

Figure 1. Daily mean precipitation rate in Jan-Feb 2019 simulated with (a) YSU in domain 1, (b) ACM2 in domain 1 with a 15 km grid spacing, (c) YSU in domain 2, (d) ACM2 in domain 2 with a 3 km grid spacing, (e) single-domain YSU, (f) single-domain ACM2 with a 3 km grid spacing and from (g) IMERG, (h) CMORPH data. The rectangle in (a) marks the location of the nested domain.

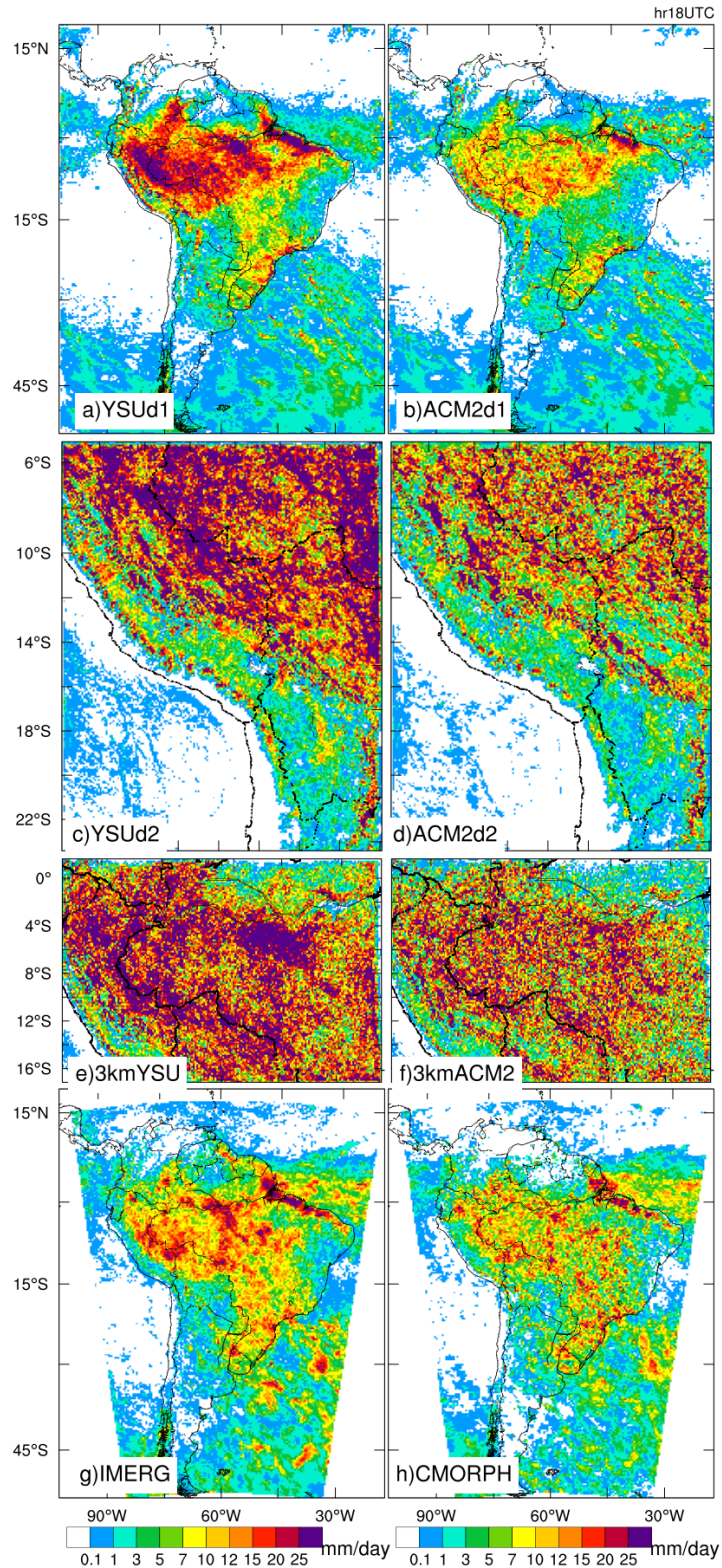


Figure 2. Hourly mean precipitation rate at 18 UTC (14 LST) in Jan-Feb 2019 simulated with (a) YSU in domain 1, (b) ACM2 in domain 1, (c) YSU in domain 2, (d) ACM2 in domain 2, (e) single-domain YSU, (f) single-domain ACM2 and observed from (g) IMERG, (h) CMORPH.

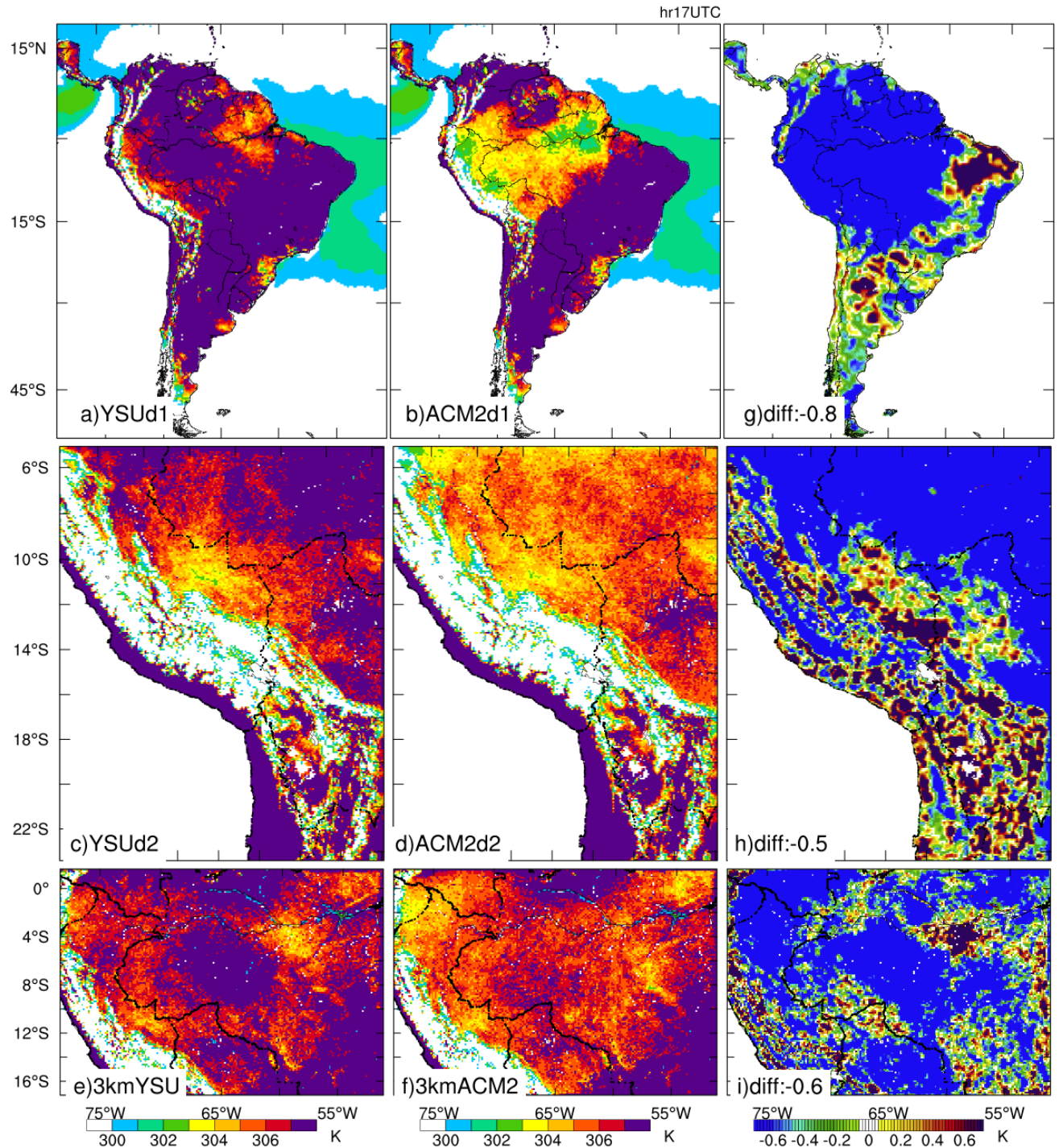


Figure 3. Average surface temperature at 17 UTC in Jan-Feb 2019 from (a,c,e) YSU, (b,d,f) ACM2, and (g,h,i) their difference (ACM2-YSU) in (top to bottom) different domains. The average difference over land is marked at the lower-left corner in (g,h,i)

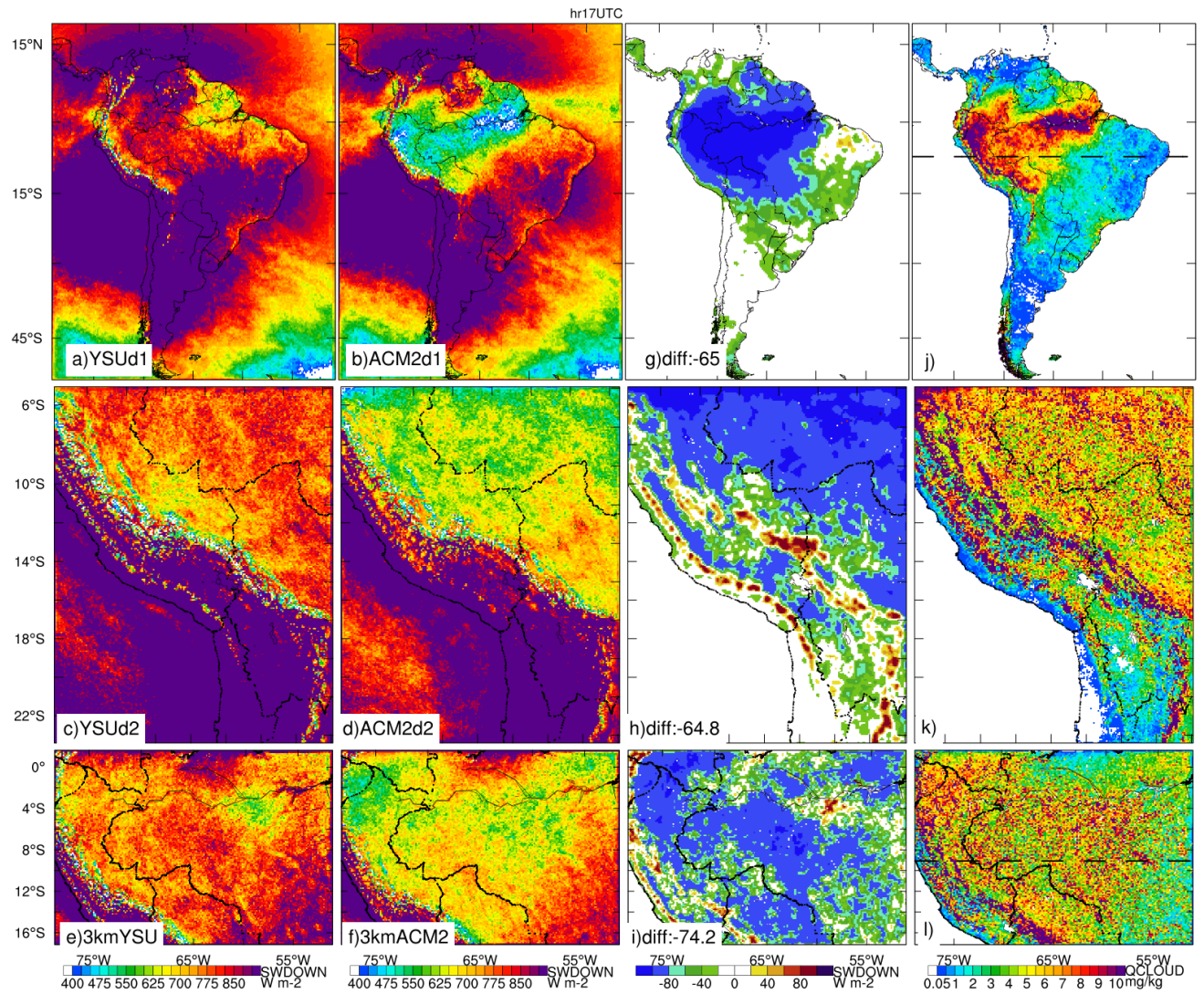


Figure 4. Average surface downward shortwave radiation at 17 UTC in Jan-Feb 2019 simulated with (a,c,e) YSU, (b,d,f) ACM2, (g,h,i) their difference, and (j,k,l) column-average cloud water mixing ratios in (top to bottom) different domains. The straight dash lines mark the location of cross-sections in Figs. 5, 6, and 11.

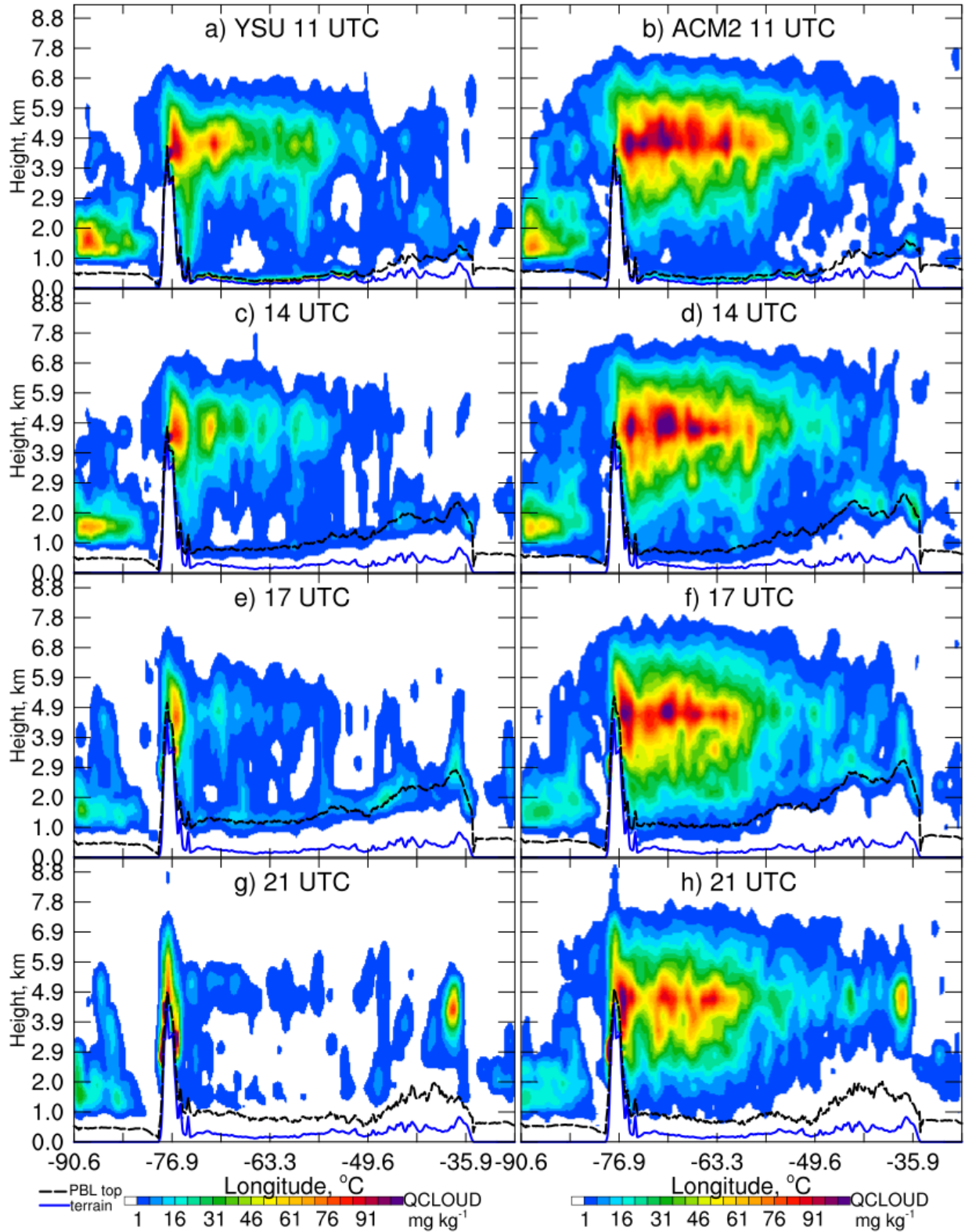


Figure 5. Cross-section of cloud water over the Amazon in Jan-Feb 2019 simulated by (left) YSU and (right) ACM2 at (a,b) 11, (c,d) 14, (e,f) 17, and (g,h) 21 UTC (7, 10, 13, 17 LST correspondingly). The location of these cross-sections is marked in Fig. 4j

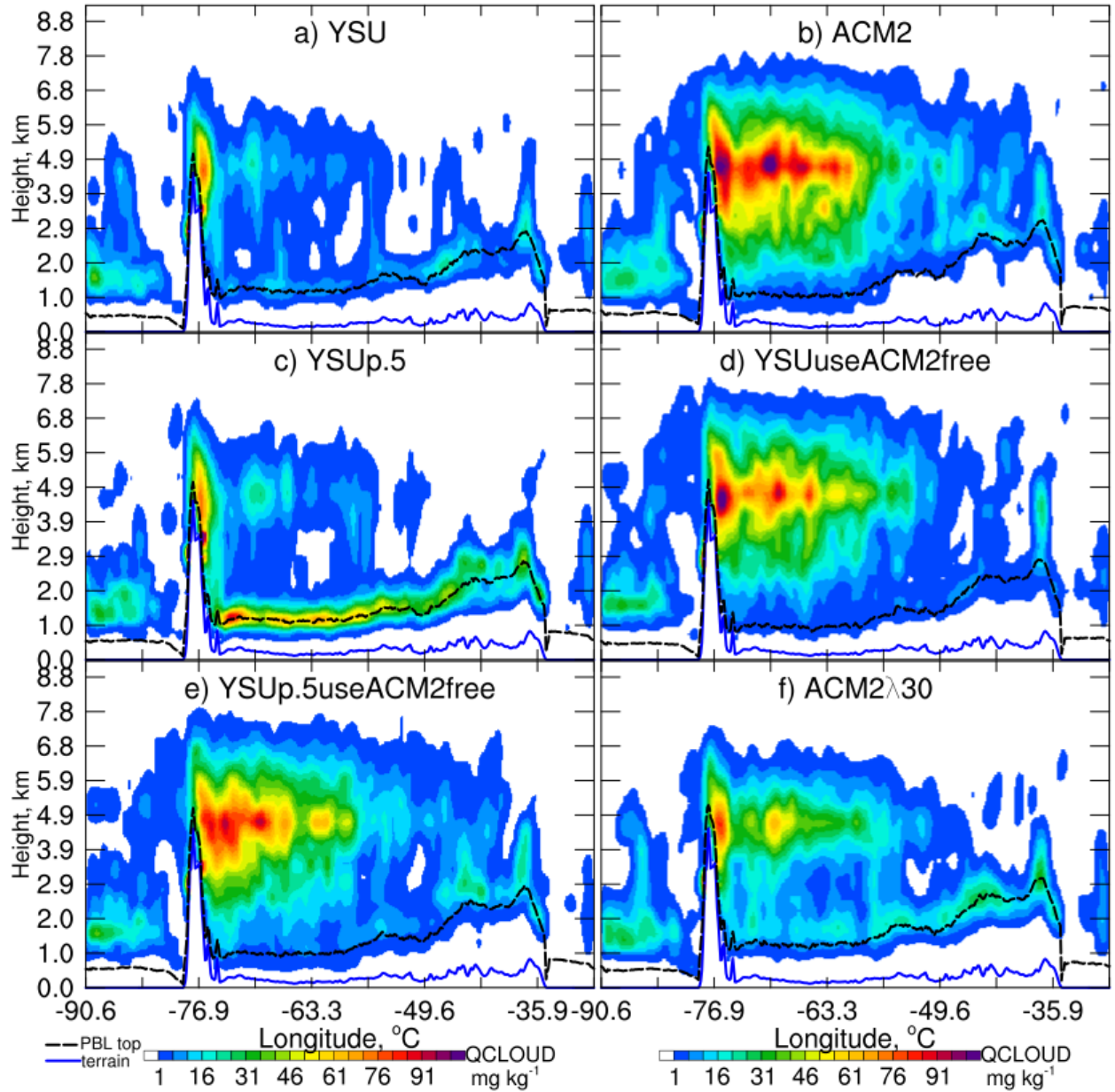


Figure 6. Cross-section of cloud water over the Amazon in Jan-Feb 2019 simulated by (a) YSU and (b) ACM2, (c) YSU p.5, (d) YSUuseACM2free, (e) YSU p.5useACM2free, (f) ACM2 λ 30 at 17 UTC. The location of these cross-sections is marked in Fig. 4j

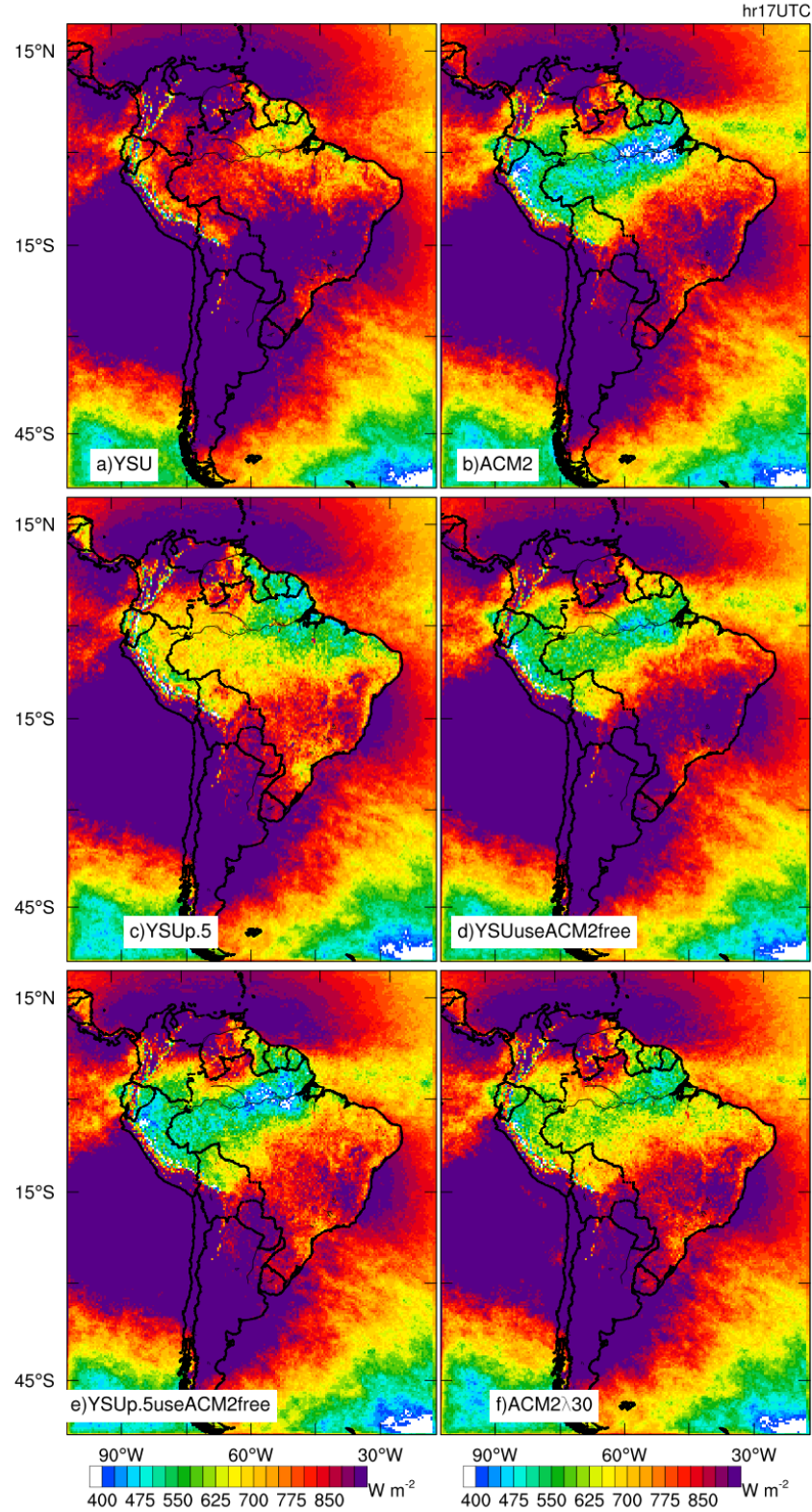


Figure 7. Average surface downward shortwave radiation at 17 UTC during January-February 2019 simulated by (a) YSU, (b) ACM2 and 4 sensitivity simulations (c) YSU λ 5 , (d) YSUuseACM2free, (e) YSU λ 5useACM2free, (f) ACM2 λ 30.

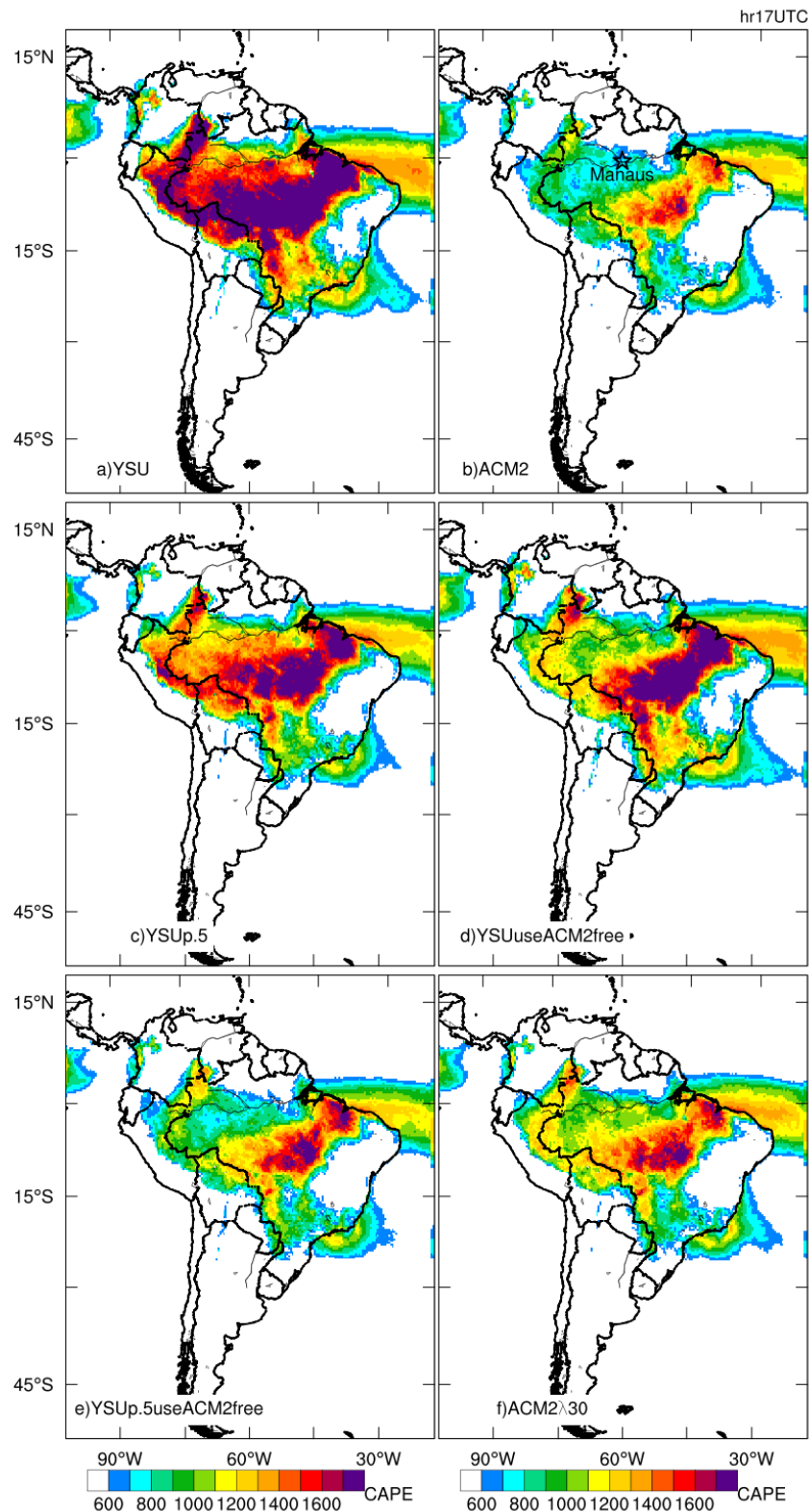


Figure 8. Average CAPE at 17 UTC during January-February 2019 simulated by (a) YSU, (b) ACM2 and 4 sensitivity simulations (c) YSU_{p.5}, (d) YSU_{useACM2free}, (e) YSU_{p.5useACM2free}, (f) ACM2_{λ30}.

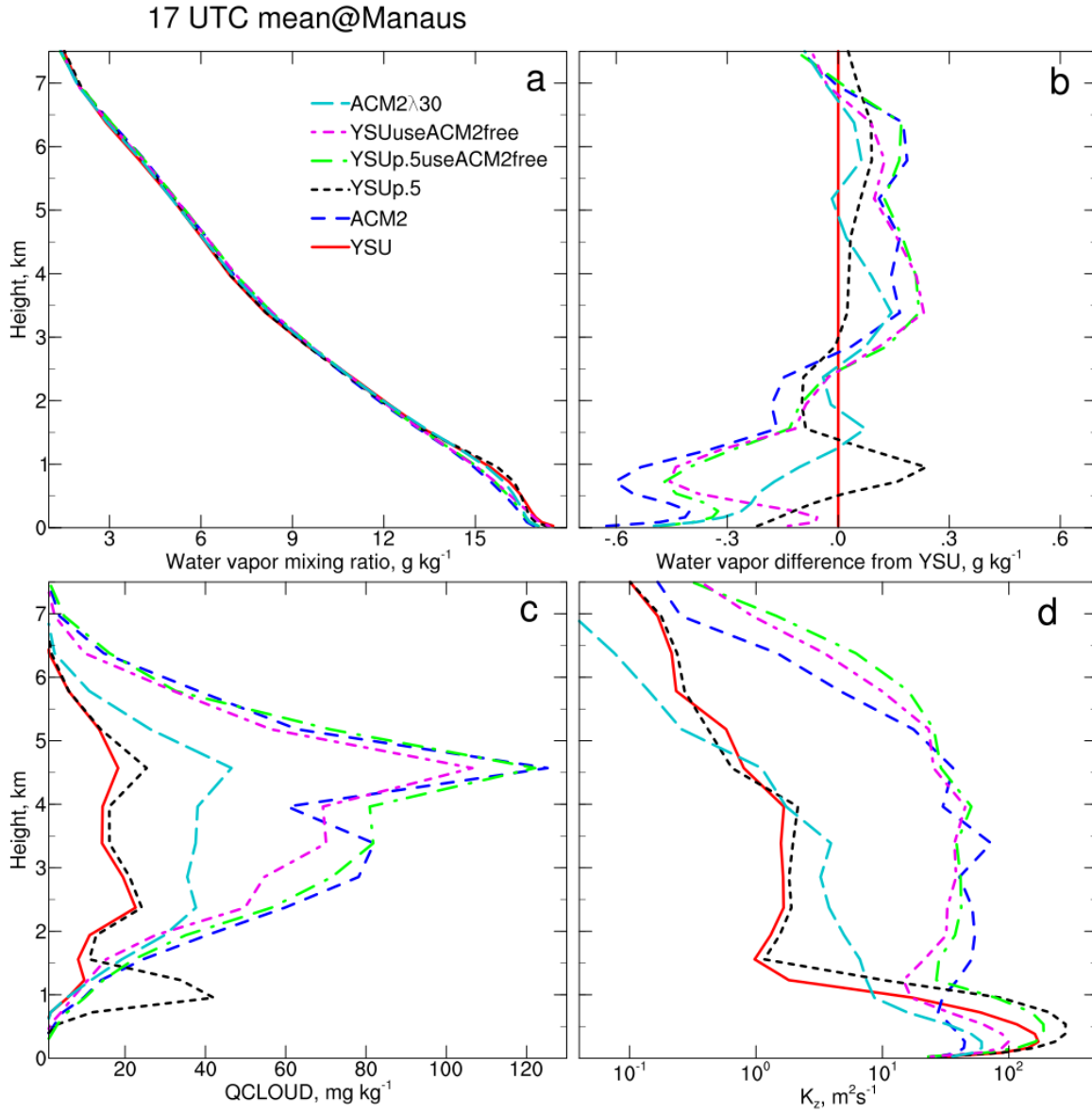


Figure 9. Mean profiles of (a) water vapor mixing ratio, (b) water vapor difference from that simulated by YSU, (c) cloud water mixing ratio (QCLOUD), and (d) vertical mixing coefficient (K_z) at 17 UTC during January-February 2019 at Manaus (location marked in Fig. 8b) simulated by YSU, ACM2 and 4 sensitivity simulations YSUp.5, YSUuseACM2free, YSUp.5useACM2free, ACM2 λ 30.

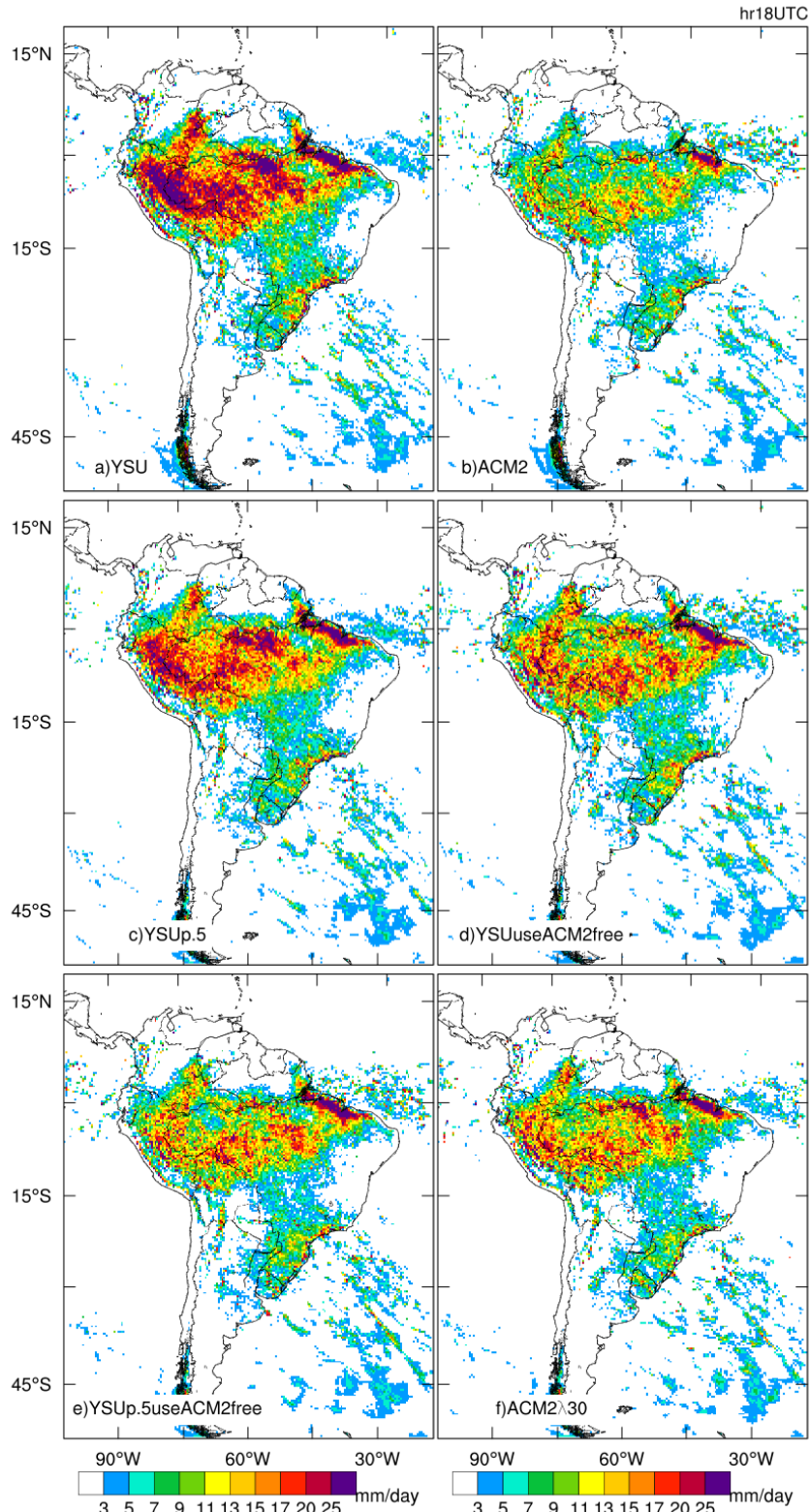


Figure 10. Average precipitation rate at 18 UTC during January-February 2019 simulated by (a) YSU, (b) ACM2 and 4 sensitivity simulations (c) YSU p.5 , (d) YSU use ACM2 free , (e) YSU p.5 use ACM2 free, (f) ACM2 λ_{30} .

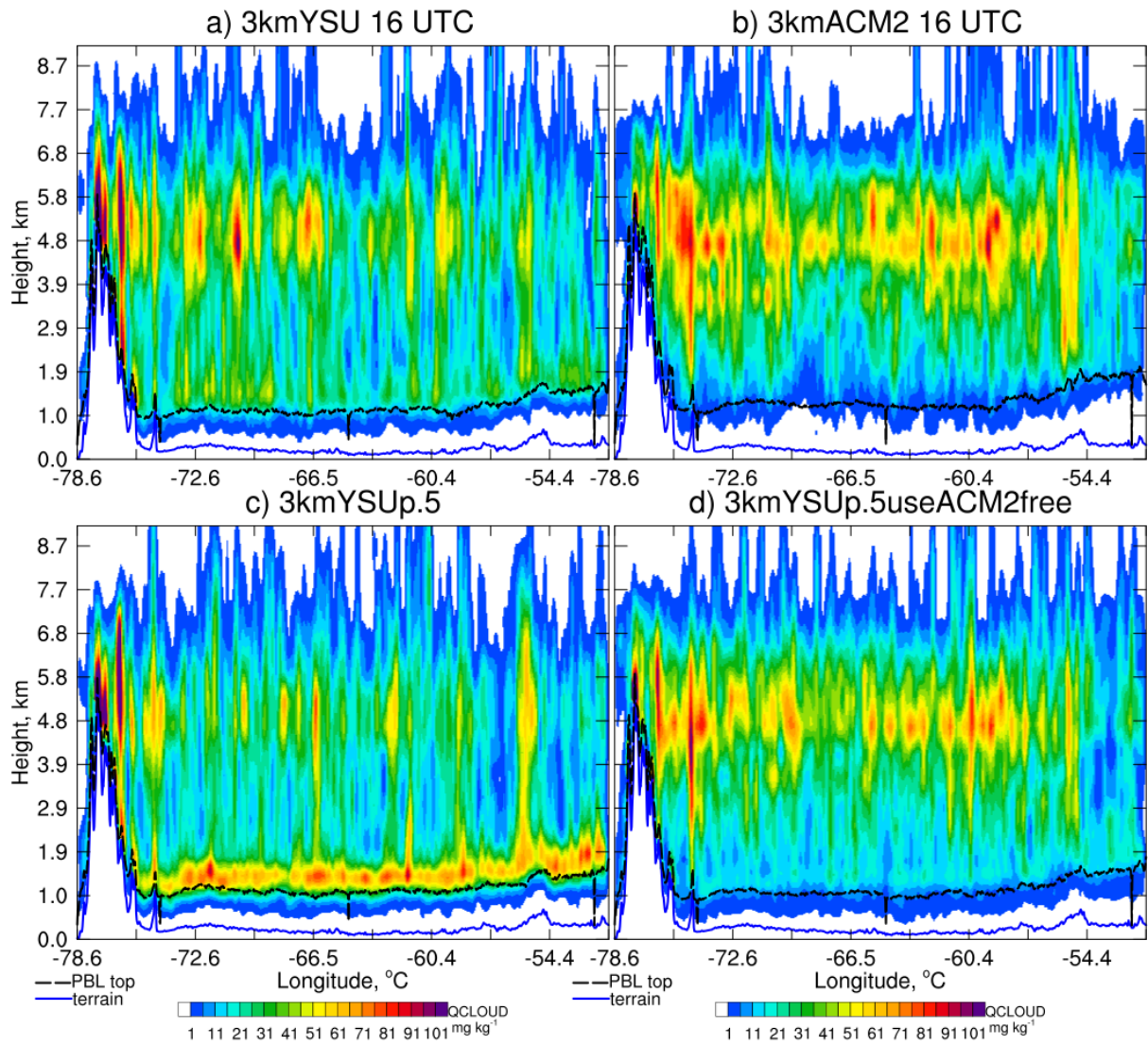


Figure 11. Cross-section of average noon-time cloud water mixing ratios over the Amazon in Jan-Feb 2019 simulated by (a) 3kmYSU , (b) 3kmACM2 , (c) 3kmYSUp.5 , and (d) 3kmYSUp.5useACM2free. The location of these cross-sections is marked in Fig. 4l

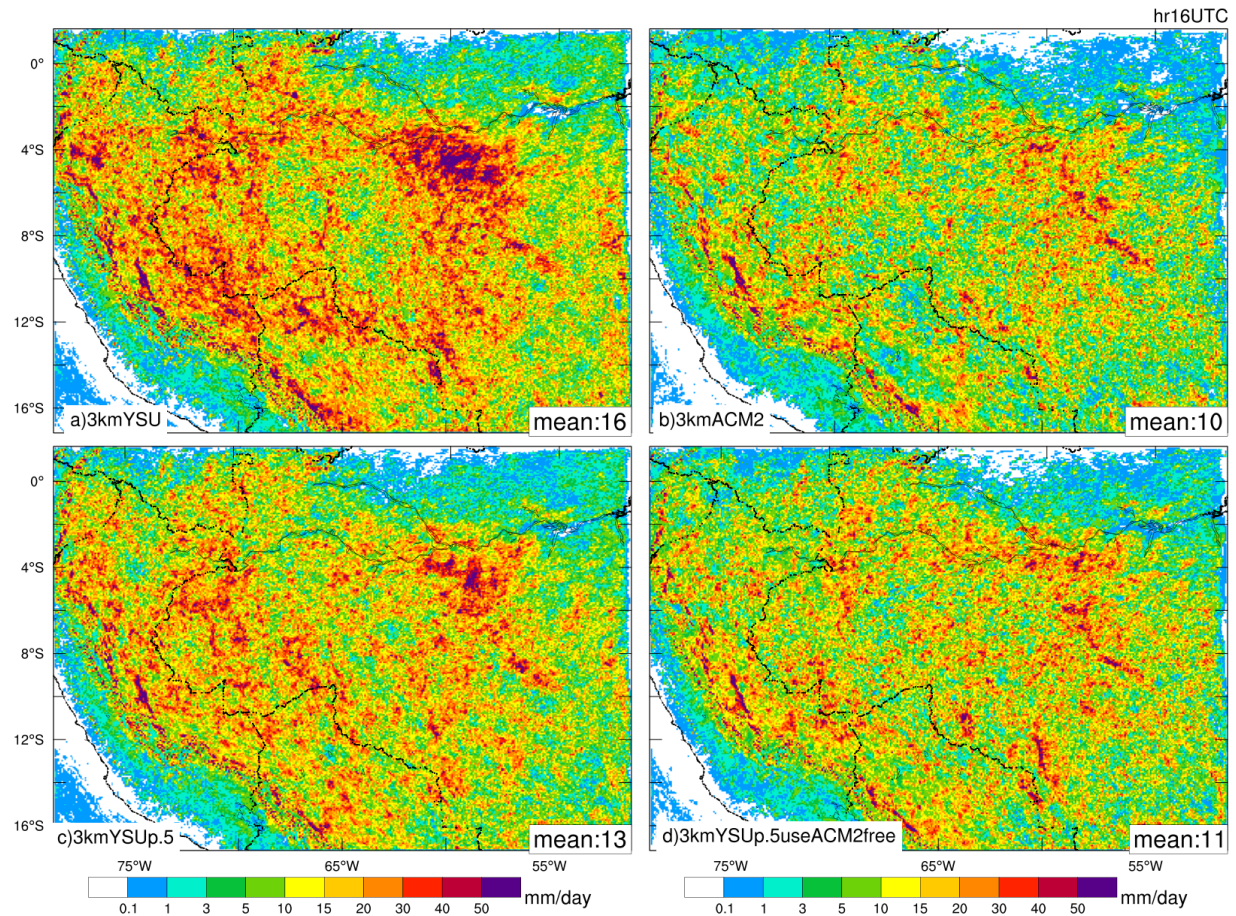


Figure 12. Average noon-time precipitation rate in Jan-Feb 2019 simulated by (a) 3kmYSU, (b) 3kmACM2, (c) 3kmYSUp.5, and (d) 3kmYSUp.5useACM2free. The domain-averaged values are marked.