

Development of a new analysis and data assimilation of surface pollutants at Environment and
Climate Change Canada

Richard Ménard and Martin Deshaies-Jacques
Air Quality Research Division, Environment and Climate Change Canada

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We present the results of the new 3D chemical analysis scheme based on climatological ensembles and online estimation of error variances. We first compare different methods of estimation of error variances and correlations using innovations and ensembles. In particular we compare: 1 -The Hollingsworth-Lonnberg and the Desroziers method to obtain error variances in observation space, 2 – The Hollingsworth-Lonnberg, Maximum likelihood and chi-2 method to obtain the homogeneous isotropic correlation length-scale, 3 – Using ensemble of past model output we generate error variances and non-homogeneous non-isotropic error correlations against those obtain with innovations. We discuss the smoothing and localization needed in the ensemble method. We then present the numerics of the new analysis scheme for compact support correlation functions using sparse matrix algebra, and compare the results and cost with analyses of full support functions. Preliminary results of assimilation cycling with GEM-MACH will also be presented.