Modeling of RF propagation in the atmosphere requires modified refractive index (M) profiles from the surface to the top of the atmosphere. The full 3D COAMPS model does not explicitly represent the surface layer especially in the lowest 10 m or so where the evaporative duct occurs. Therefore, it is the general practice to use a diagnostic evaporative duct model, such as the Navy Atmospheric Vertical Surface Layer Model (NAVSLaM), to produce an independent evaporation duct representation based on the 3D model's results in its lowest level(s). The resultant M-profile for the evaporative duct is then blended to the lowest levels of the 3D forecast model M-profile. The two models are not necessarily consistent in their representation of the near surface properties such as surface flux parameterization or even offset the surface layer representation to better enable a merged profile. The existing blending approach works well in many cases, but may experiences difficulties in producing a reasonably smooth transition in the blending interval altitudes, which sometimes produces a kink in the profile.

An alternative to the mentioned 'blending' technique, in order to avoid discontinuity at the transition levels, is to use a high resolution Single Column Model (SCM) that comprises the entire atmospheric column to produce the M-profile. However, the SCM results can deviate from the parent model quite quickly because of the uncertainties in deriving external forcing from the 3-D model to drive the SCM. In order to leverage both the strength of the SCM's advantage of high resolution to resolve the surface layer and the strength of the 3D COAMPS model to forecast the large scale evolution, we attempt to run the SCM using a nudging technique which nudges the SCM to follow 3D model for the atmosphere above the surface layer. Since the atmospheric layers above the surface layer are forced to be consistent with the 3D COAMPS model result, there is no need to consider the effects of the external forcing for these layers. In this manner the boundary layer and the surface layer will be evolving forward in time as a result of turbulent mixing and surface fluxes. Hence the blending is done through turbulence mixing in the SCM.

To evaluate the SCM approach for blending, the same COAMPS profiles were used as input to NAVSLaM and the resulting evaporative duct profiles were blended to the COAMPS profiles using traditional blending algorithm. Results of the new SCM blending scheme and from the traditional blending algorithm are compared to show the effectiveness of the new blending algorithm. We found that the new blending algorithm gives similar results as the traditional algorithm in many cases, but may produce better results when the traditional algorithm experiences difficulties in obtaining reasonable combined profiles.