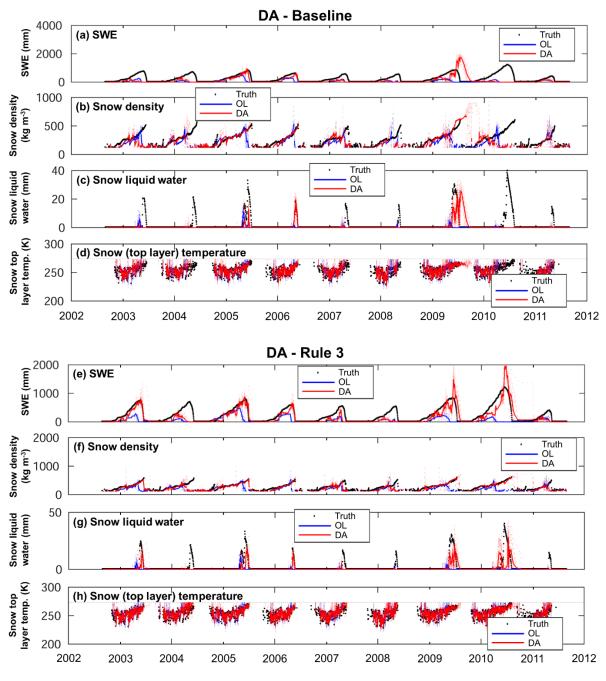


**Figure S1.** Time series of SWE (a and e), snow density (b and f), snow liquid water (c and g), and snow (top layer) temperature (d and h) including the synthetic truth (black dots), OL ensemble mean (blue line), and DA ensemble mean (red line) for the baseline (upper) and rule 3 cases (lower) in Grid #3.



**Figure S2.** Time series of SWE (a and e), snow density (b and f), snow liquid water (c and g), and snow (top layer) temperature (d and h) including the synthetic truth (black dots), OL ensemble mean (blue line), and DA ensemble mean (red line) for the baseline (upper) and rule 3 cases (lower) in Grid #4.