

Supplemental Material

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https://doi.org/10.1175/MWR-D-21-0199.1 **Supplemental Material** Surface-based SfcRadS5: RMSI & Total spread of Surface-based SfcRadS1: RMSI & Total spread of Vr RMSI & Total spread of Vr (m/s) RMSI & Total spread of Vr (m/s) (a) (b) 3.5 3.5 --Total spread 3.0 -Total spread 3.0 **RMSI RMSI** 2.5 2.5 2.0 2.0 1.5 1.5 1.0 1.0 12 14 15 5 5 6 8 9 10 11 13 6 7 8 9 10 11 12 13 14 15 t (min) t (min) Surface-based SfcRadSE5: RMSI & Total spread of Vr Surface-based SfcRadSE1: RMSI & Total spread of Vr 4.0 RMSI & Total spread of Vr (m/s) RMSI & Total spread of Vr (m/s) (c) (d) 3.5 3.5 3.0 3.0 - Total spread - Total spread **RMSI** RMSI 2.5 2.5 2.0 2.0 1.5 1.5 15 5 6 8 9 10 11 12 13 14 5 6 9 10 11 12 13 14 15 t (min) t (min) Surface-based RadSE1: RMSI & Total spread of Vr 4.0 RMSI & Total spread of Vr (m/s) (e) 3.5 3.0 - Total spread RMSI 2.5 2.0 1.5 1.0 6 9 10 12 13 t (min)

Monthly Weather Review

Fig. S1. Observation-space root-mean-square innovation (RMSI) and total ensemble spread (standard deviation) for assimilated radial velocity observations in the surface-based case for (a) SfcRadS5, (b) SfcRadS1, (c) SfcRadSE5, (d) SfcRadSE1, and (e) RadSE1 during the data assimilation period from t = 5 to 15 min.

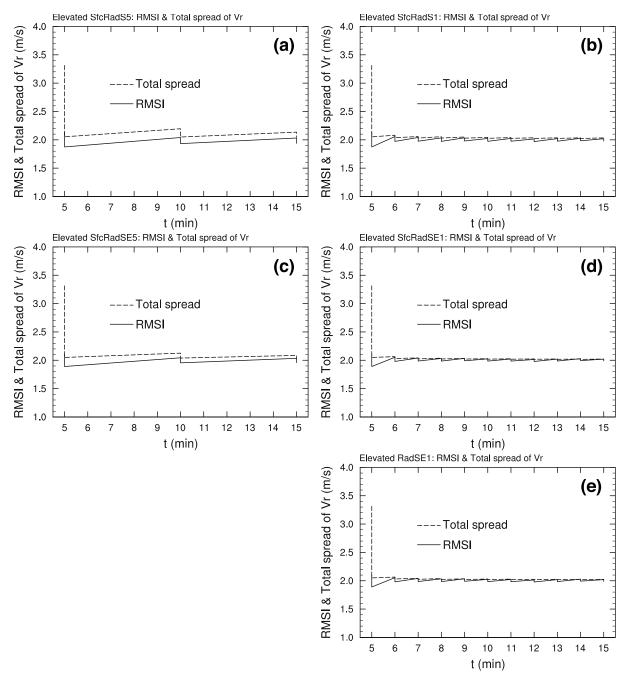


Fig. S2. Observation-space root-mean-square innovation (RMSI) and total ensemble spread (standard deviation) for assimilated radial velocity observations in the elevated case for (a) SfcRadS5, (b) SfcRadS1, (c) SfcRadSE5, (d) SfcRadSE1, and (e) RadSE1 during the data assimilation period from t = 5 to 15 min.