RAWS Project Documentation

This project requires three steps to estimate the impact of removing RAWS observations, which are to generate background & observation, and process control analysis. All the scripts and codes are in the directory /uufs/chpc.utah.edu/common/home/horel\_data/RAWS/code.

The script to create background is bkg\_one.csh, which contains 10 arguments: $yr $mo $dy $hr $lat $lon $lat\_rad $lon\_rad $case $subNo and the meanings of these arguments are as follows:

$yr: year (2 digits, like 09)

$mo: month (2 digits, like 02)

$dy: day (2 digits, like 02)

$hr: hour (2 digits, like 02)

$lat: latitude (the latitude of the center of the domain to be analyzed)

$lon: longitude (the longitude of the center of the domain to be analyzed)

$lat\_rad: latitude radius (the radius of the domain in the direction of latitude)

$lon\_rad: longitude radius (the radius of the domain in the direction of longitude)

$case: ($case means to generate background for temperature, relative humidity or wind; choose from "temp", "relh", "wind")

$subNo: (subdomain No as divided in the paper, refer to fig 1 in the paper or webpage mesowest.utah.edu/raws for details)

In the “bkg\_one.csh” script, the script “bkg\_create.csh” is run to generate background field.

The script to create observation is obs\_one.csh, which contains 9 arguments: $yr $mo $dy $hr $lat $lon $lat\_rad $lon\_rad $case and the meanings are the same as arguments in the “bkg\_one.csh” script. In the “obs\_one.csh” script, the Perl program “data\_all\_raws\_nes\_selevt.pl” is run to generate observations.

Control analysis:

To perform one control analysis, just run script matlab\_one.csh, which contains 9 arguments (same arguments as in “obs\_one.csh”). In the “matlab\_one.csh”, the matlab program “tdv\_one\_nog.m” is run to generate the result “deny.dat” of control analysis. All the data results are saved in the directory /uufs/chpc.utah.edu/common/home/horel\_data/RAWS/data/deny\_data.

For the sake of efficiency, part of matlab program to create figures during control analysis is separated from “tdv\_one\_nog.m”. To get these figures, run script “fig\_one.csh”, which contains the same arguments as in “matlab\_one.csh”. For each control analysis, at least 3 figures are plotted, including “background field”, “increments” (difference between the control analysis and background field), and “control analysis”.

To find stations that provide redundant information, three metrics are calculated: accuracy, sensitivity and analysis degradation. (refer to paper “An Evaluation of the Distribution of Remove Automated Weather Stations (RAWS) for details) .

Programs to calculate these three metrics are in the directory /uufs/chpc.utah.edu/common/home/horel\_data/RAWS/data/deny\_data, “sensitivity\_temp.m”, “sensitivity\_relh.m”, “sensitivity\_wind.m”.

All the resulting figures are saved in the directory /uufs/chpc.utah.edu/common/home/horel\_data/RAWS/data/figures and also shown at the webpage <http://mesowest.utah.edu/raws>. The default page shows the 51 analysis domains and the link of each domain. In the page of each domain, the top row shows accuracy, sensitivity and analysis degradation for temperature, relative humidity and wind of that domain. The bottom row shows background, innovation and control analysis for each day of that domain.

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To analyze the results, it is necessary to count some statistics.

The codes to get these statistics can also be found in the directory /uufs/chpc.utah.edu/common/home/horel\_data/RAWS/data/deny\_data.

“median\_value\_in\_eachobx.m” calculates the median value of sensitivity, root mean squared error, analysis degradation of each domain for temperature, relative humidity and wind.

“median\_value\_of\_all.m” calculates the median value of sensitivity, root mean squared error, analysis degradation over the whole domain for temperature, relative humidity and wind.

“scalar\_test.m” calculates the scalar field of each domain, which means to calculate the control analysis by setting background to 0 and observations to 1.