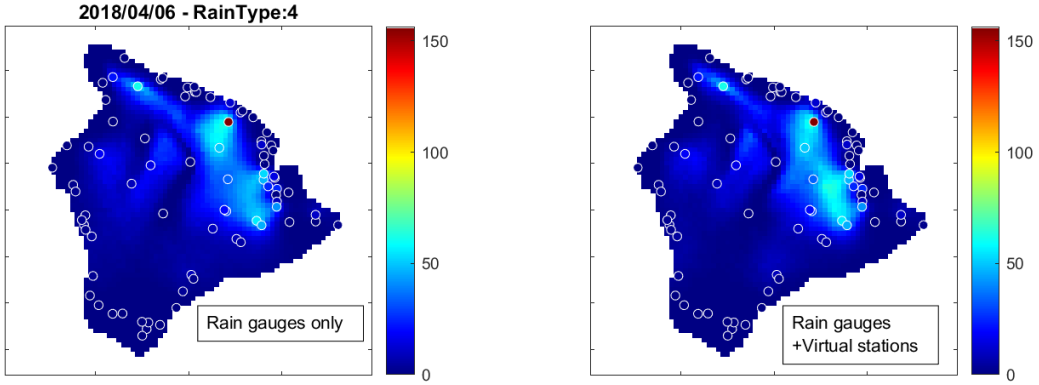
2018/04/04 - RainType:4



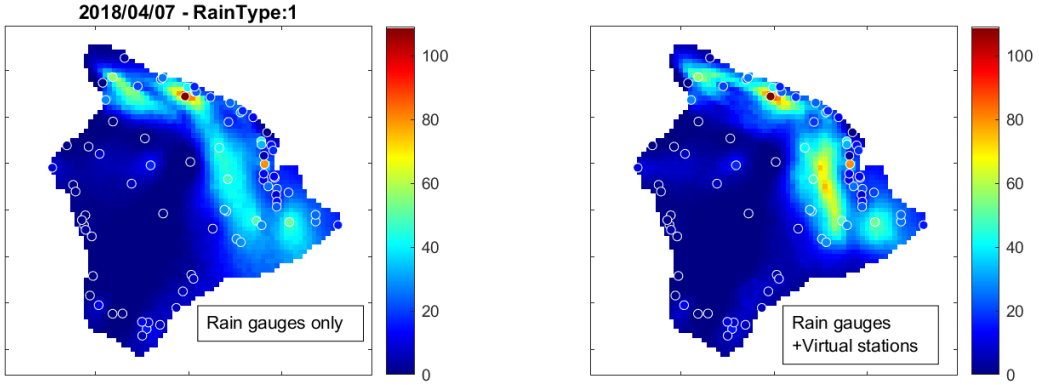
2018/04/05 - RainType:4



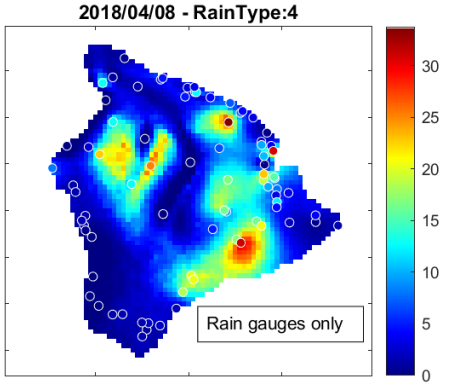
2018/04/06 - RainType:4

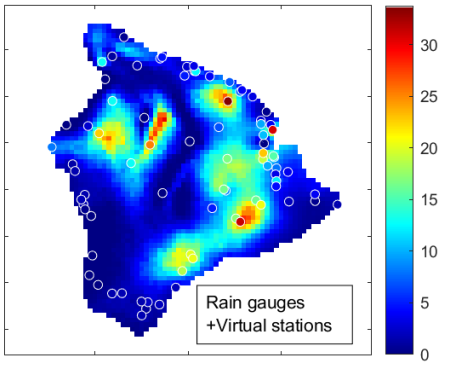


2018/04/07 - RainType:1

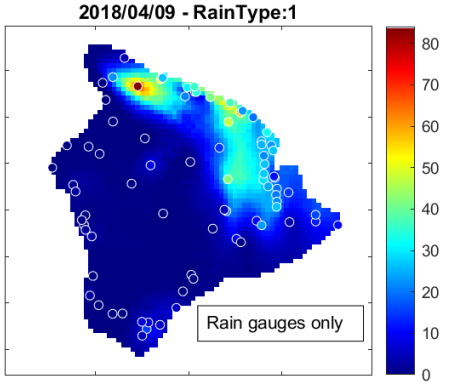


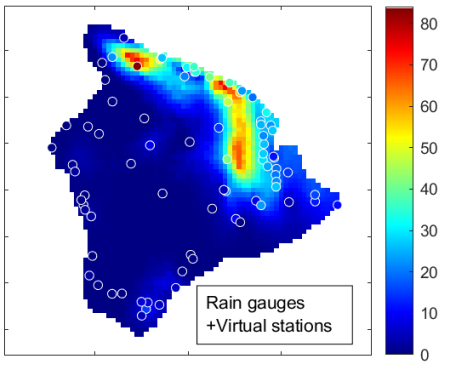
2018/04/08 - RainType:4



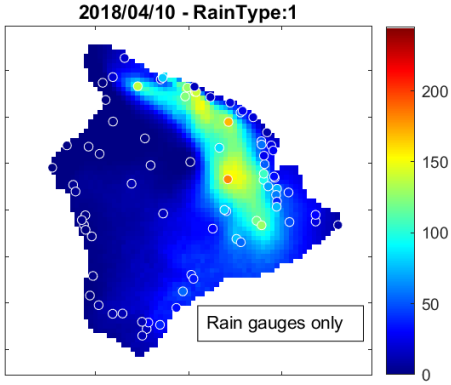


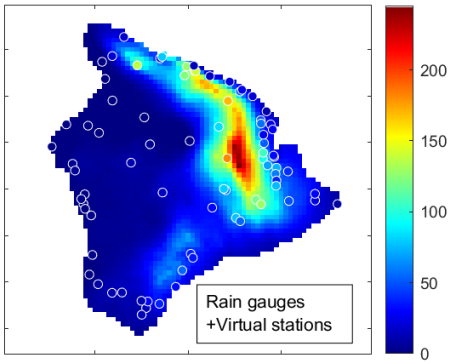
2018/04/09 - RainType:1





2018/04/10 - RainType:1





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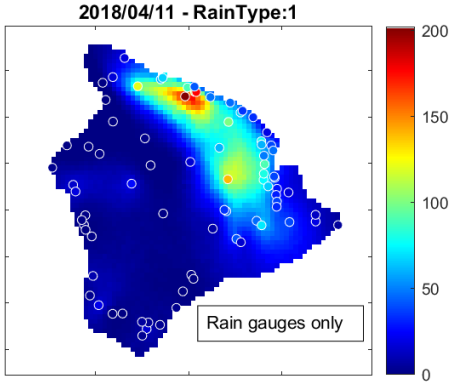
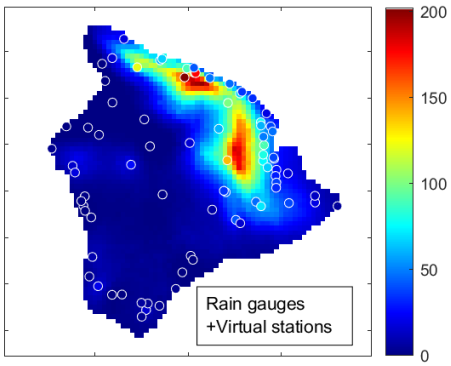
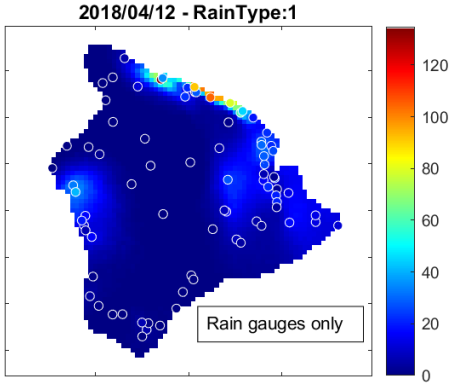
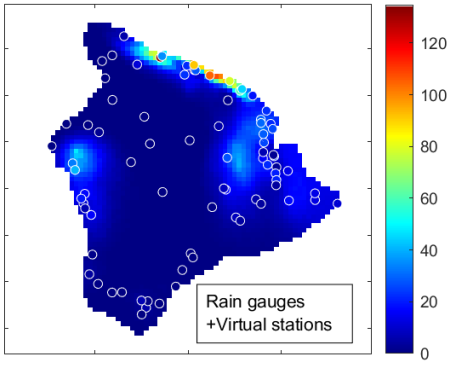




2018/04/12 - RainType:1





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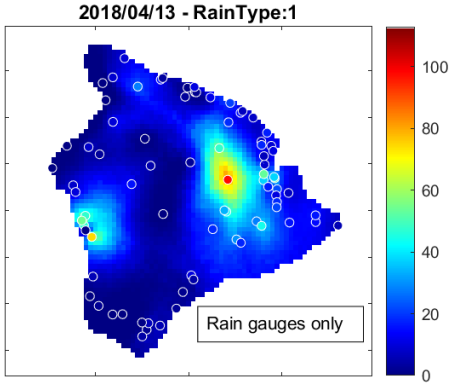
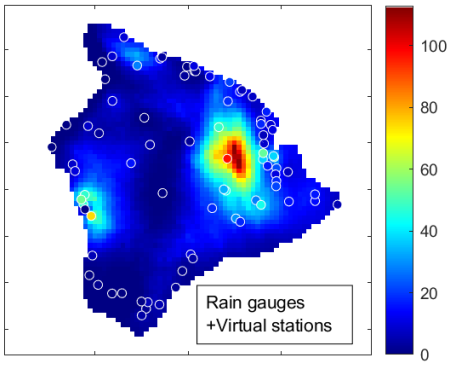
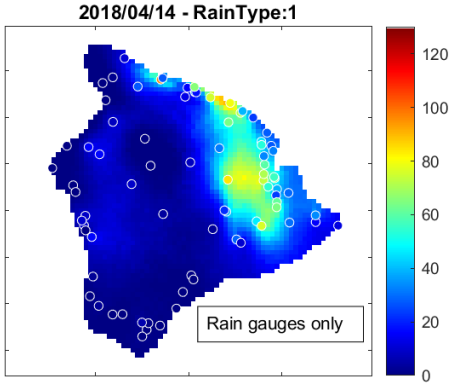
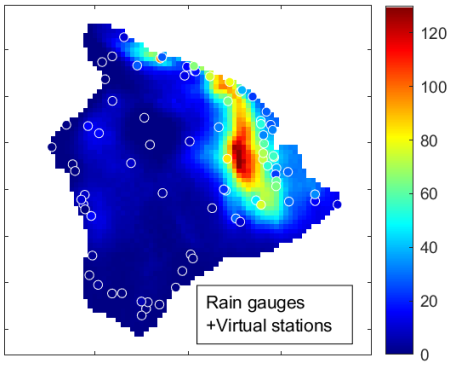


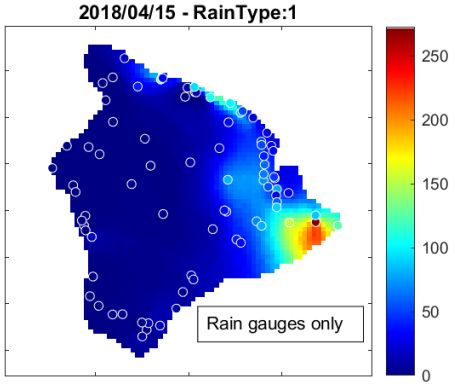


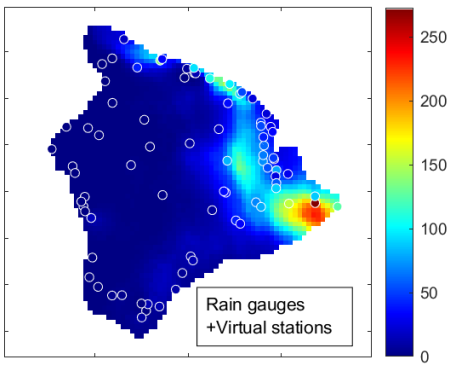
2018/04/14 - RainType:1



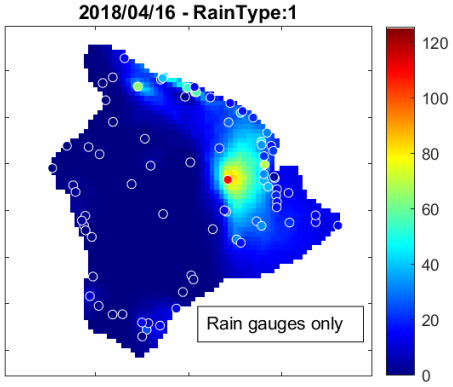


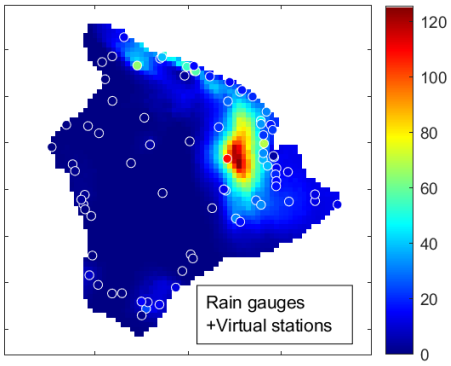
2018/04/15 - RainType:1



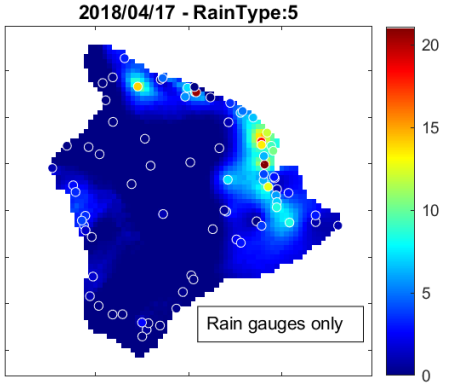


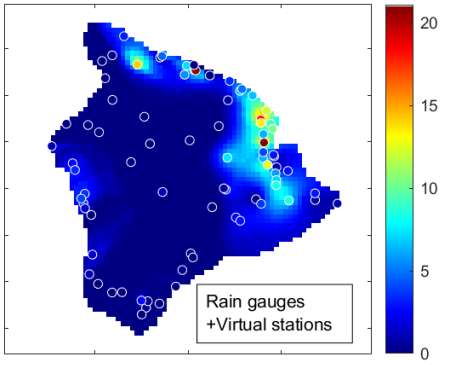
2018/04/16 - RainType:1



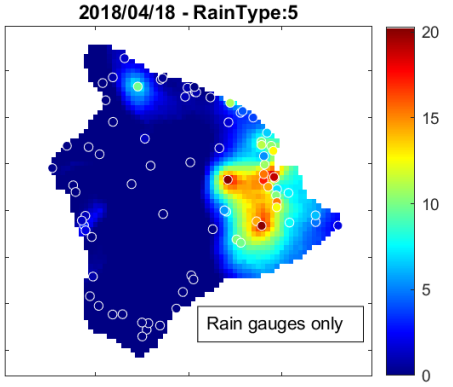


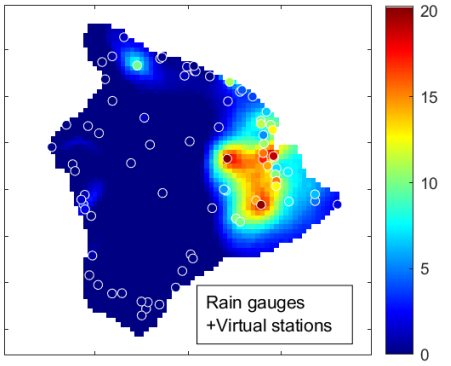
2018/04/17 - RainType:5



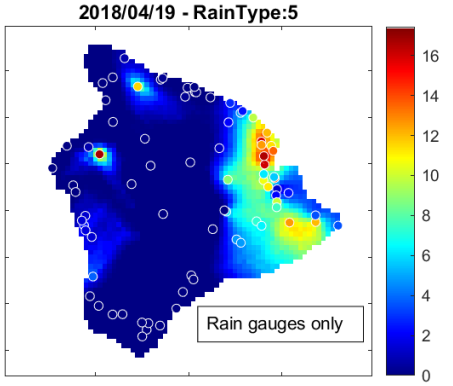


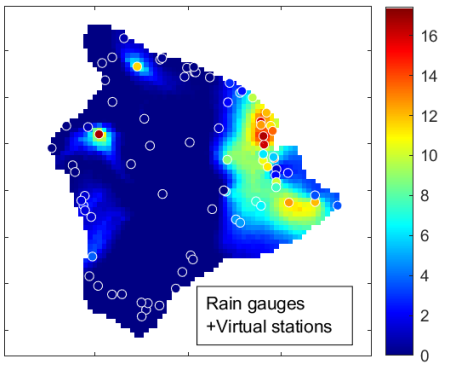
2018/04/18 - RainType:5



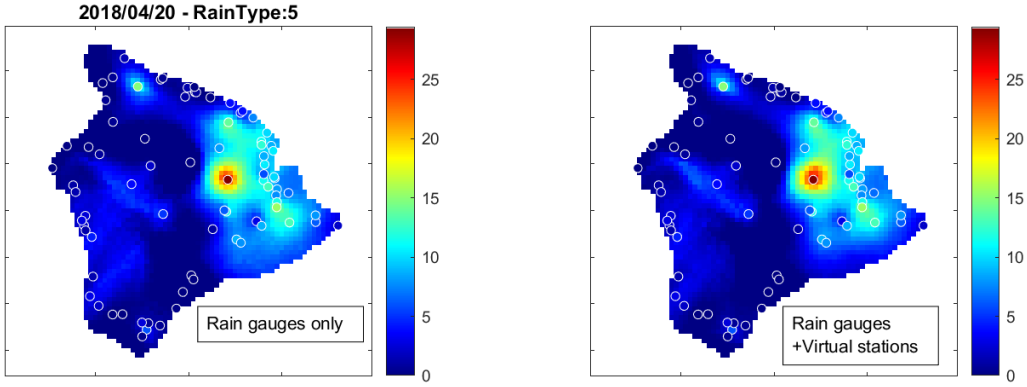


2018/04/19 - RainType:5

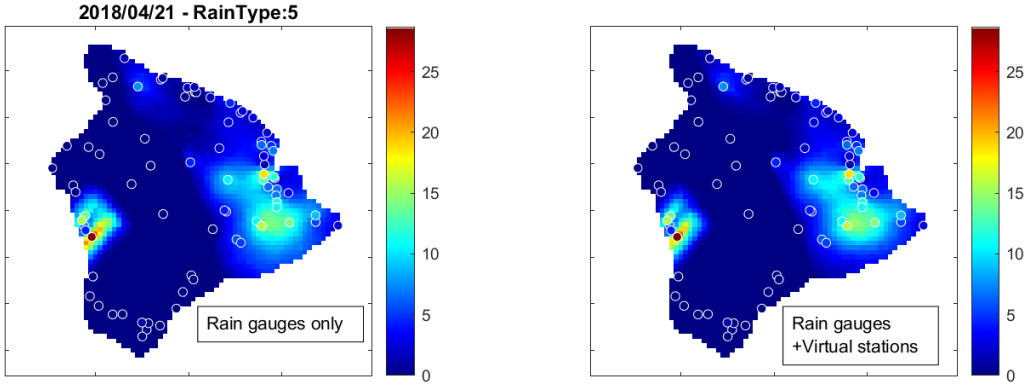




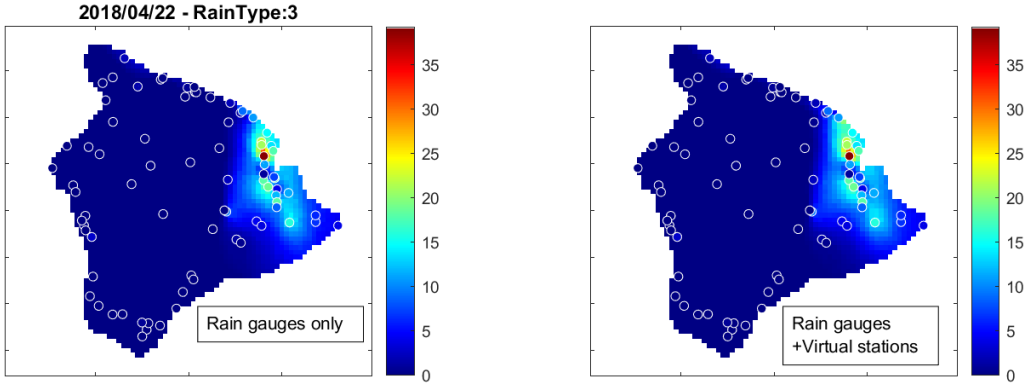
2018/04/20 - RainType:5



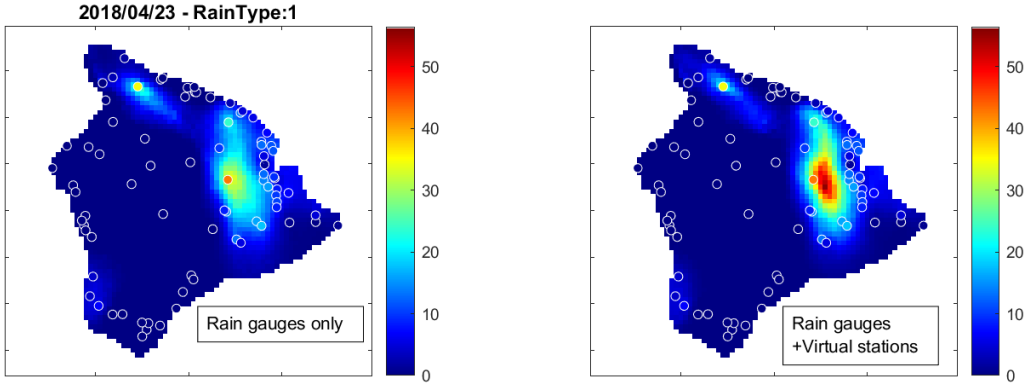
2018/04/21 - RainType:5



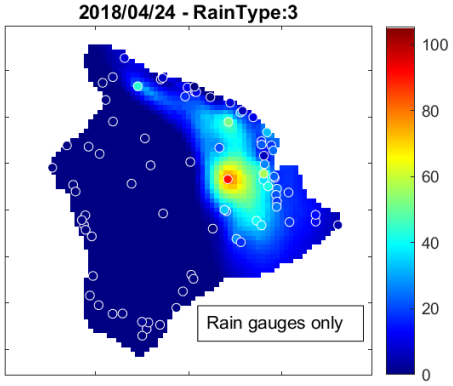
2018/04/22 - RainType:3

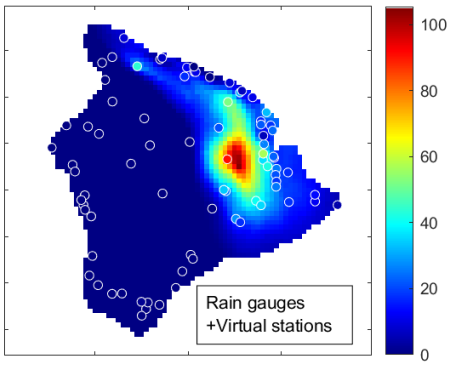


2018/04/23 - RainType:1

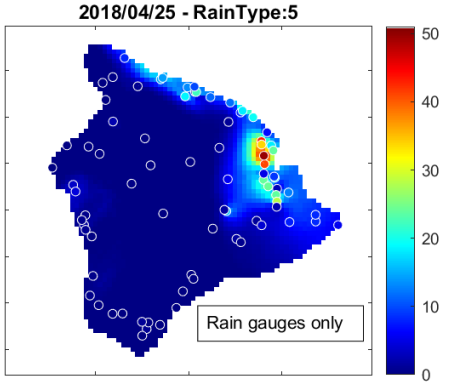


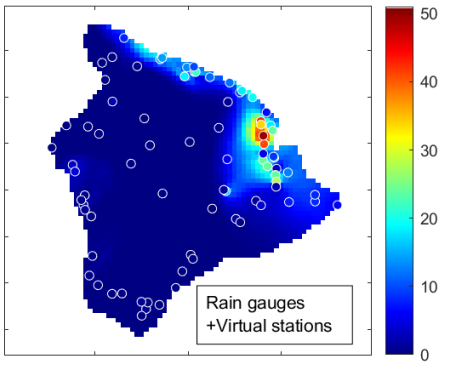
2018/04/24 - RainType:3



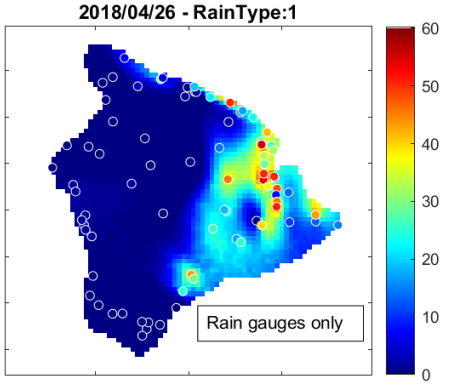


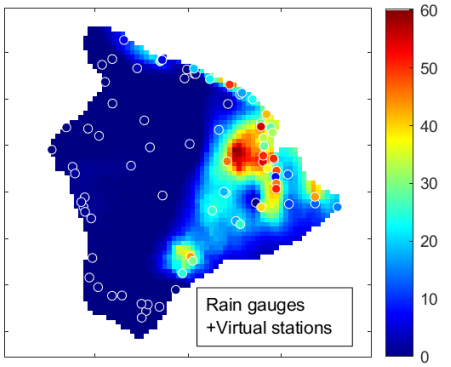
2018/04/25 - RainType:5



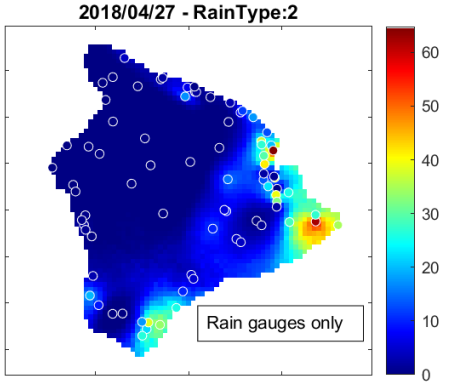


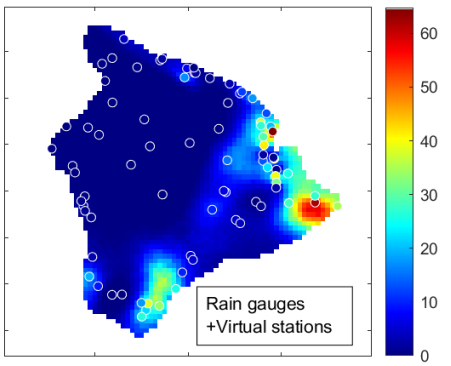
2018/04/26 - RainType:1

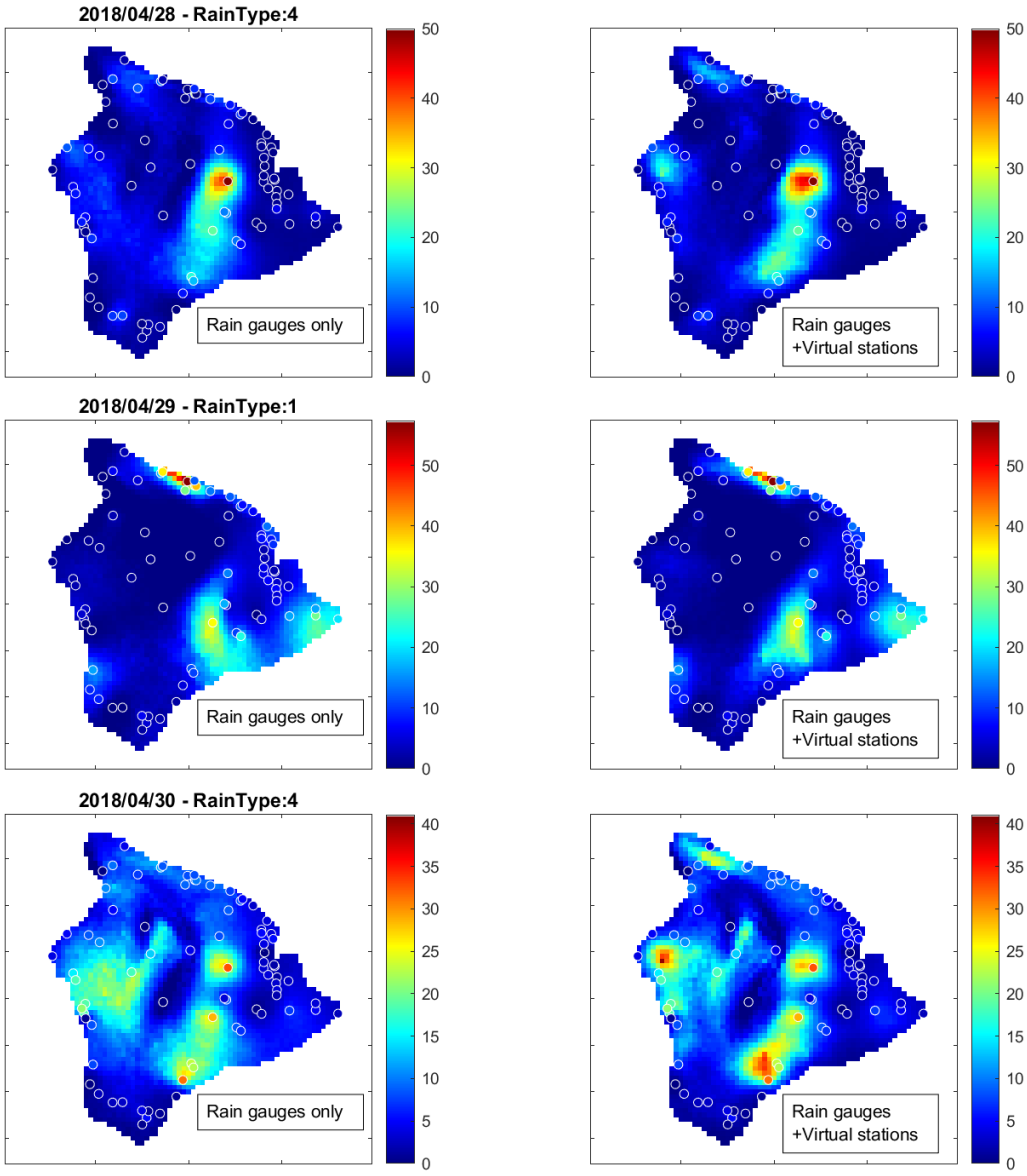




2018/04/27 - RainType:2

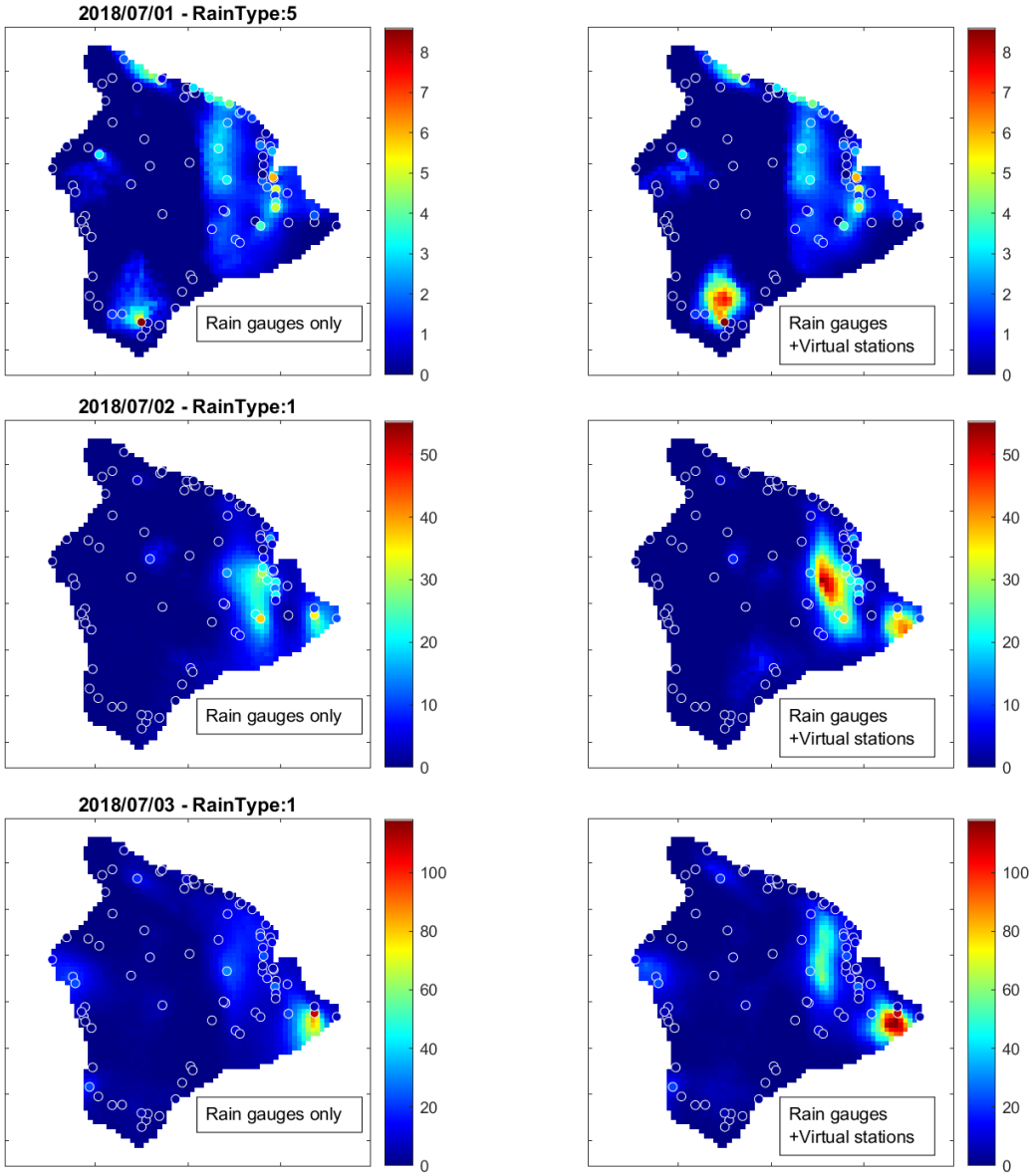




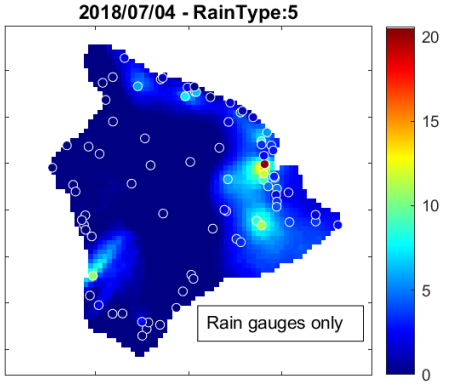

2018/04/28 - RainType:4
Rain gauges only
Rain gauges
+Virtual stations
2018/04/29 - RainType:1
Rain gauges only
Rain gauges
+Virtual stations
2018/04/30 - RainType:4
Rain gauges only
Rain gauges
+Virtual stations

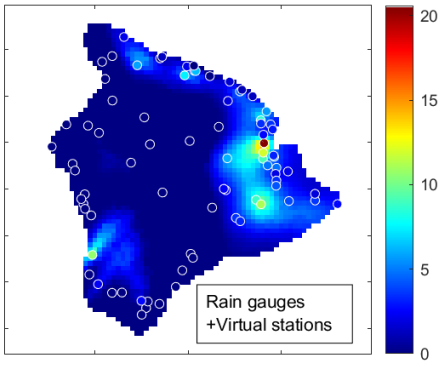
Section S5:

Daily rainfall maps for the month of July 2018 obtained by stochastic simulations conditioned to rain gauges only (column 1) and conditioned to rain gauges and 200 virtual stations (column 2). The colored dots denote rain gauge observations and the background color is the rainfall map. For each day the rain type is given in addition to the date. Note that the color scale changes from day to day to accommodate the temporal variation of daily rainfall intensity.

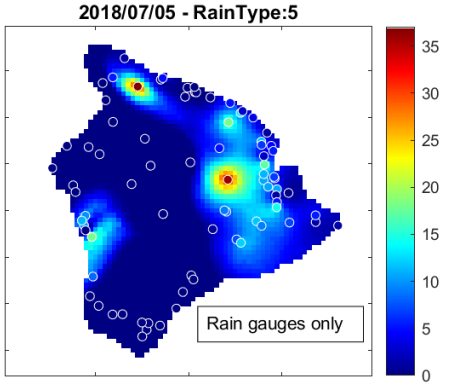


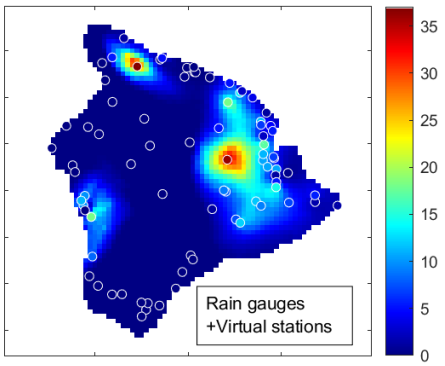
2018/07/04 - RainType:5



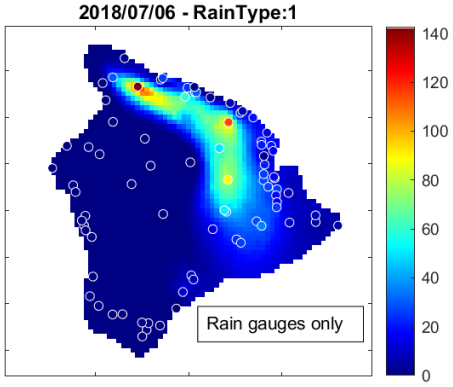


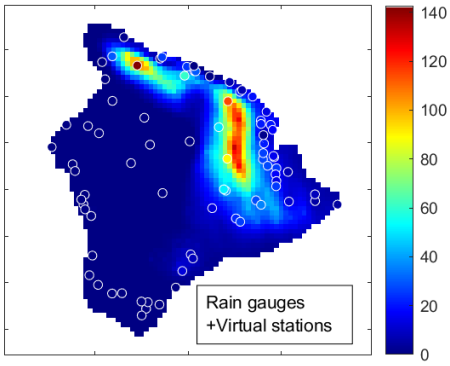
2018/07/05 - RainType:5



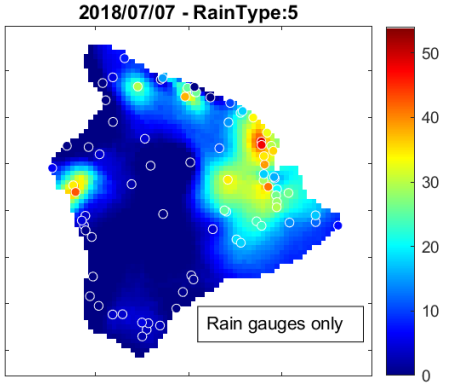


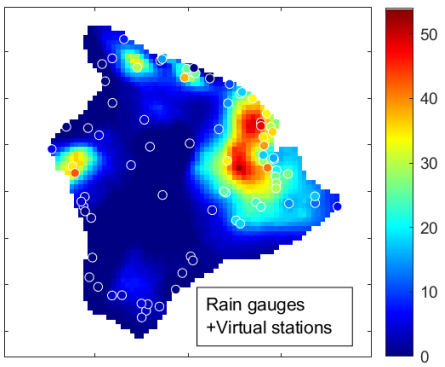
2018/07/06 - RainType:1



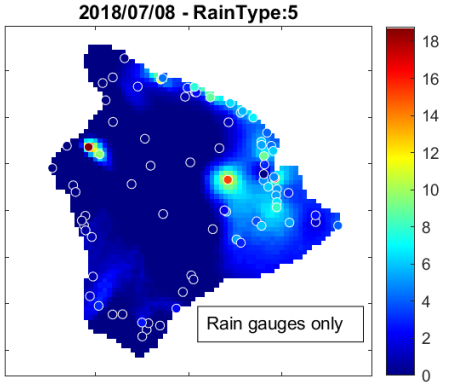


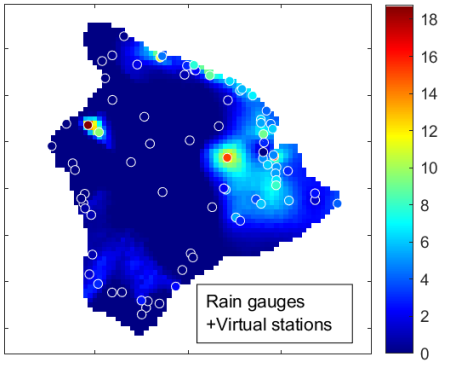
2018/07/07 - RainType:5



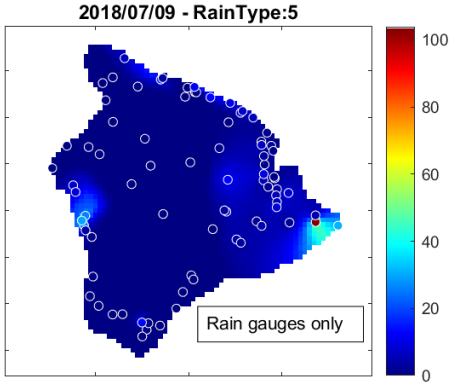


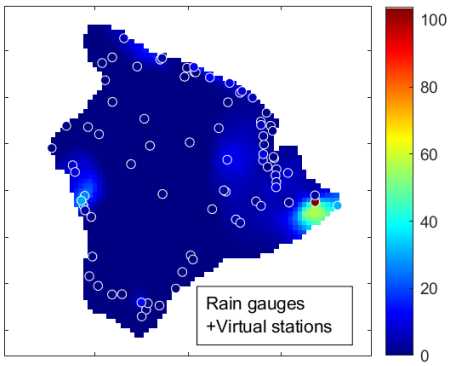
2018/07/08 - RainType:5



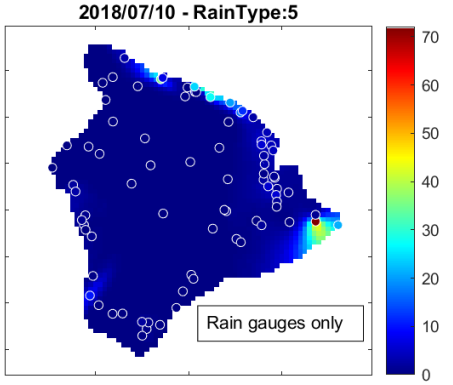


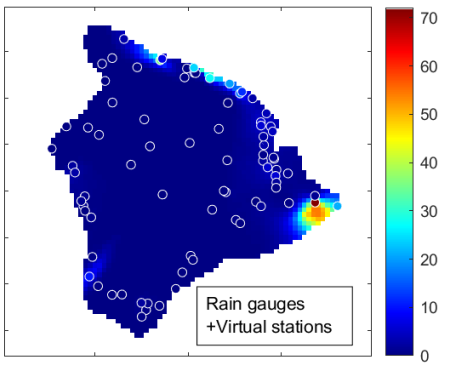
2018/07/09 - RainType:5



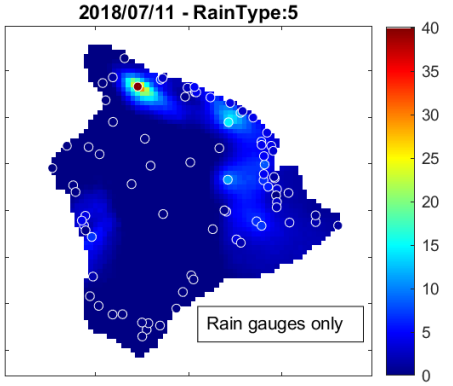


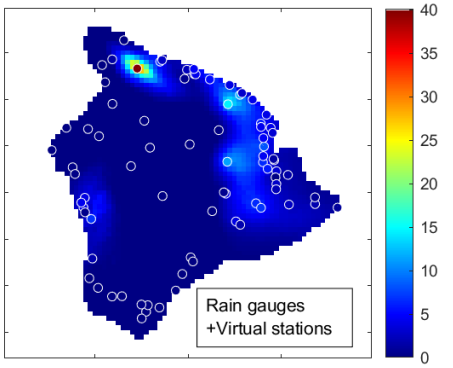
2018/07/10 - RainType:5



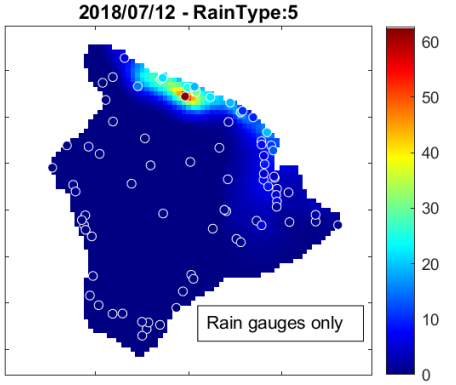


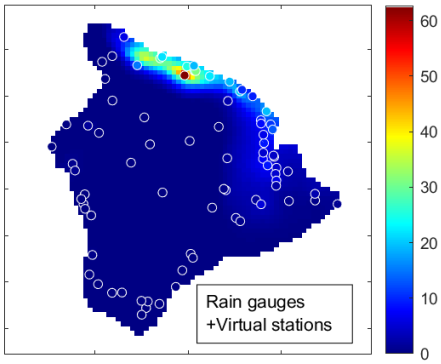
2018/07/11 - RainType:5



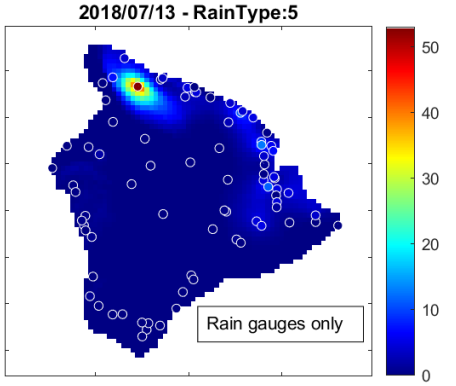


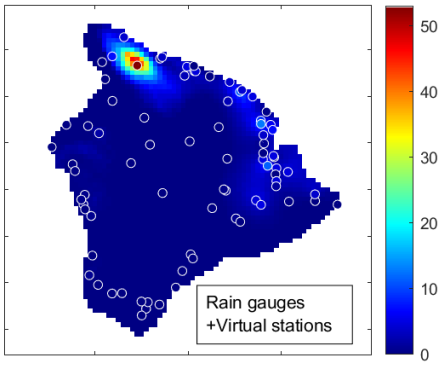
2018/07/12 - RainType:5



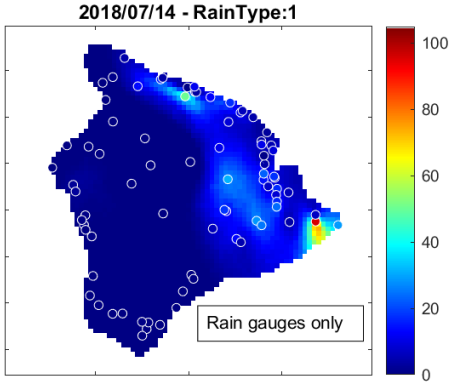


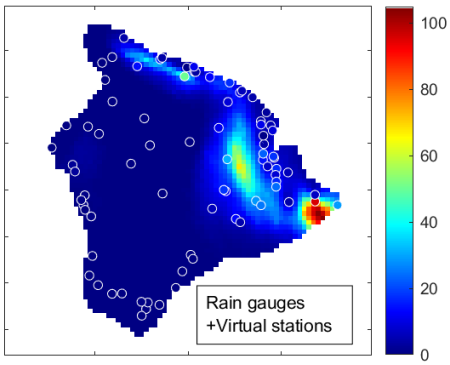
2018/07/13 - RainType:5



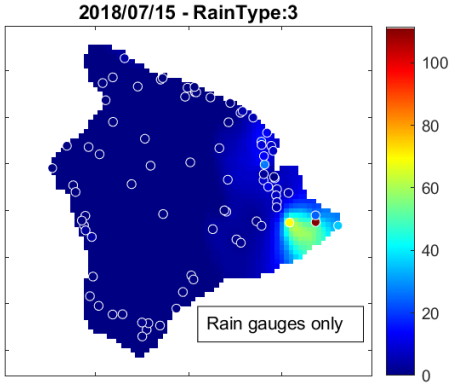


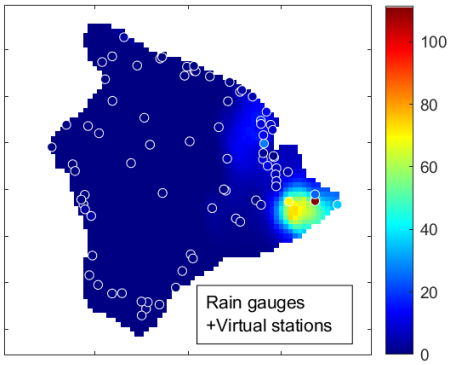
2018/07/14 - RainType:1



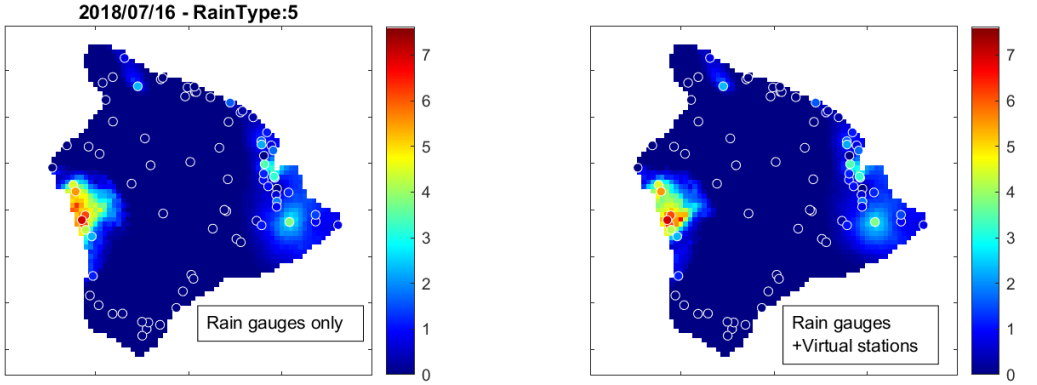


2018/07/15 - RainType:3

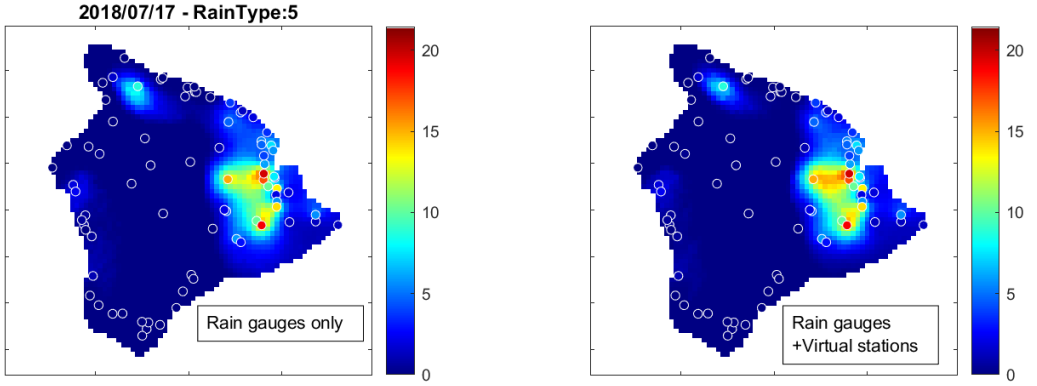




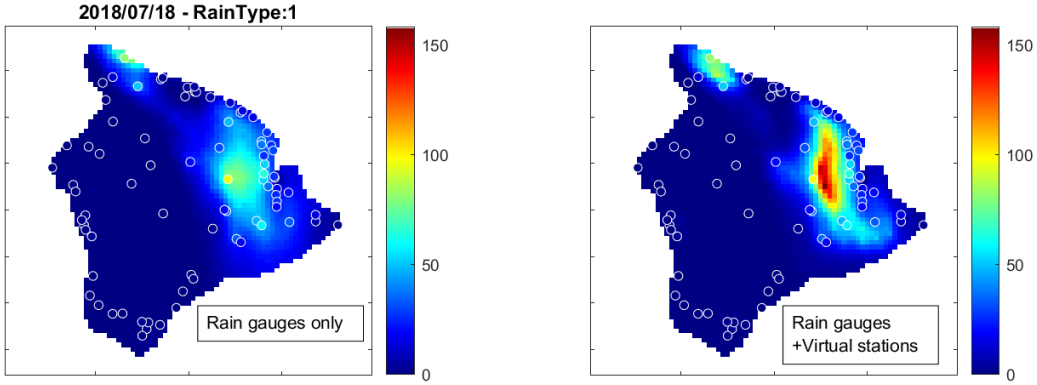
2018/07/16 - RainType:5



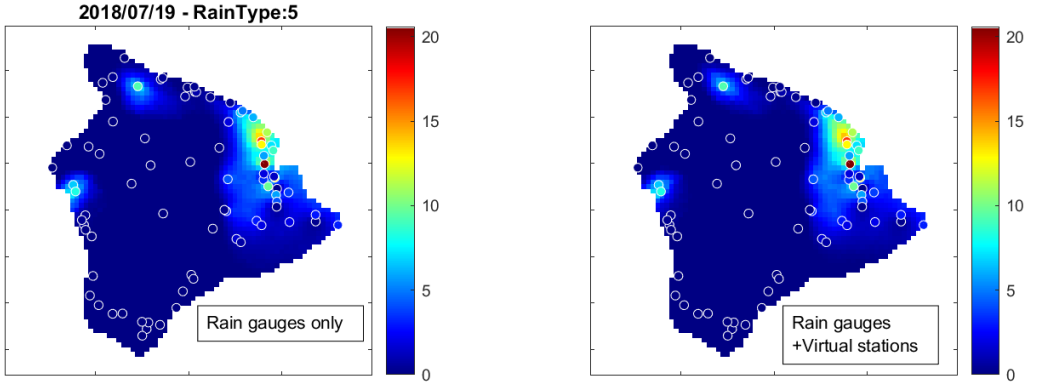
2018/07/17 - RainType:5



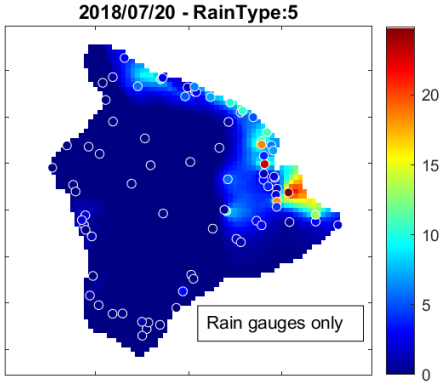
2018/07/18 - RainType:1

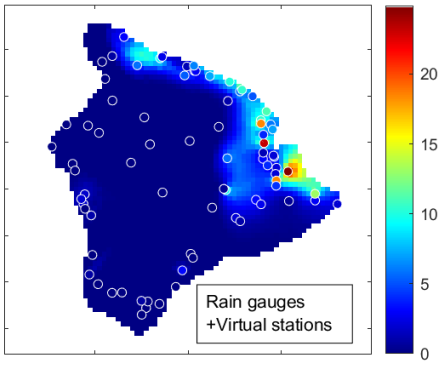


2018/07/19 - RainType:5

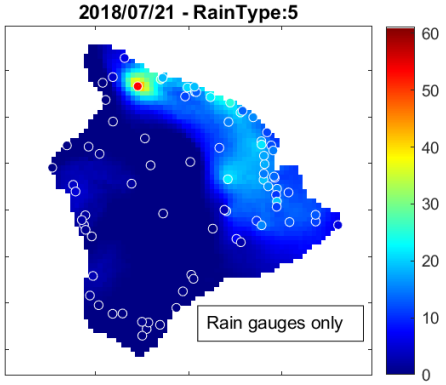


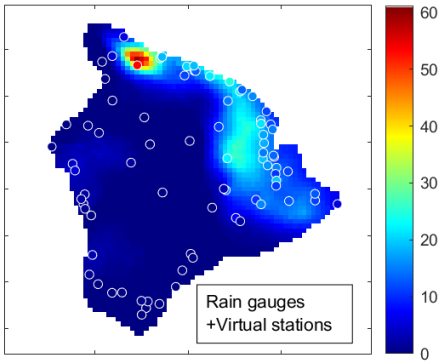
2018/07/20 - RainType:5



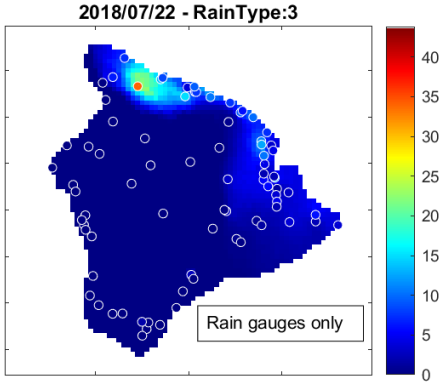


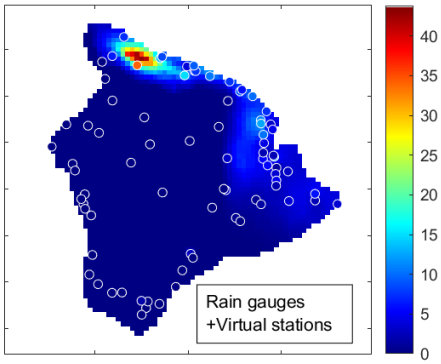
2018/07/21 - RainType:5



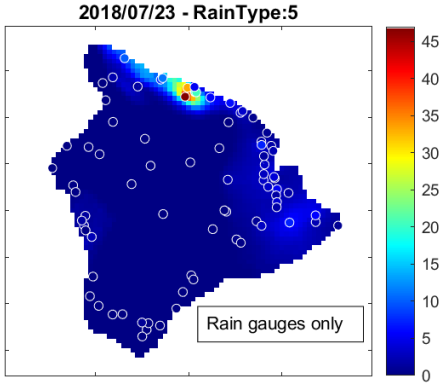


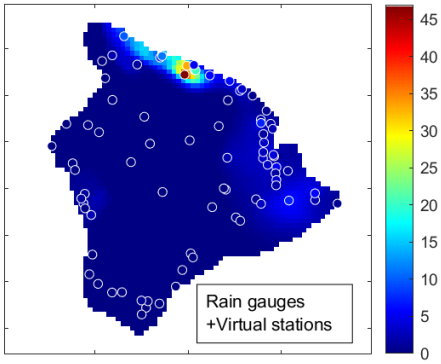
2018/07/22 - RainType:3



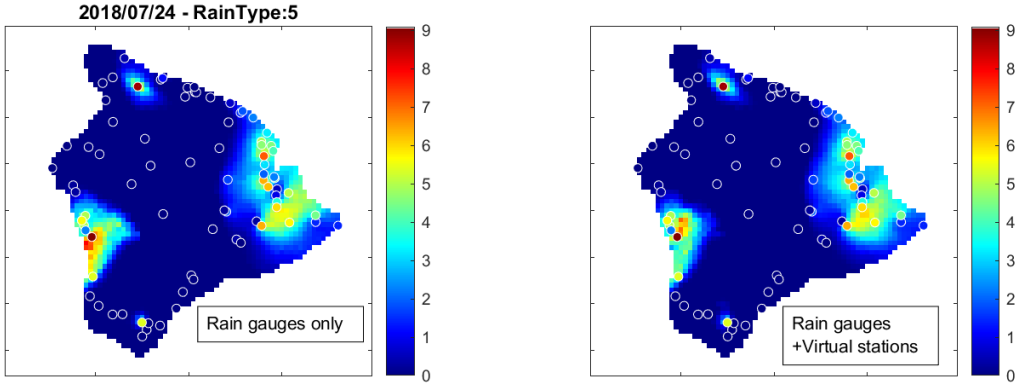


2018/07/23 - RainType:5

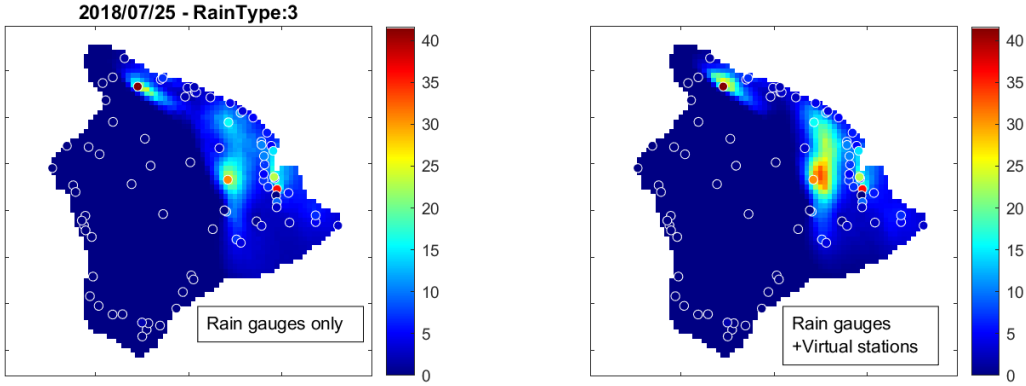




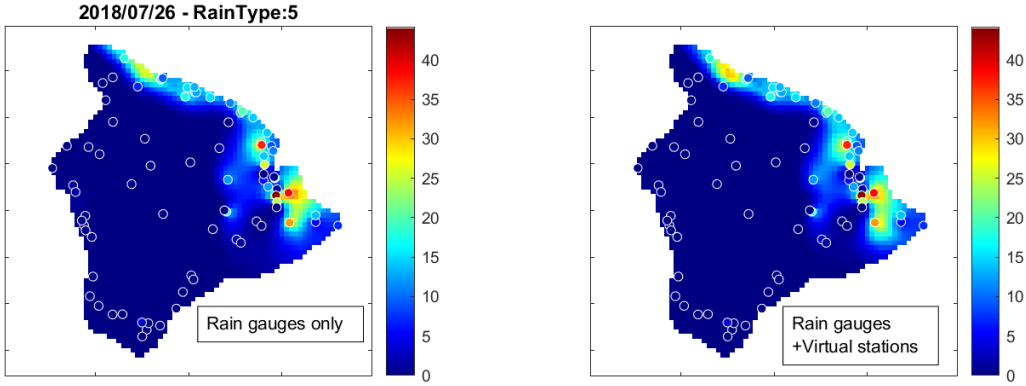
2018/07/24 - RainType:5



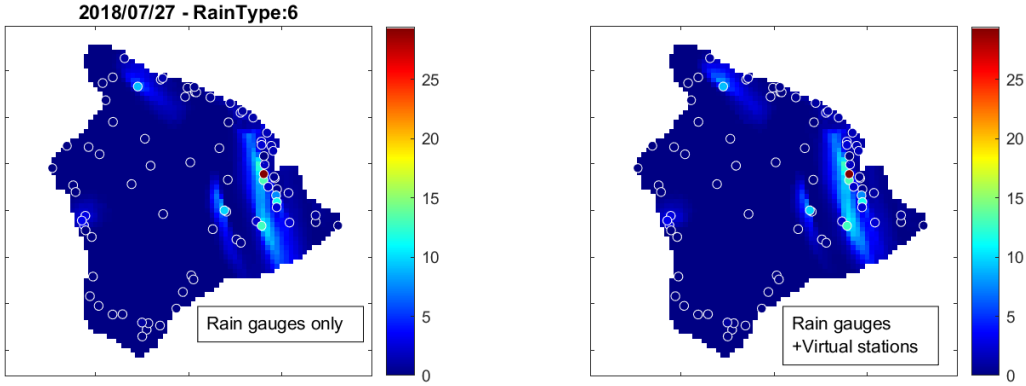
2018/07/25 - RainType:3



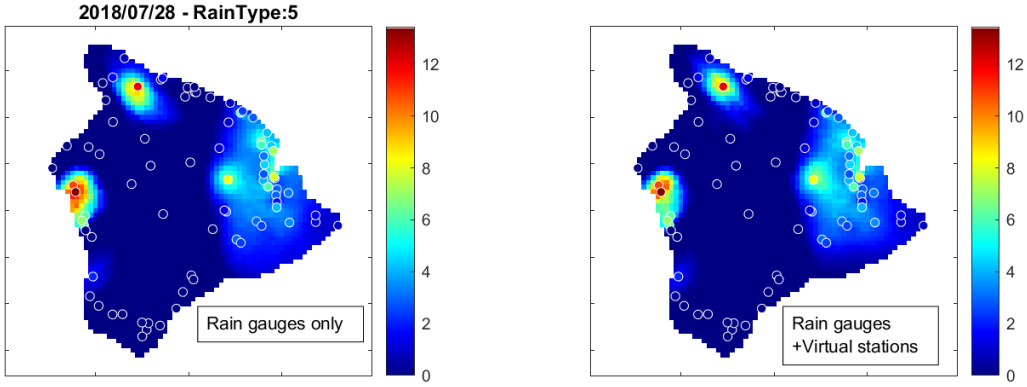
2018/07/26 - RainType:5



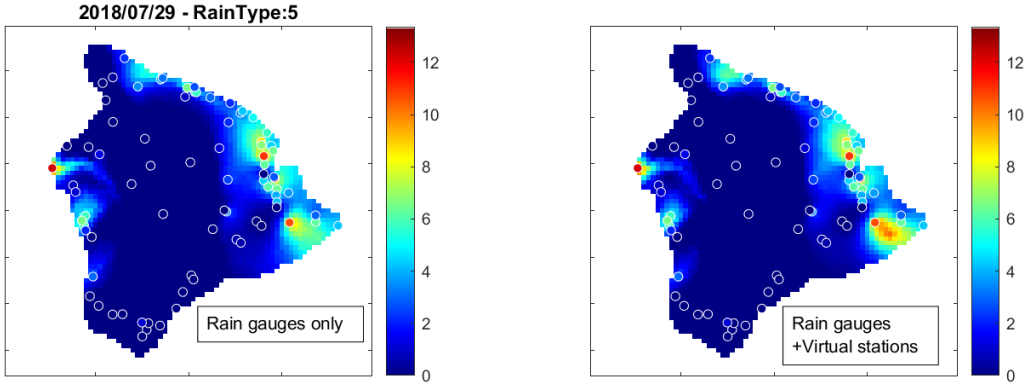
2018/07/27 - RainType:6



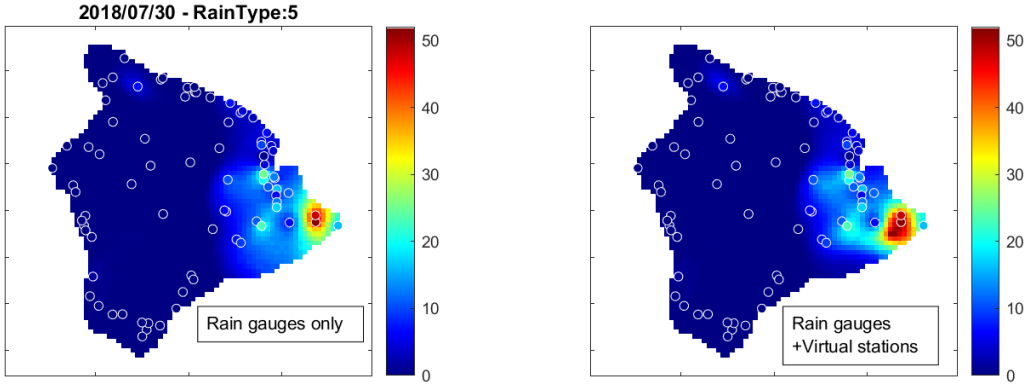
2018/07/28 - RainType:5



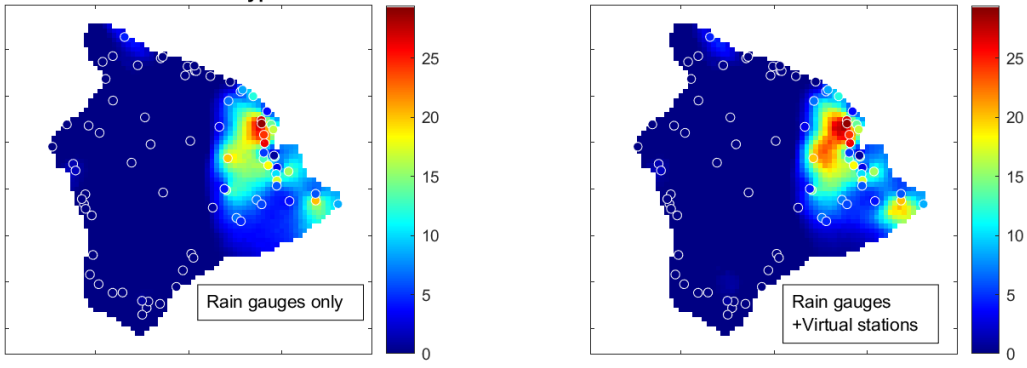
2018/07/29 - RainType:5



2018/07/30 - RainType:5

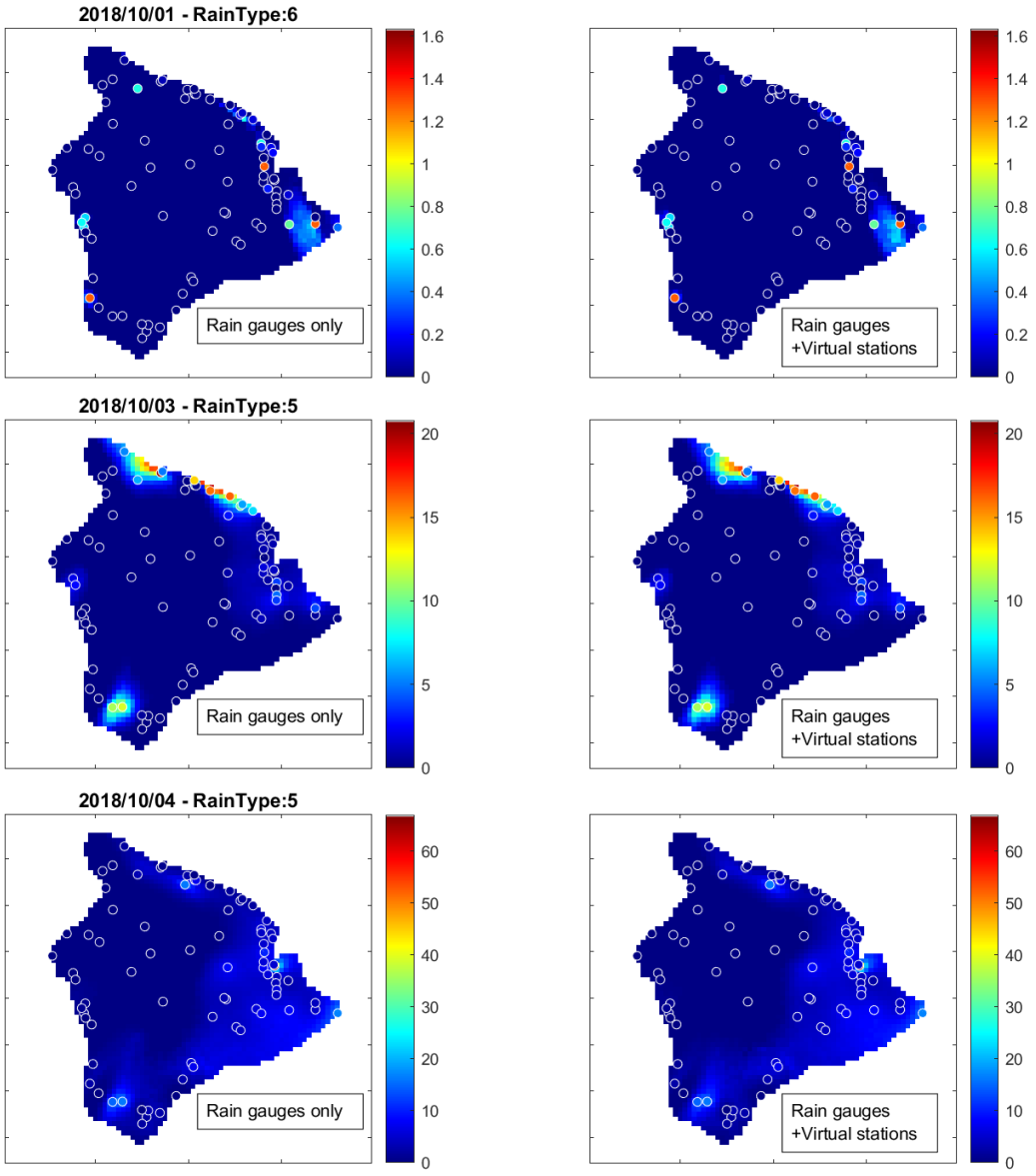


2018/07/31 - RainType:5

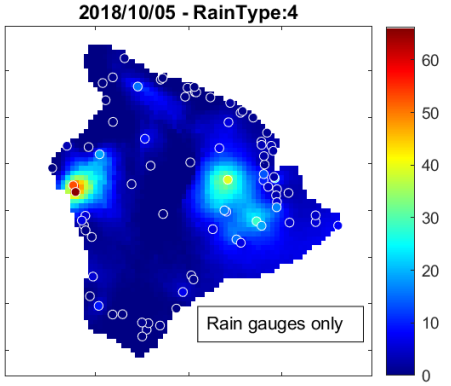


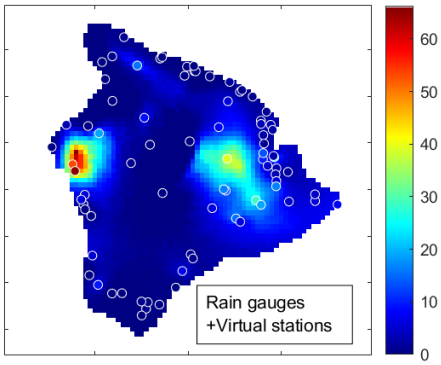
Section S6:

Daily rainfall maps for the month of October 2018 obtained by stochastic simulations conditioned to rain gauges only (column 1) and conditioned to rain gauges and 200 virtual stations (column 2). The colored dots denote rain gauge observations and the background color is the rainfall map. For each day the rain type is given in addition to the date. Note that the color scale changes from day to day to accommodate the temporal variation of daily rainfall intensity, and that October 2nd is not displayed here because it was dry throughout the island.

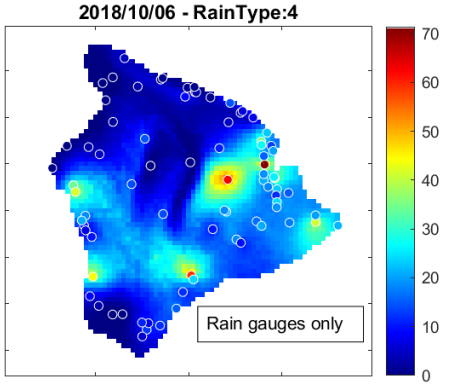


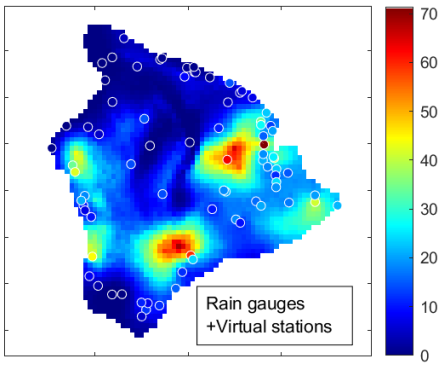
2018/10/05 - RainType:4



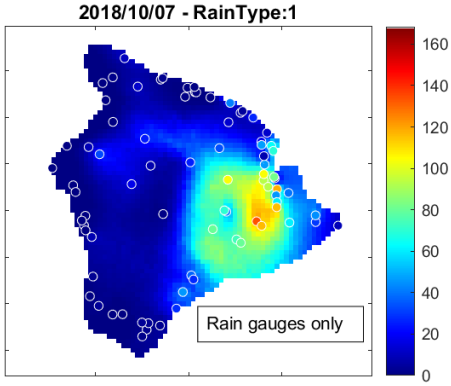


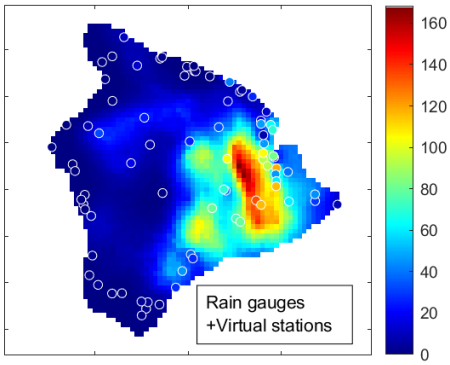
2018/10/06 - RainType:4



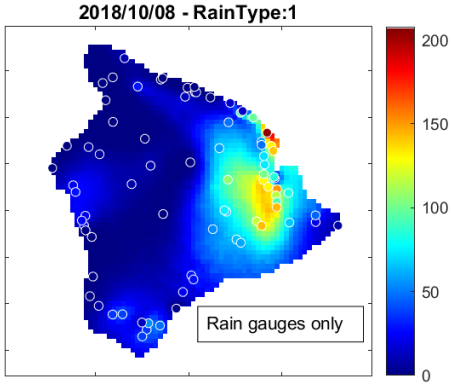


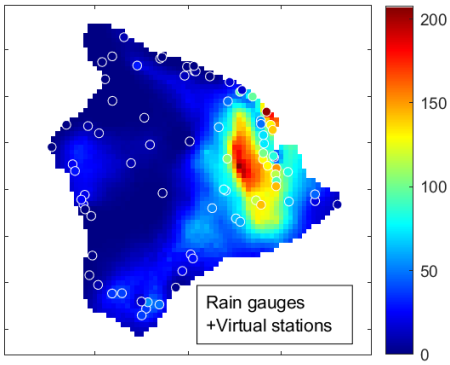
2018/10/07 - RainType:1



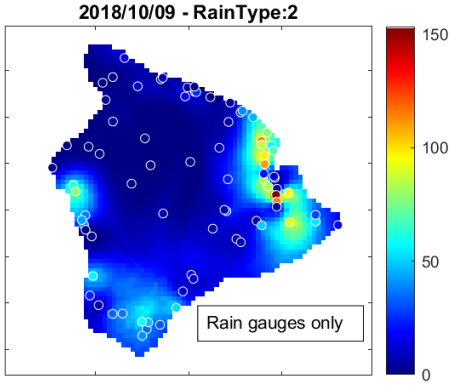


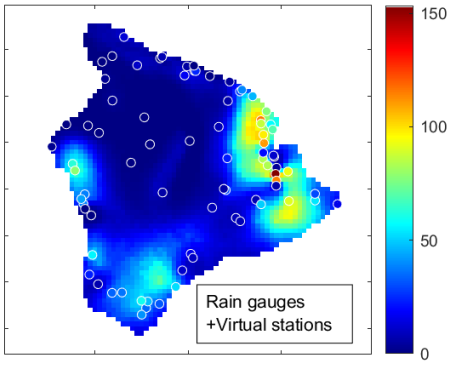
2018/10/08 - RainType:1



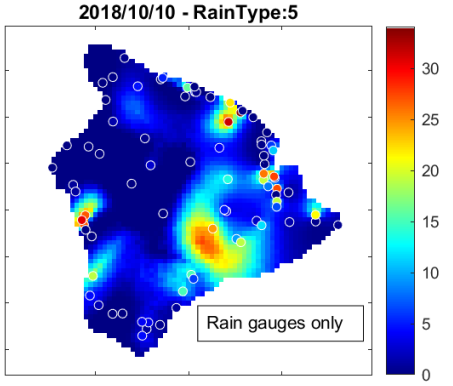


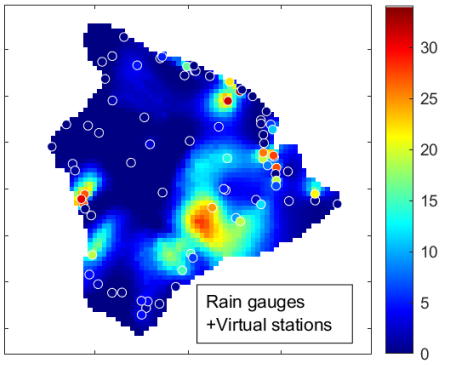
2018/10/09 - RainType:2



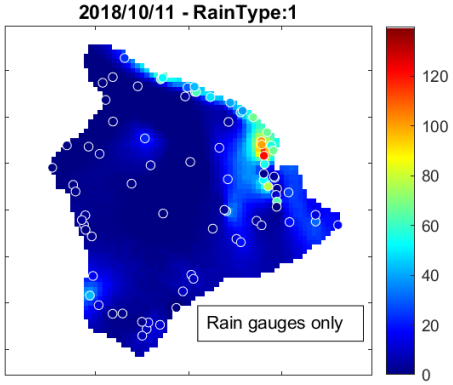


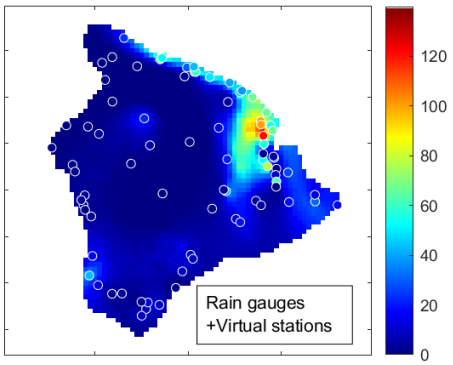
2018/10/10 - RainType:5



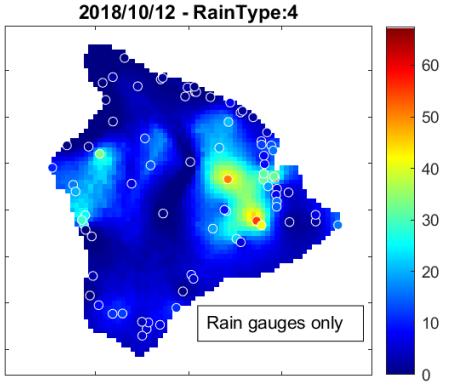


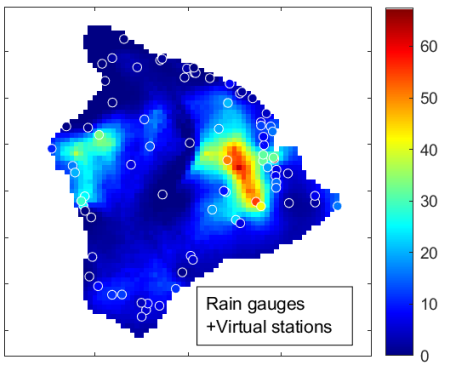
2018/10/11 - RainType:1



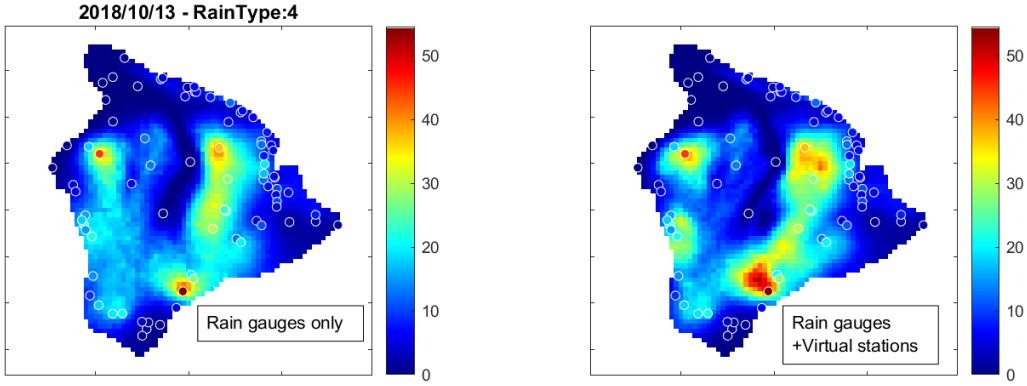


2018/10/12 - RainType:4

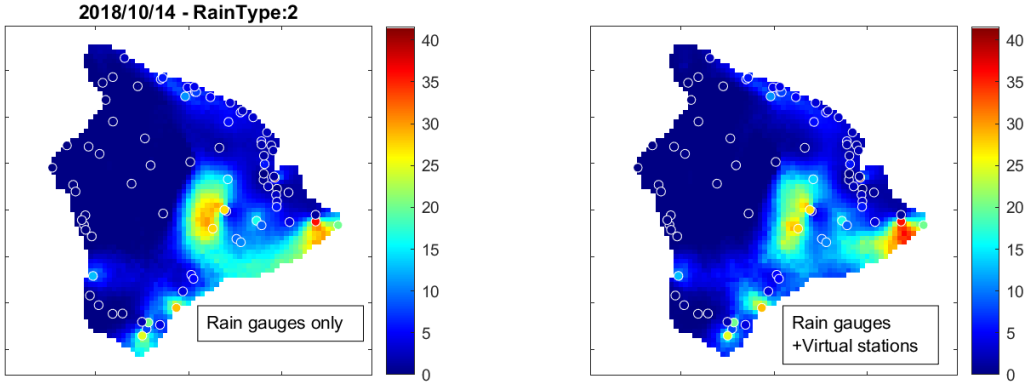




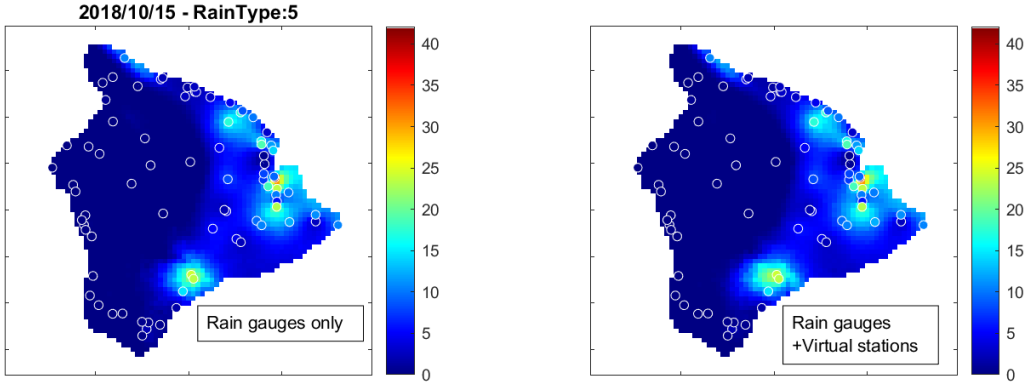
2018/10/13 - RainType:4



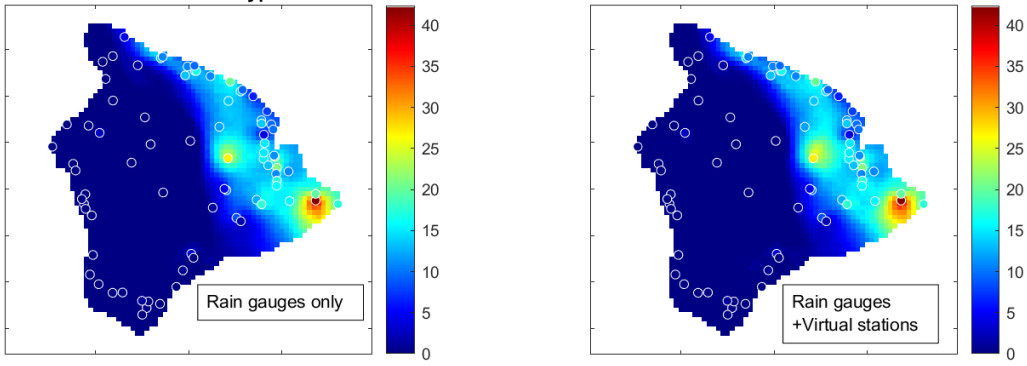
2018/10/14 - RainType:2



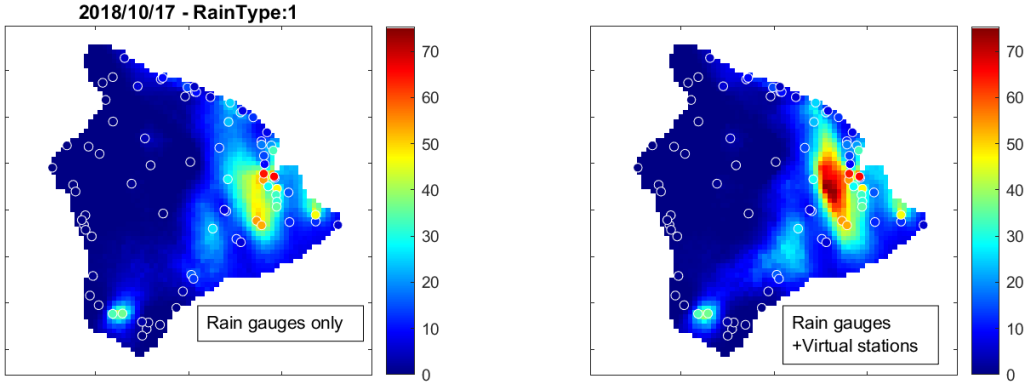
2018/10/15 - RainType:5



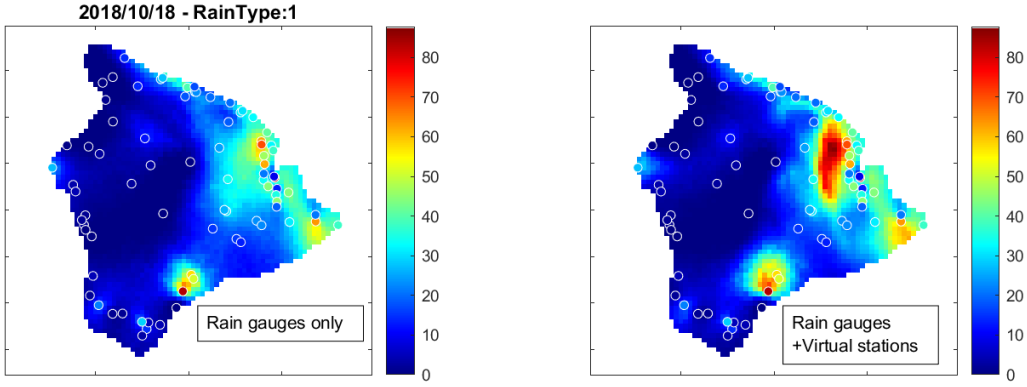
2018/10/16 - RainType:5



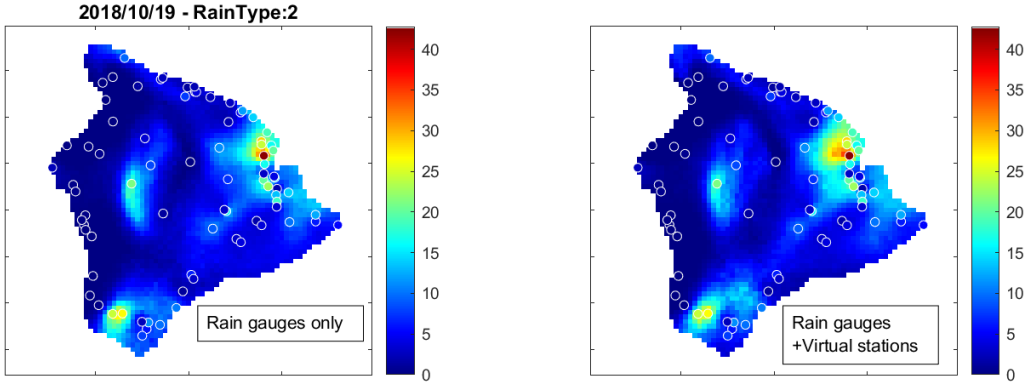
2018/10/17 - RainType:1



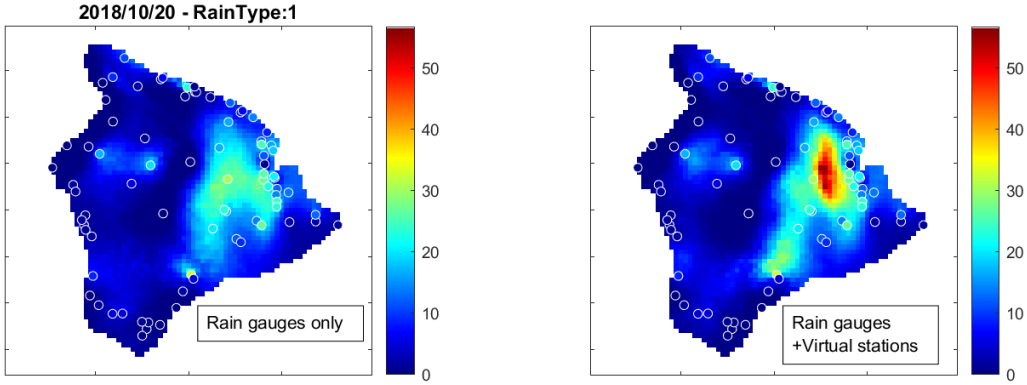
2018/10/18 - RainType:1



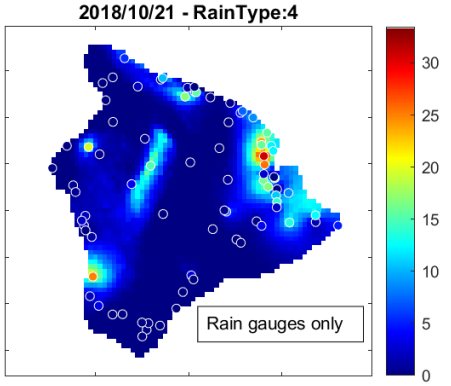
2018/10/19 - RainType:2

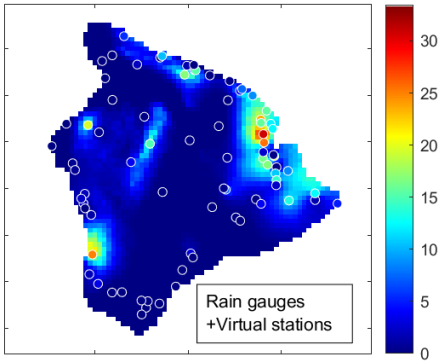


2018/10/20 - RainType:1

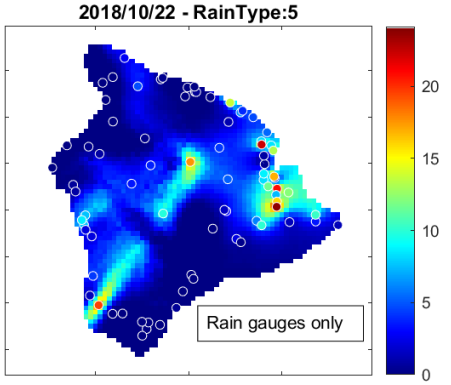


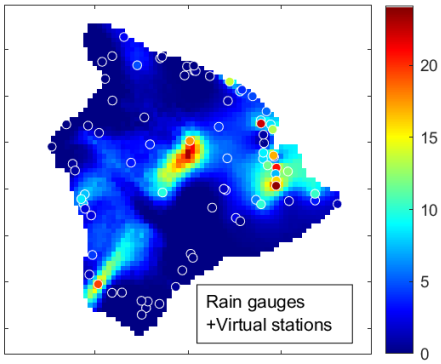
2018/10/21 - RainType:4



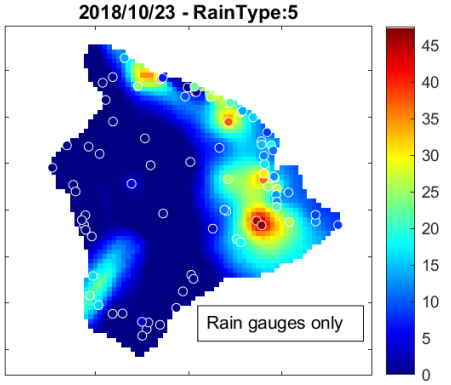


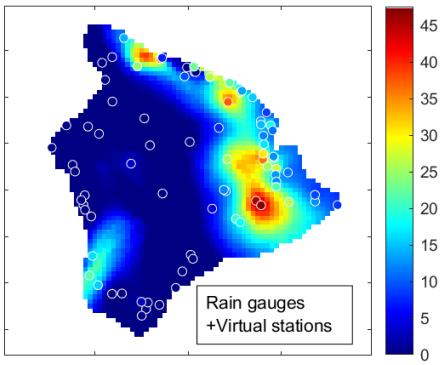
2018/10/22 - RainType:5



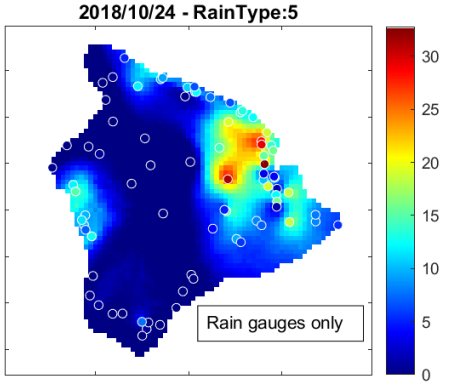


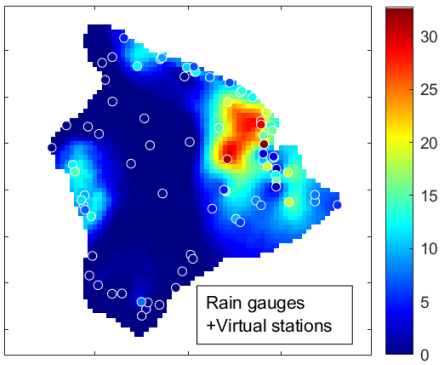
2018/10/23 - RainType:5



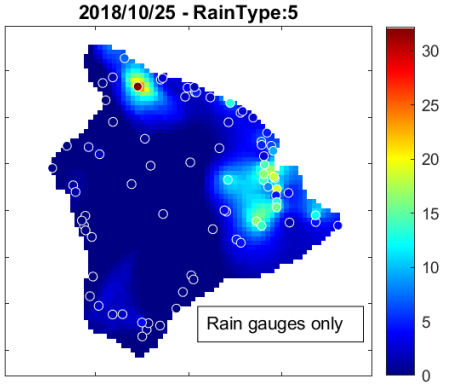


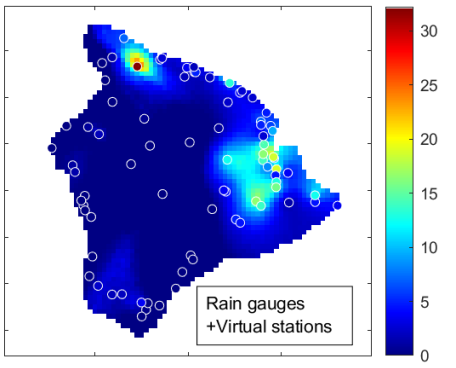
2018/10/24 - RainType:5



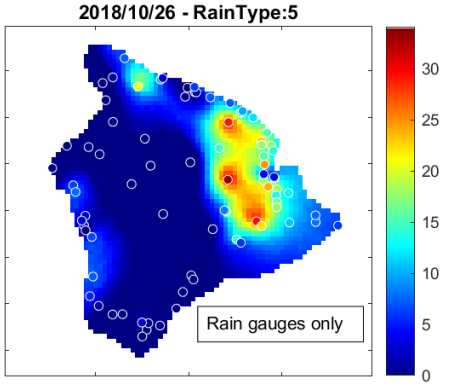


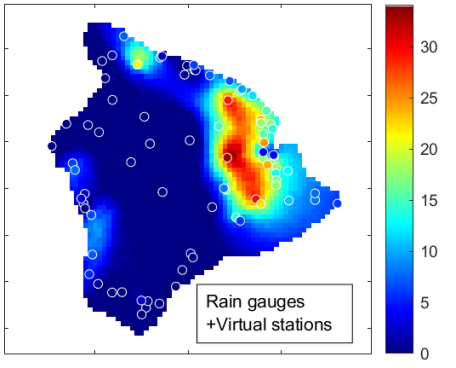
2018/10/25 - RainType:5



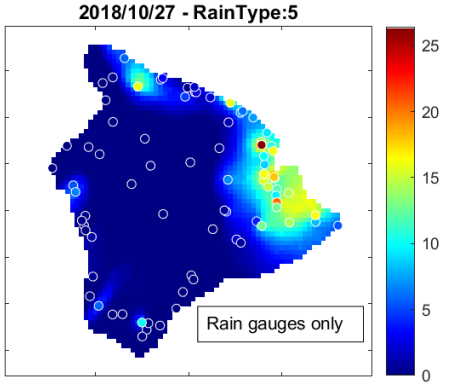


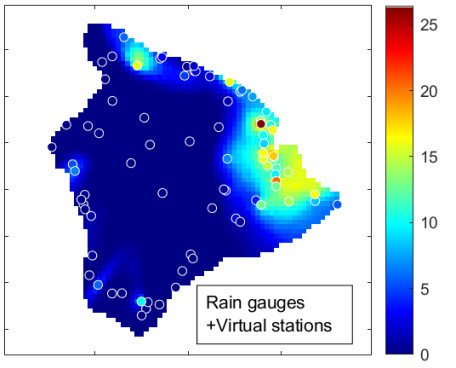
2018/10/26 - RainType:5



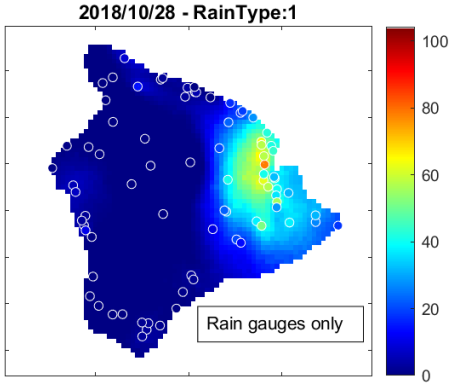


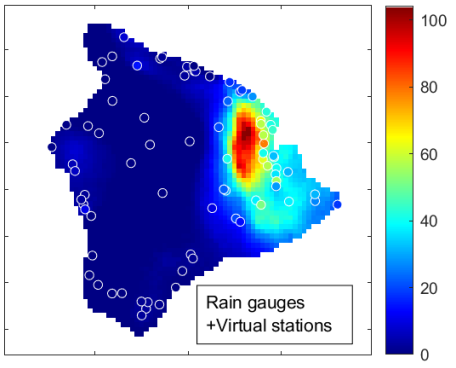
2018/10/27 - RainType:5



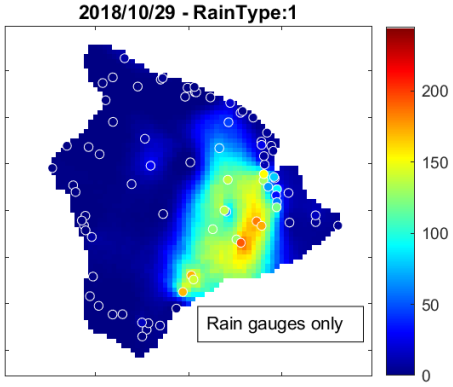


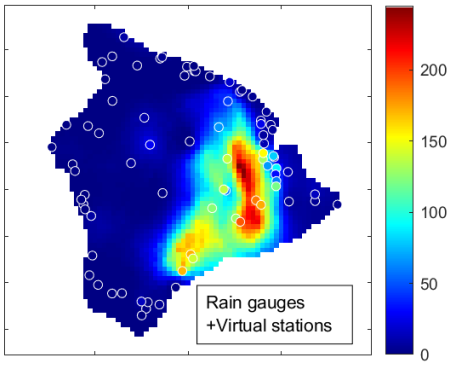
2018/10/28 - RainType:1



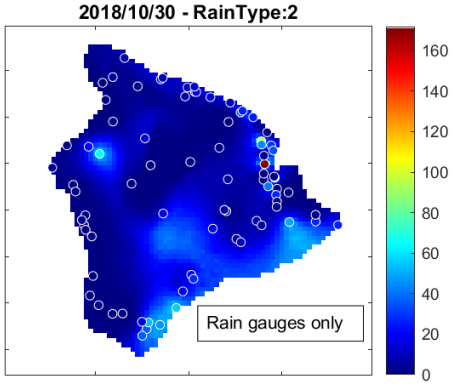


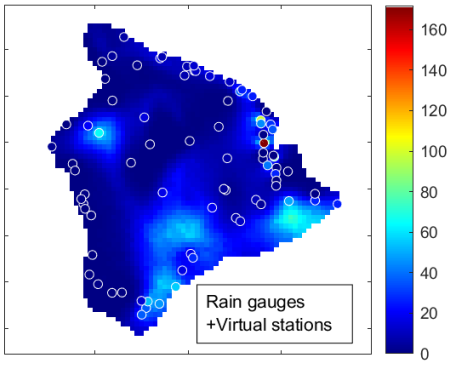
2018/10/29 - RainType:1





2018/10/30 - RainType:2





2018/10/31 - RainType:4