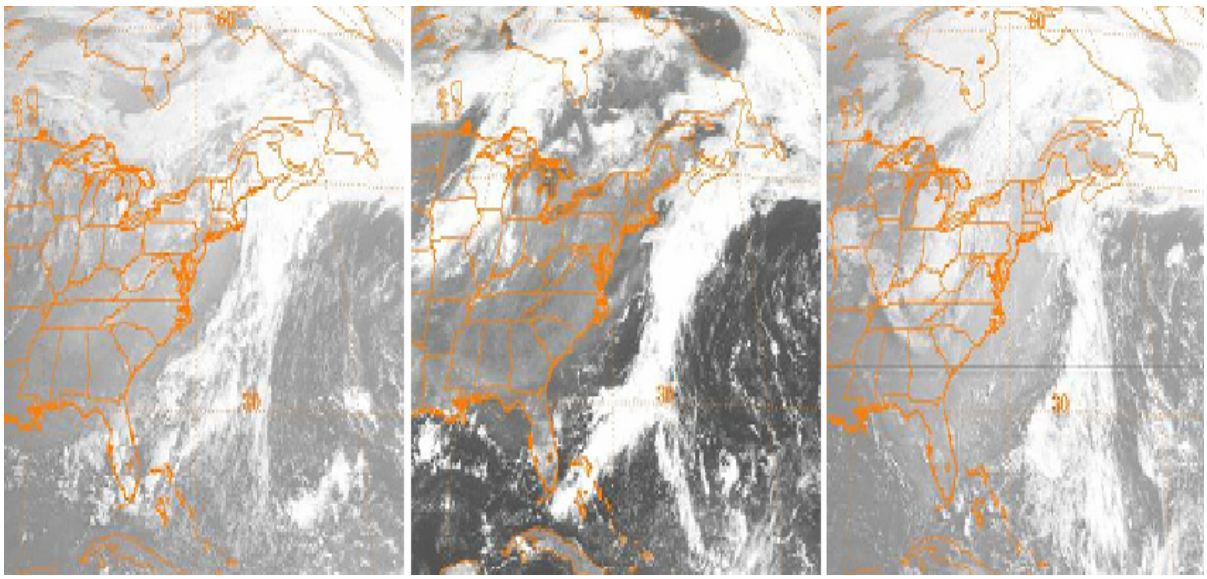
**Responses to Evaluation by Reviewer 2**

The authors appreciate the reviewer's evaluation of the paper and his insightful suggestions for its improvement. Based on his comments, the final revision of the work will incorporate the expanded discussion of the synoptic conditions surrounding the plume transport. This discussion will build on the analysis of the plume's development as described in section 3.1, and include the suggested GOES visible imagery for the study period as shown in figure R2 below. As seen in figure R2 a) and the surface/lower tropospheric analysis presented in figure 1a)-c), a low-level trough developed parallel to the North American coastline. This induced much of the southwesterly nature of the plume's flow during the three day period and the stronger winds observed on 7/20 and 7/21 over the GOM. Further examination of other influential features will be added to the proposed daily summary format. An increasing number of recent works have also described many aspects of the synoptic conditions during the study period including Mao et al. (2006), White et al. (2006), Millet et al. (2006), Methven et al. (2006), Real et al. (2008), and Lee et al. (2011). References to these works will also be incorporated into the discussions with particular focus on features most likely influencing the plume and surrounding atmospheric layers between 7/20 and 7/22. Mobile wind profiler observations may be added as well, to provide accurate evaluation of local coastal circulations influencing the inland mixing of the plume.



a) b) c)

**Figure R2.** GOES-12 visible satellite imagery at a) 12Z on 7/20, b) 15Z on 7/21, and c) 12z on 7/22.

With regards to stability within the plume and plume-adjacent layers, further analysis will be added to the final version along the lines proposed by the reviewer. This will include similar profiles of the Brunt-Vaisala frequency (N) during the 7/20 and 7/21

intercepts over the GOM presented alongside profiles of the CO mixing ratio, TKE, and virtual potential temperature in figure R3 below. Values of the Brunt-Vaisala frequency ranged from 0.002 to 0.058 over the GOM during the three-day study which compare closely with the previously measured range of 0.0025-0.04 $s^{-1}$, reported by Gong et al. (2000). In figure R3 b) and f), the static stability indicated by the Brunt-Vaisala profiles exhibited little change between 7/20 (blue lines) and 7/21 (red lines). However, the profiles over the coastal region (figure R3b) maintained higher values of N on both days than corresponding profiles over the open ocean region. This increased stability in the plume layer resulted lower $\theta_v$ and $\theta_v$ gradients (figures R3 d) and h). This in turn reduced the turbulent intensity within the plume layer over the coastal GOM, as evidenced by the significantly reduced TKE (figures R3 c) and d).

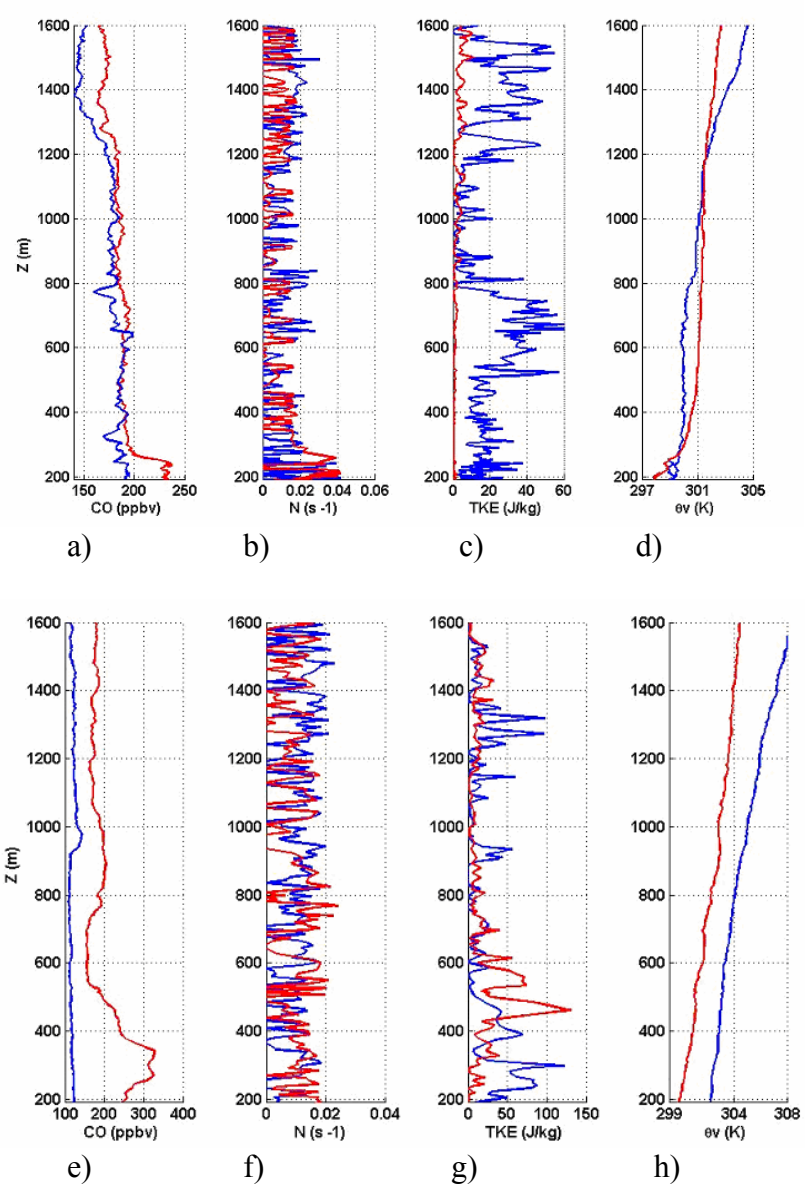



**Figure R3.** Vertical profiles of selected parameters on 7/20(blue lines) and 7/21 (red lines) over the coastal GOM ( a)-d) ) and open ocean GOM ( e)-h)). CO mixing ratios are shown in a) and e), Brunt-Vaisala frequencies in b) and f), TKE in c) and g) and $\theta_v$ in d) and h).

The authors appreciate the thorough evaluation of the paper and will incorporate the further editing suggestions provided by the reviewer.