

**Modeling with the SAPRC99
Chemical Mechanism:
Preliminary Analysis of HGB Base
Case Modeling**

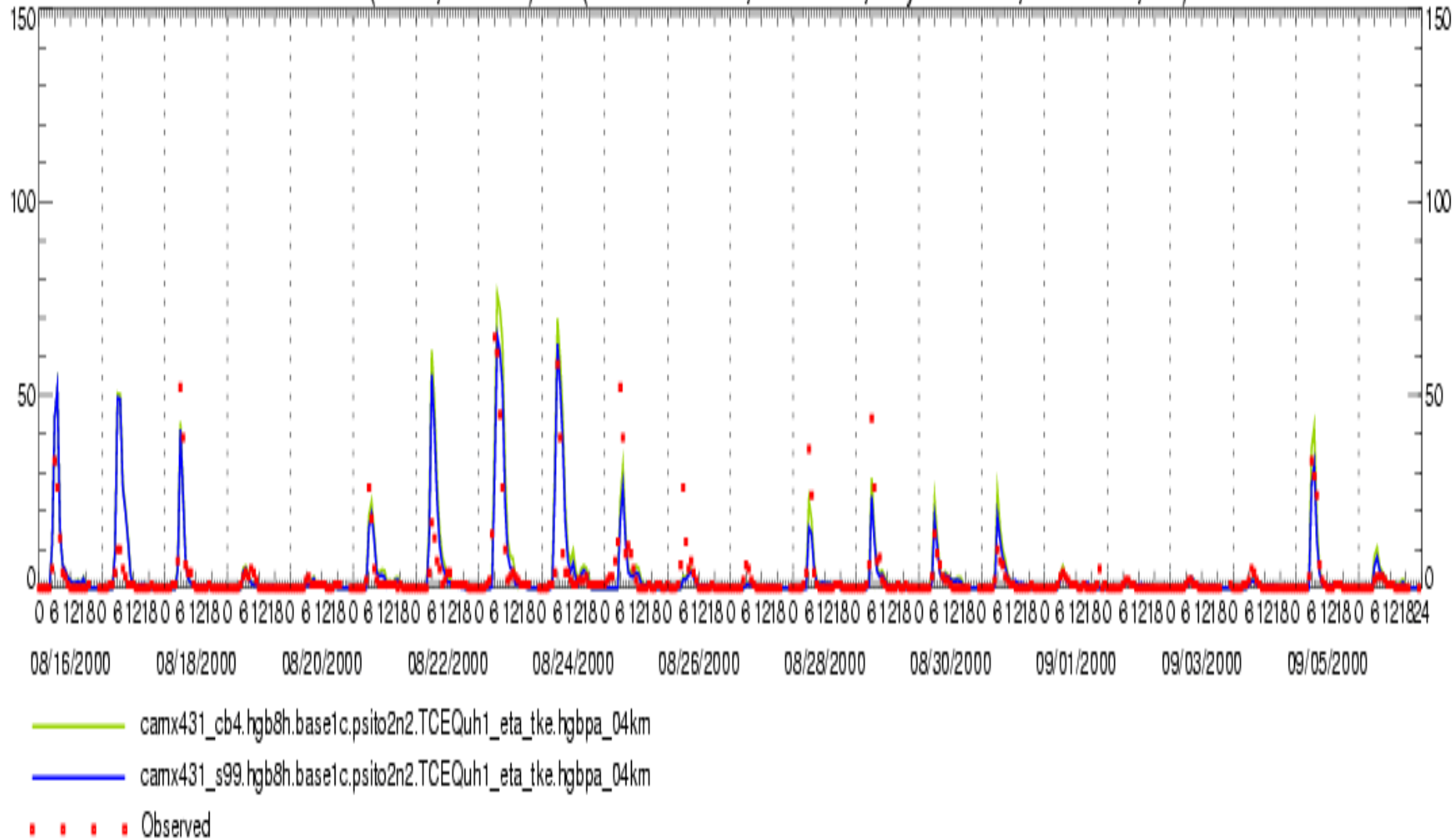
Mark Estes

SIP Informational Meeting
8 June 2006

Hourly Average NO Concentration (ppb) at Layer 1 (08/16/2000–09/06/2000)

camx431_s99.hgb8h.base1c.psit02n2.TCEQuh1_eta_tke.hgbpa_04km vs camx431_cb4.hgb8h.base1c.psit02n2.TCEQuh1_eta_tke.hgbpa_04km

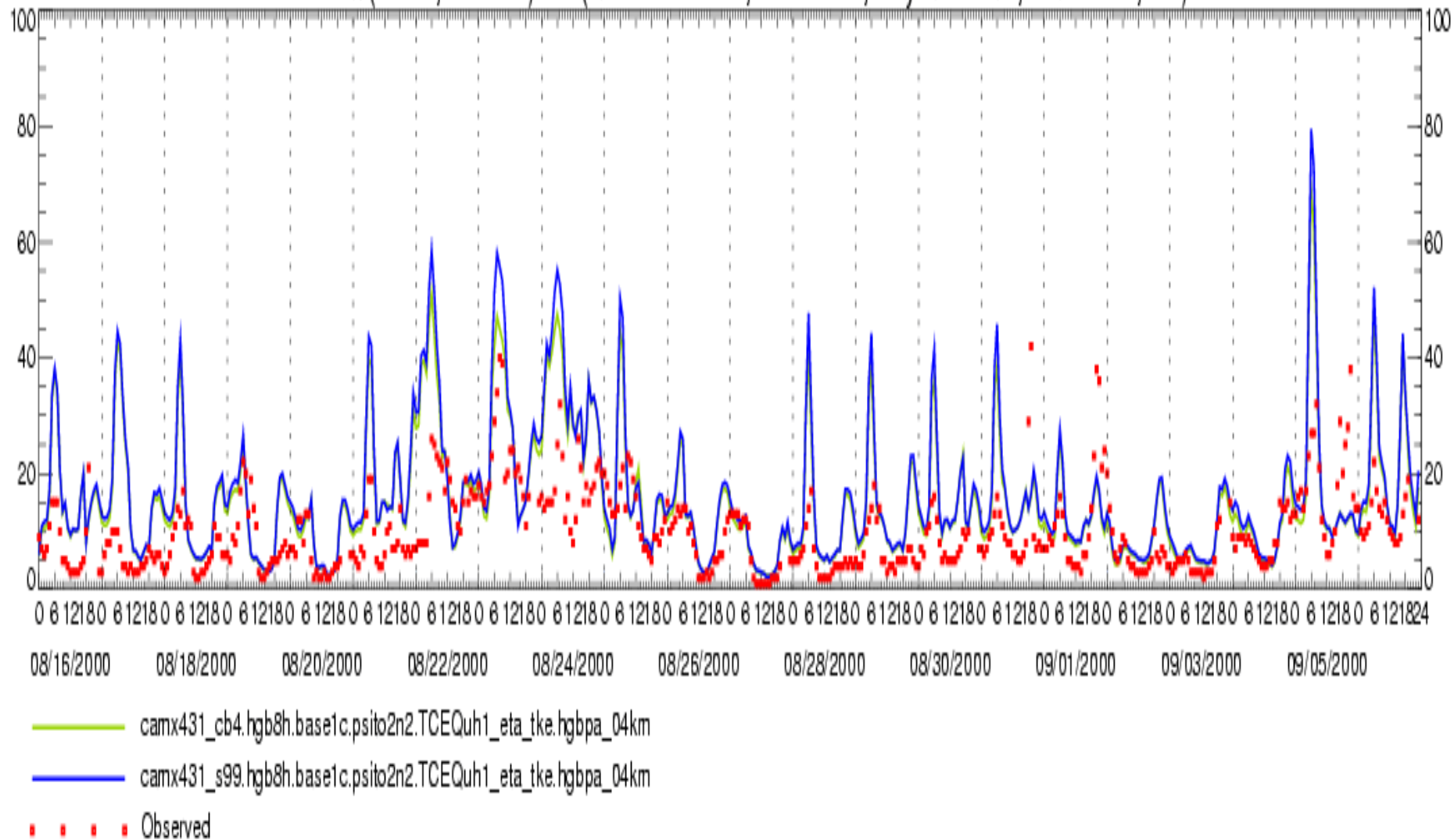
BAYP at (435.5,-1114.4) km (airs482010055, C53/A146, Bayland Park, Harris Co., TX)



Hourly Average NO₂ Concentration (ppb) at Layer 1 (08/16/2000–09/06/2000)

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke.hgbpa_04km vs camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke.hgbpa_04km

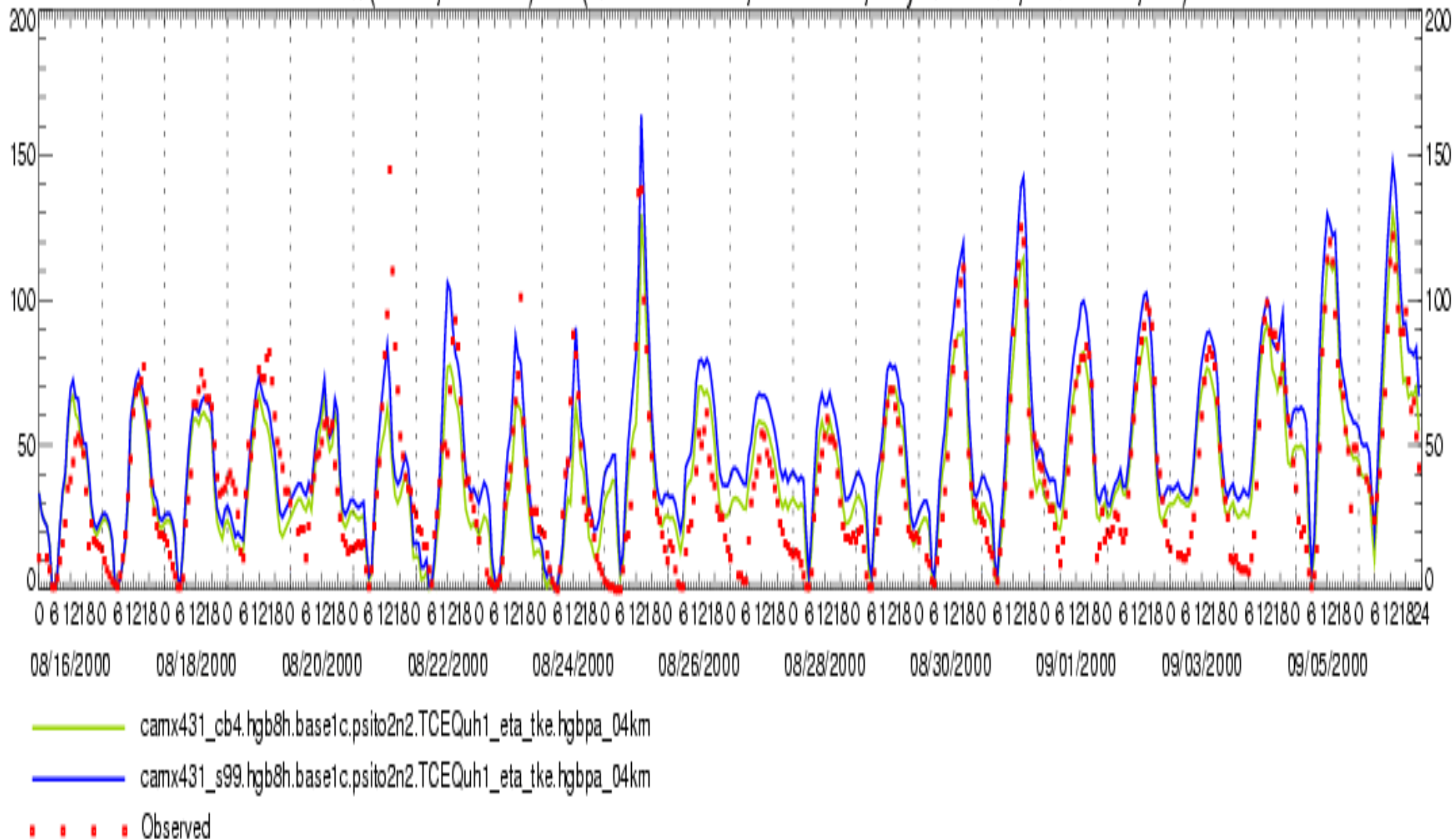
BAYP at (435.5,-1114.4) km (airs482010055, C53/A146, Bayland Park, Harris Co., TX)



Hourly Average O₃ Concentration (ppb) at Layer 1 (08/16/2000–09/06/2000)

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke.hgbpa_04km vs camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke.hgbpa_04km

BAYP at (435.5,-1114.4) km (airs482010055, C53/A146, Bayland Park, Harris Co., TX)



Preliminary analysis

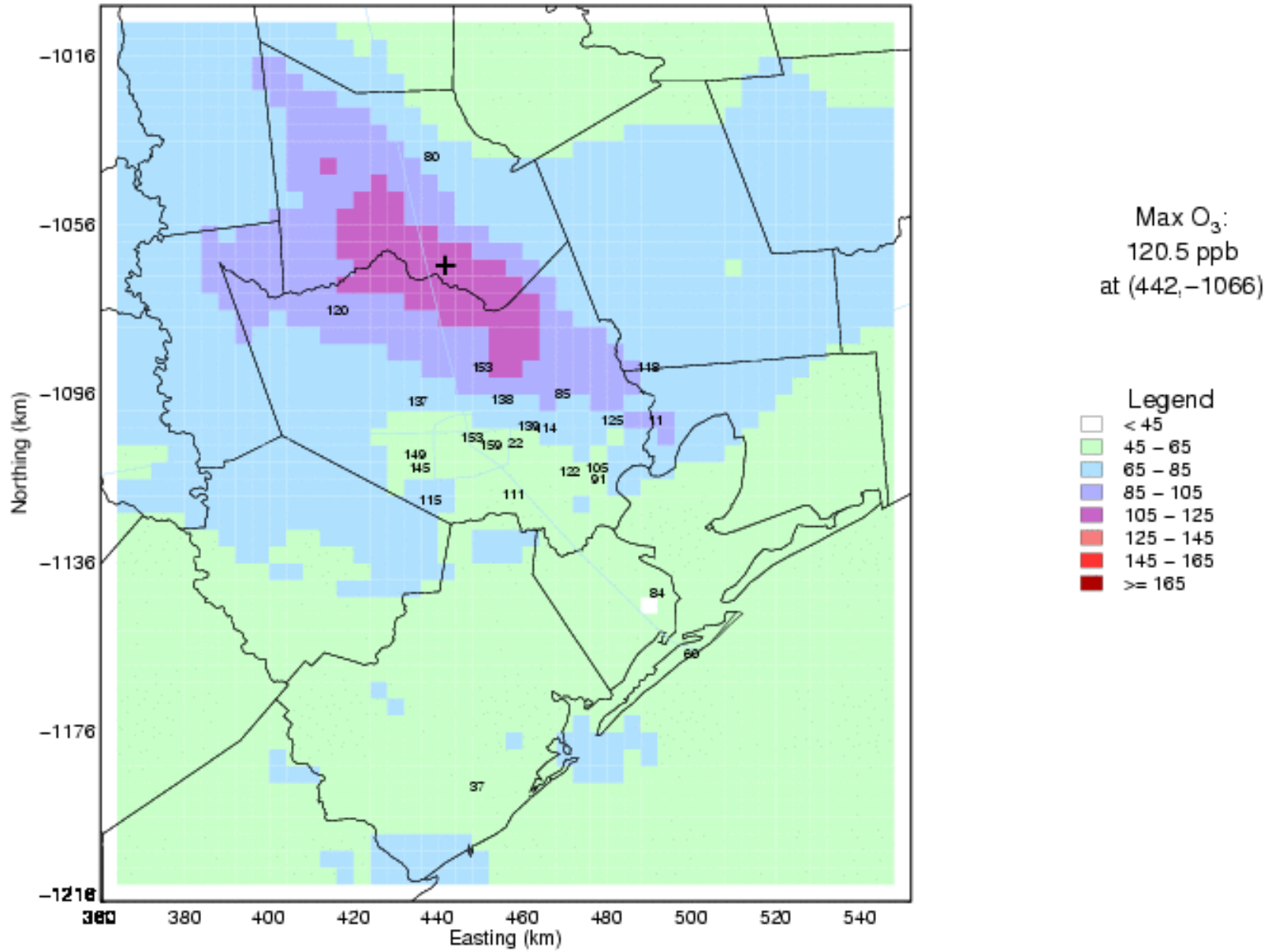
- SAPRC99 appears to convert more NO to NO₂.
- This may be one reason why it generally makes more ozone than CB4 in the base case.

Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/21/2000

camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4

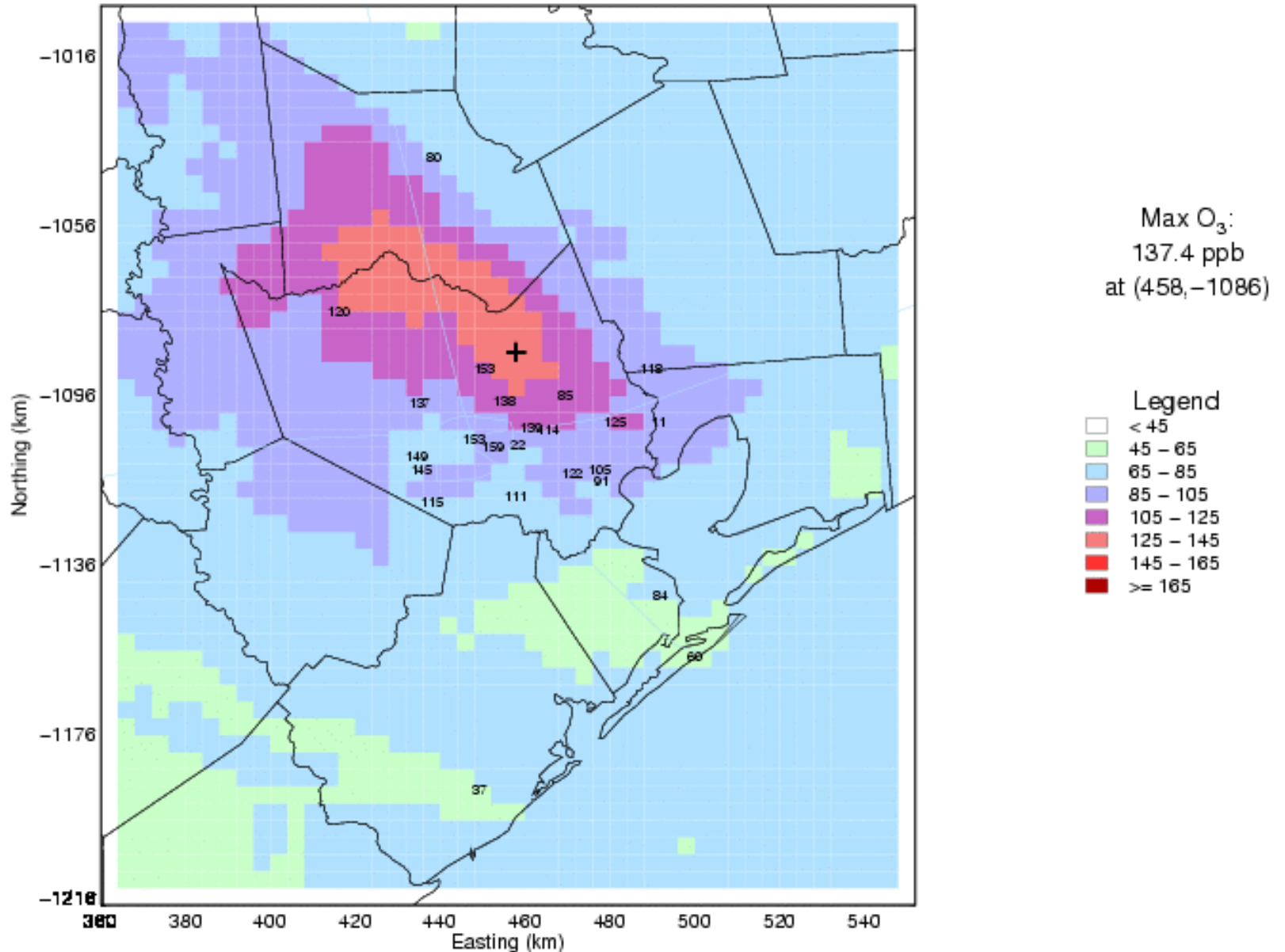


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/21/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1

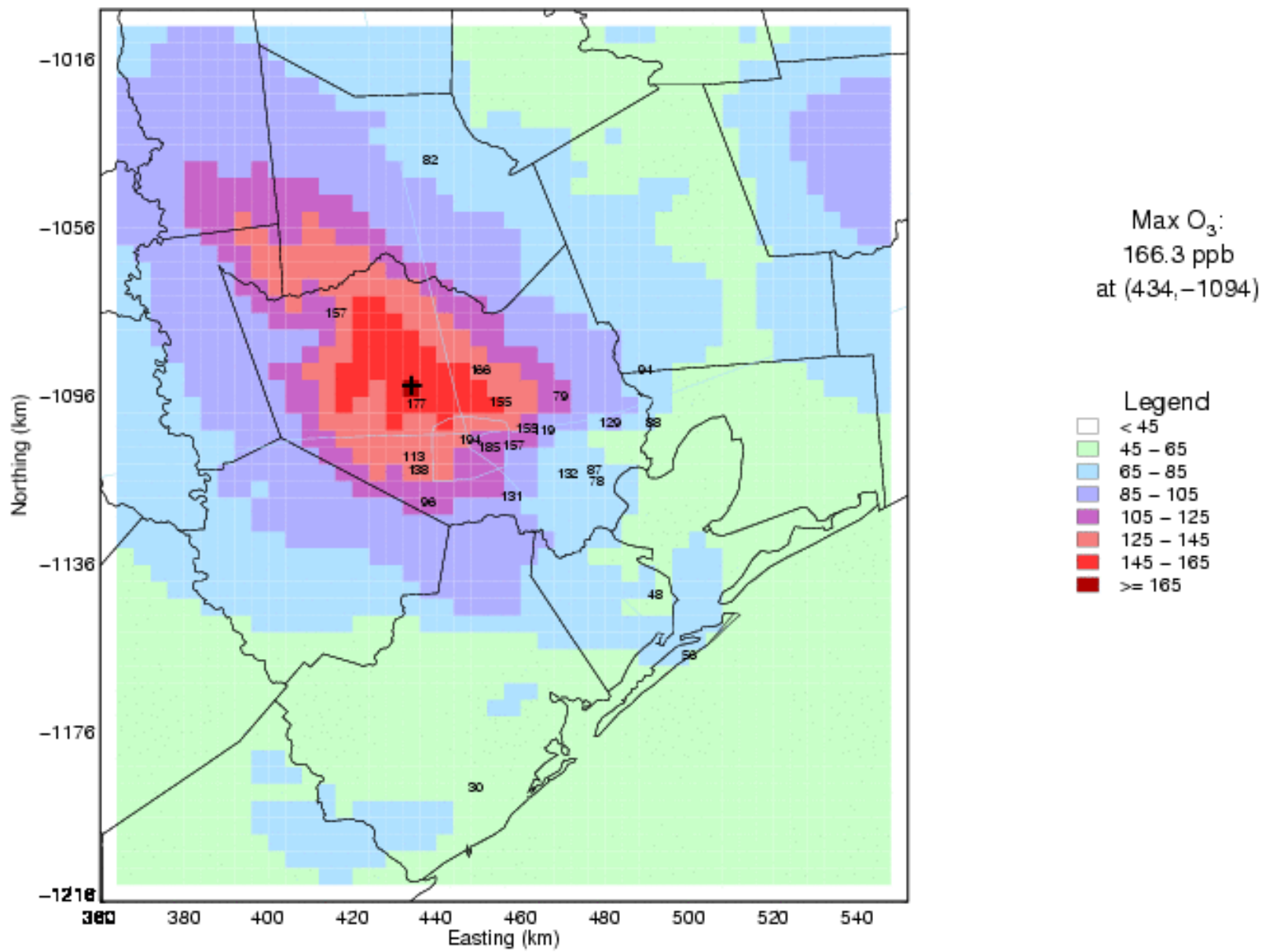


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/25/2000

camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4

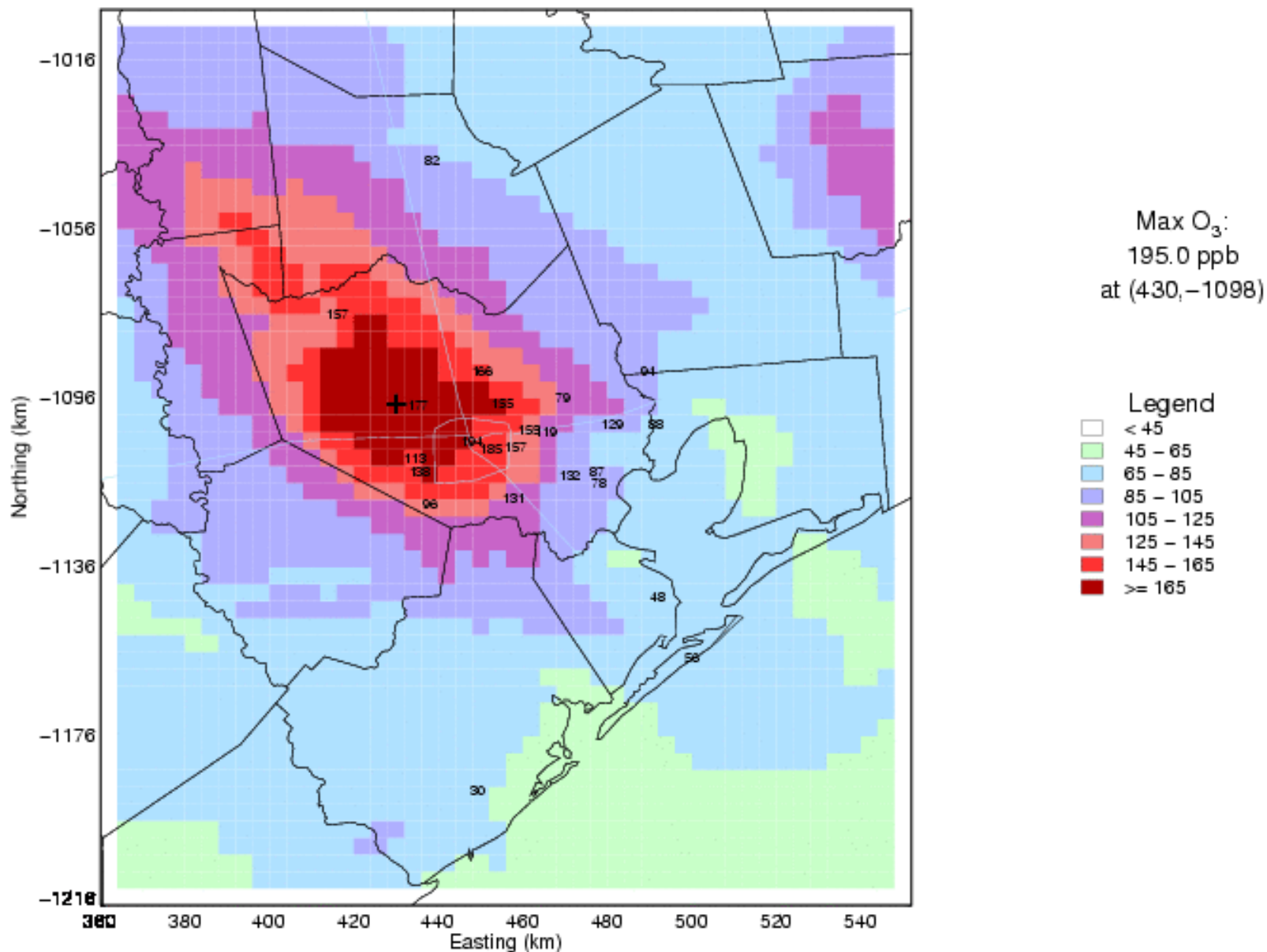


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/25/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1

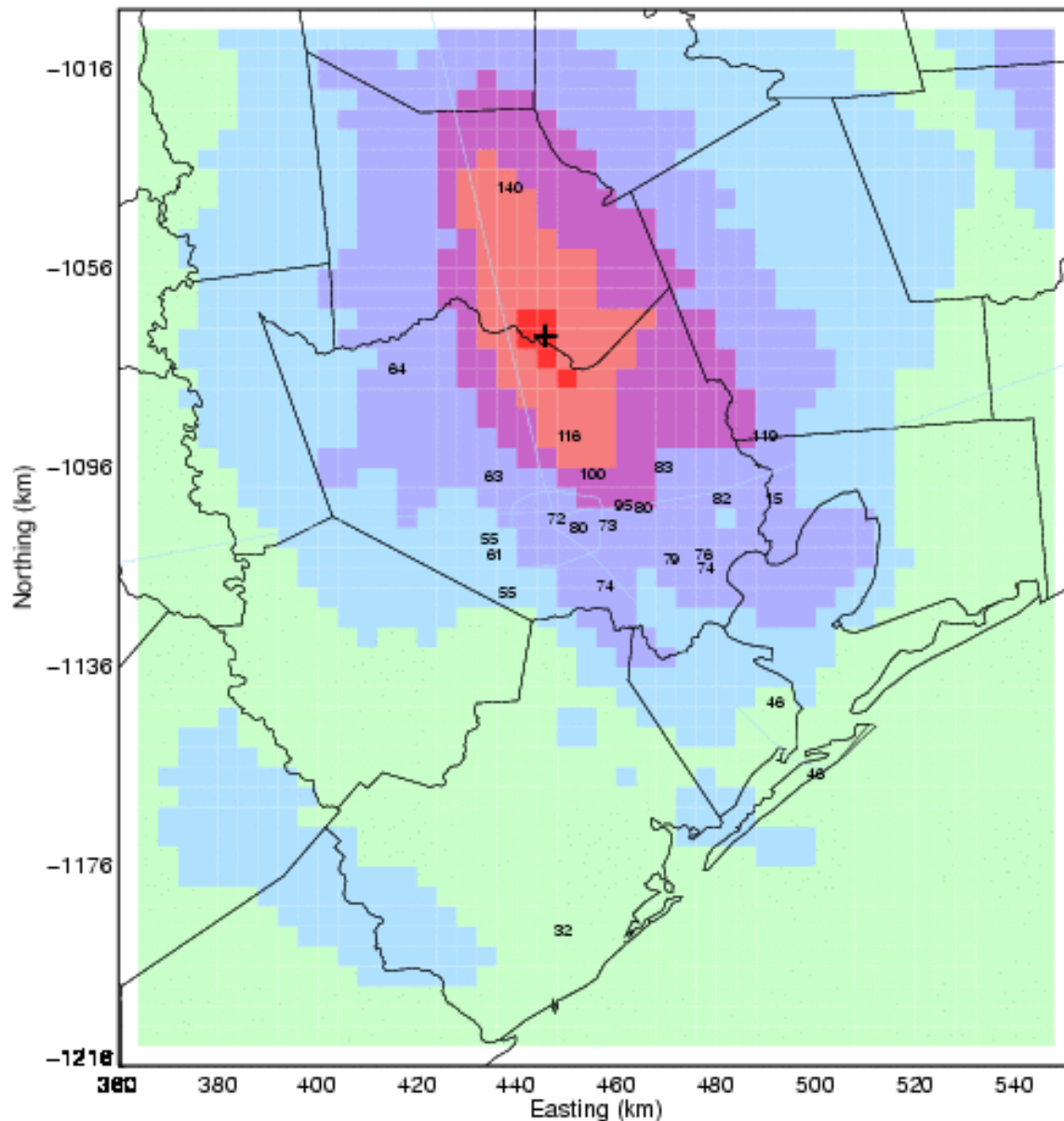


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/26/2000

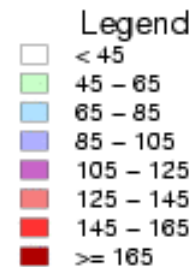
camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4



Max O₃:
148.3 ppb
at (446, -1070)

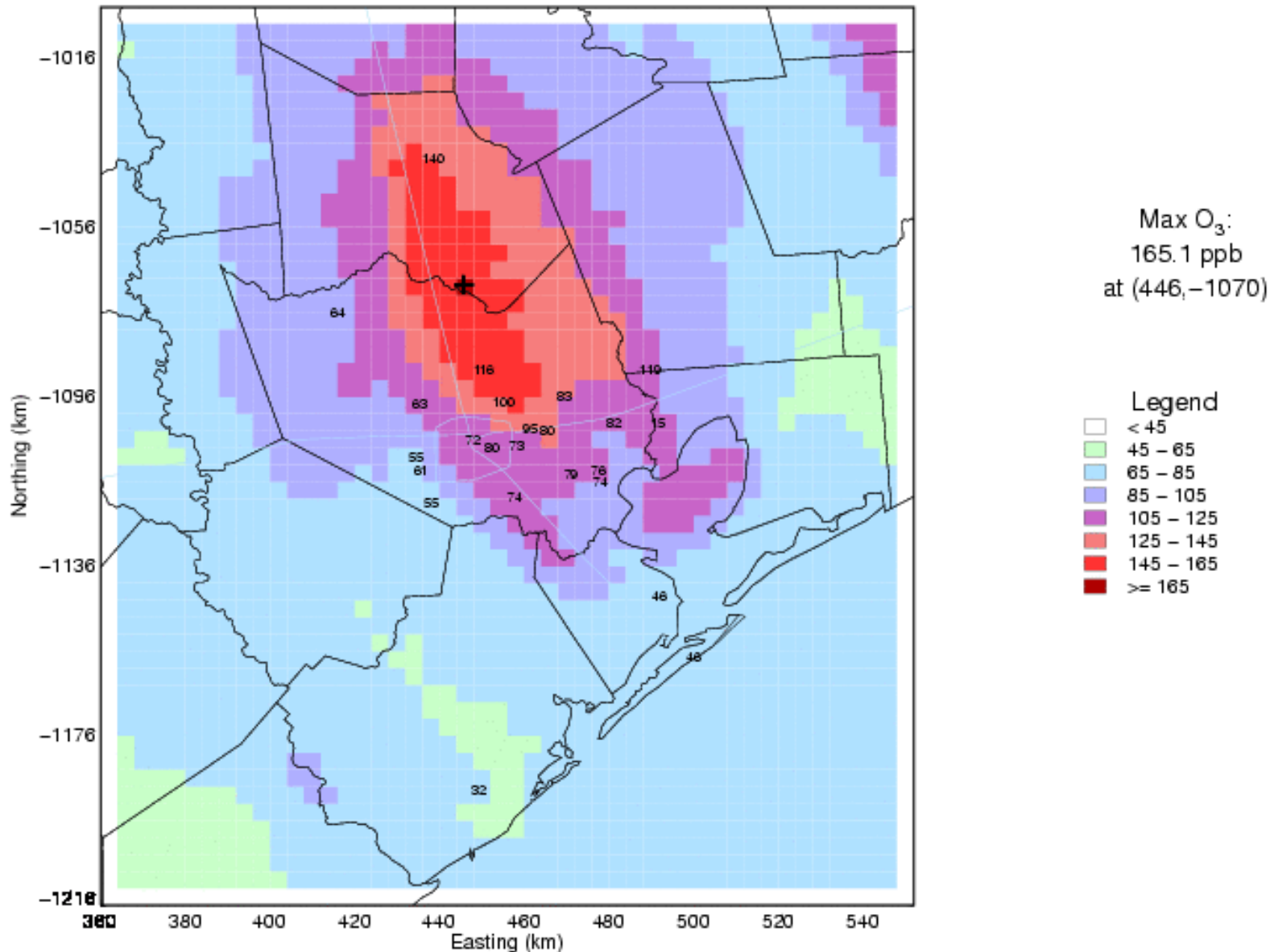


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/26/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1

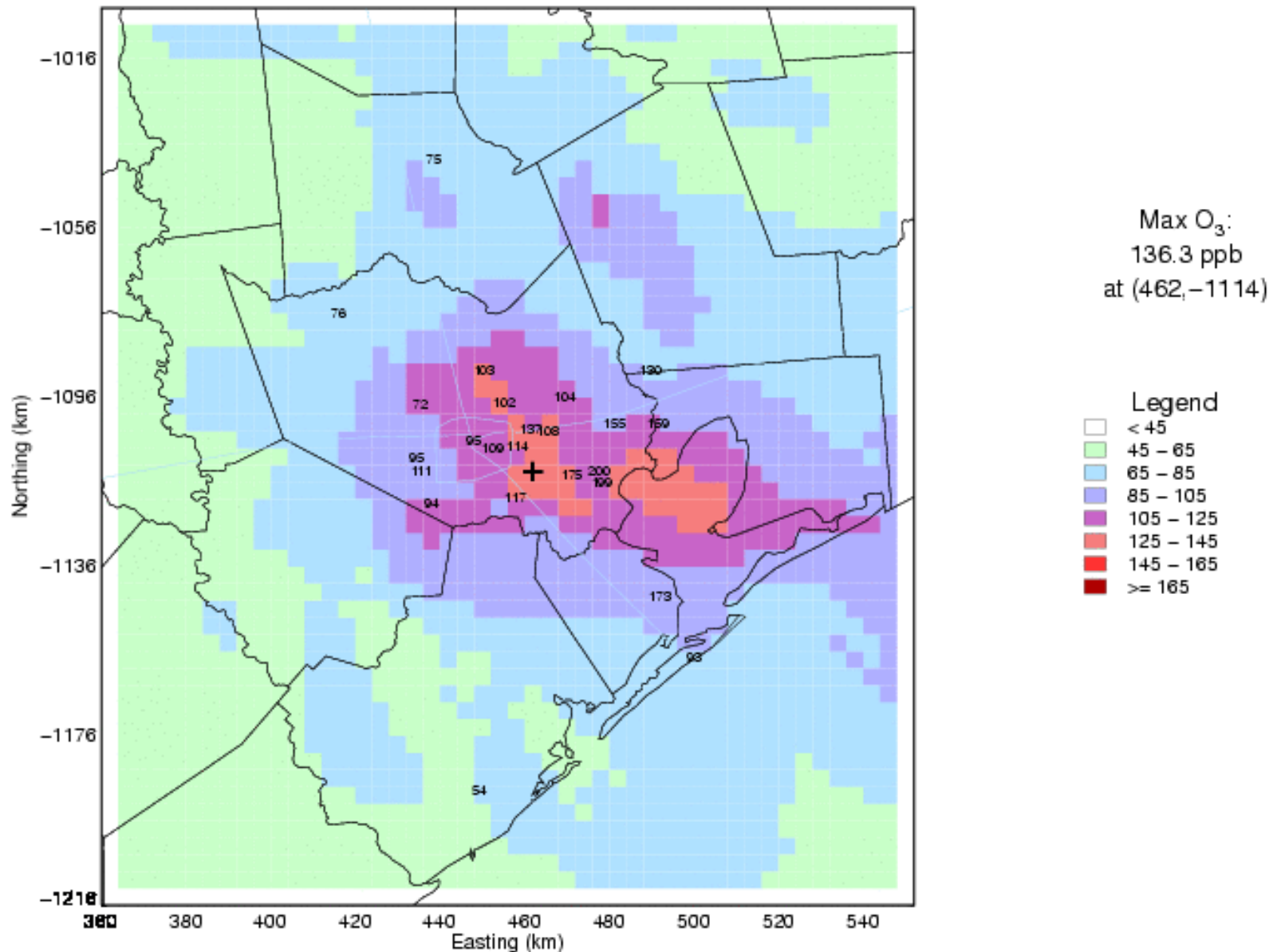


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/30/2000

camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4

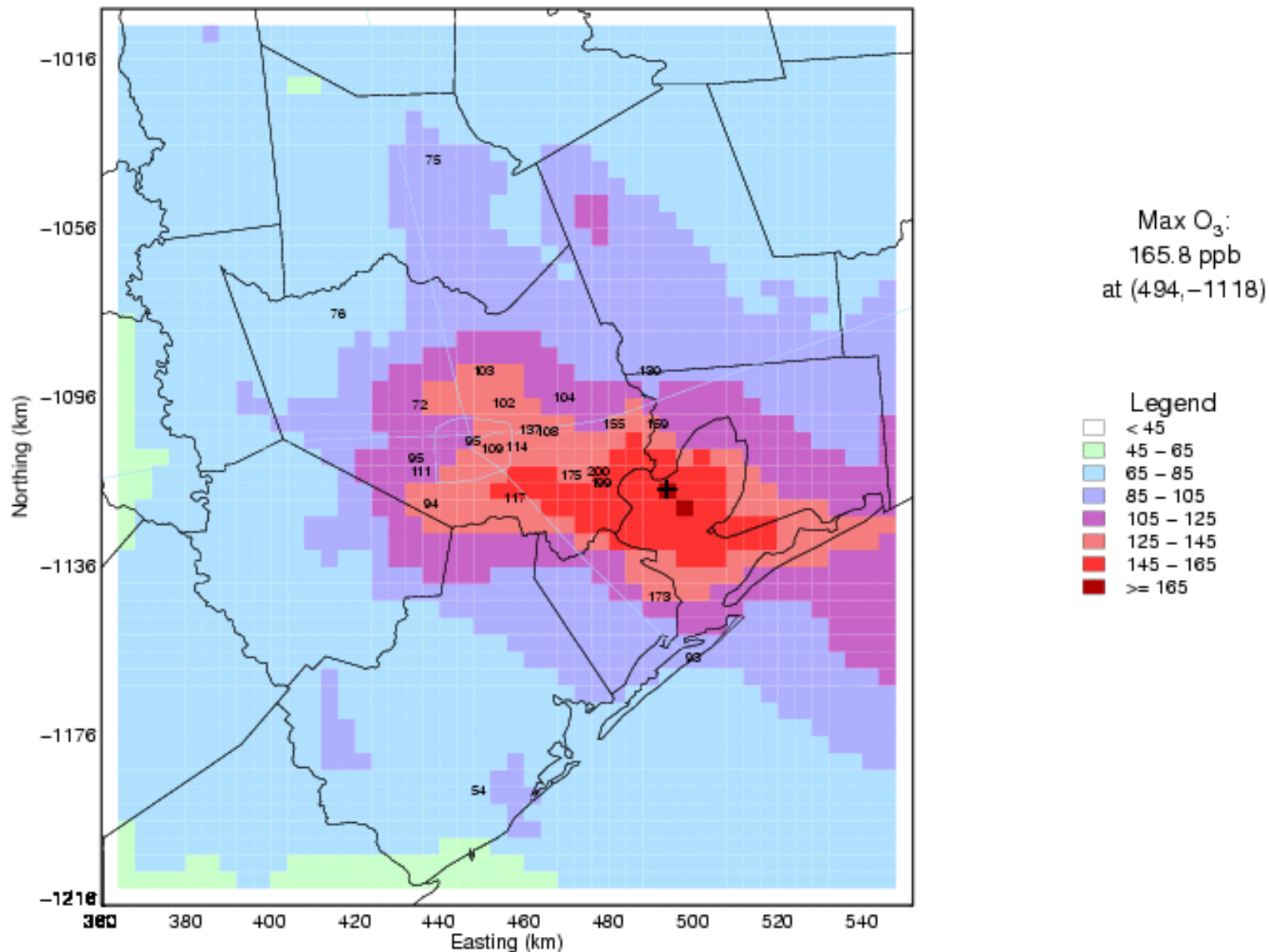


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/30/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1

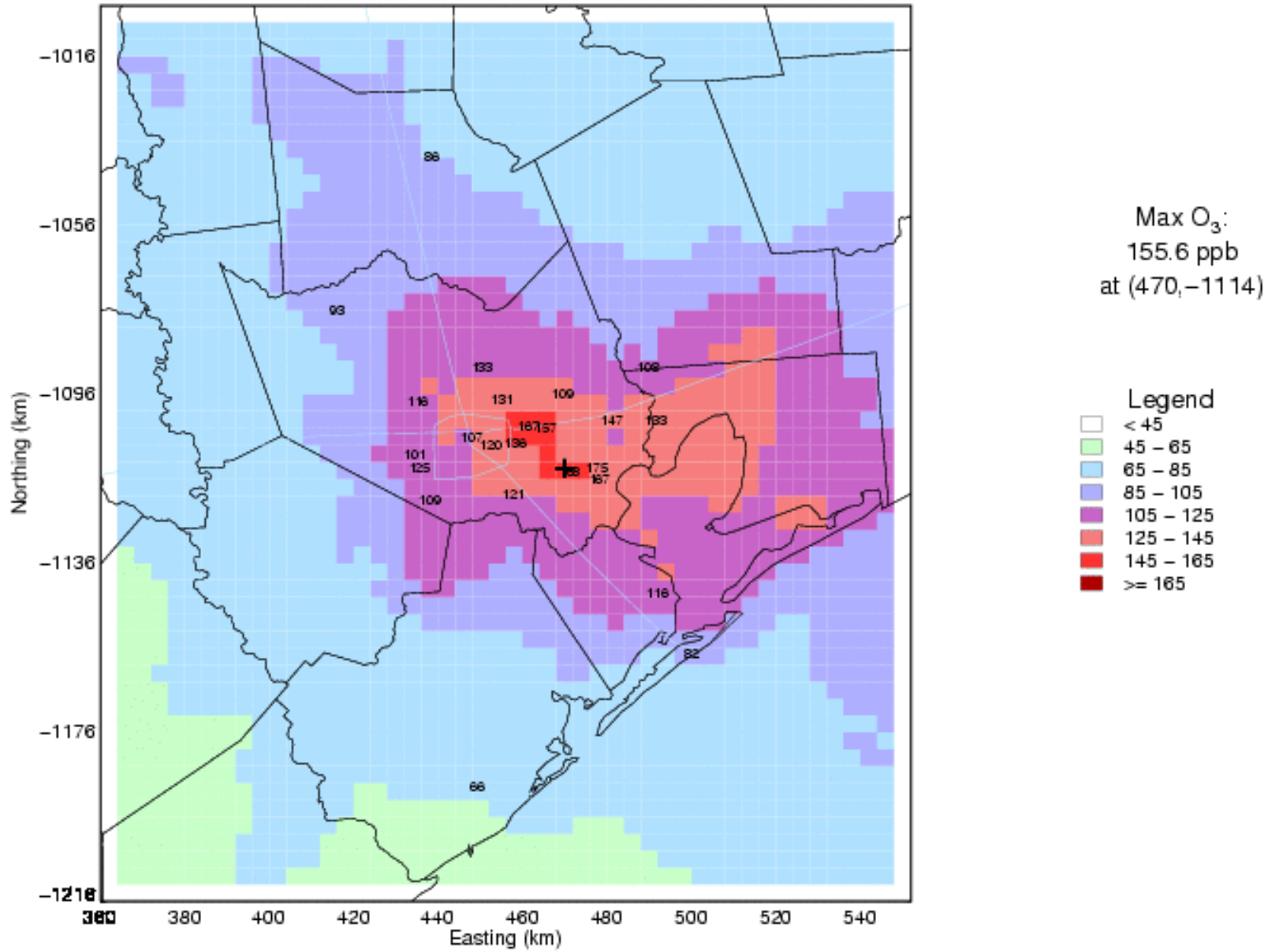


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/31/2000

camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4

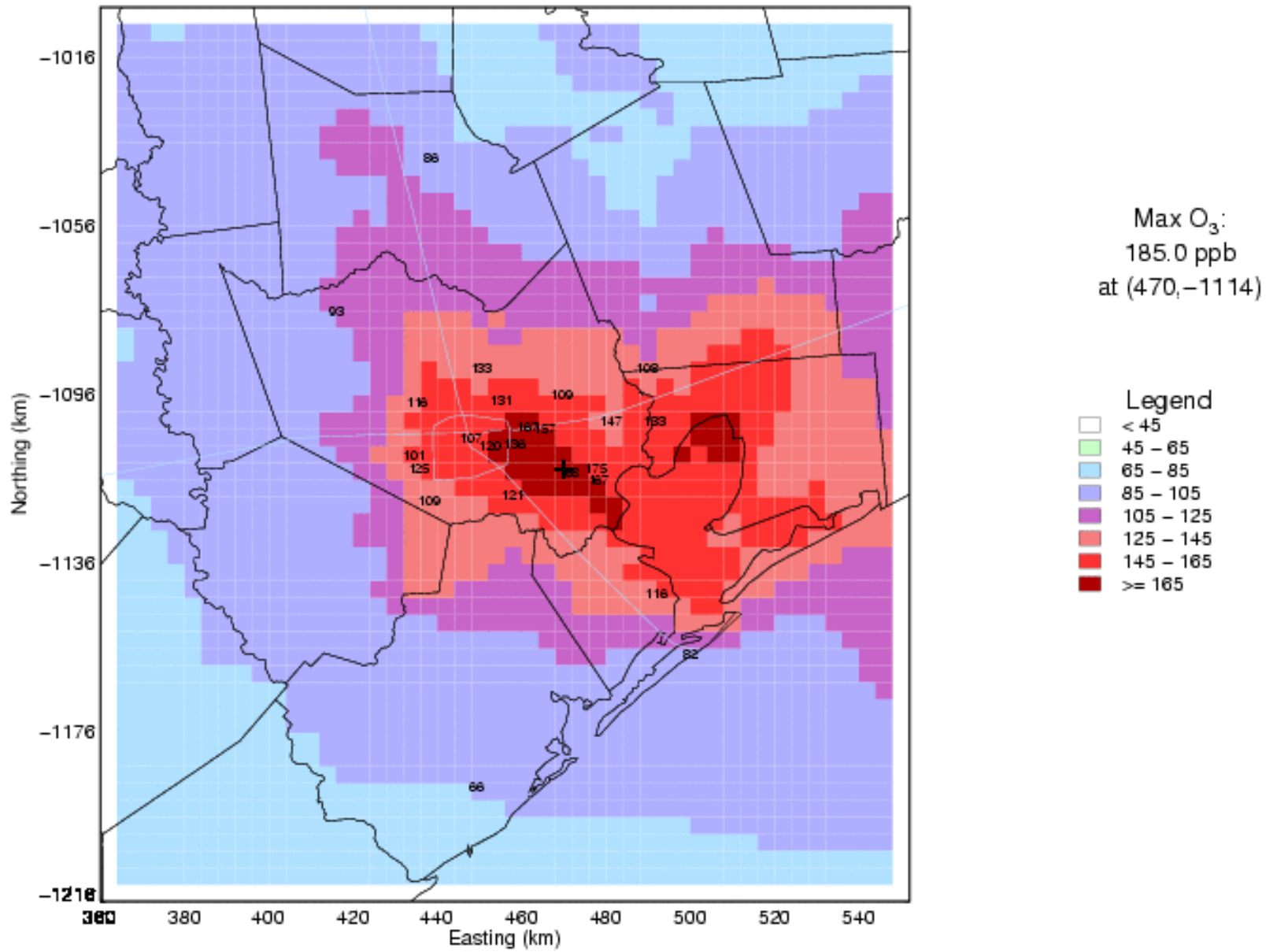


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 08/31/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1

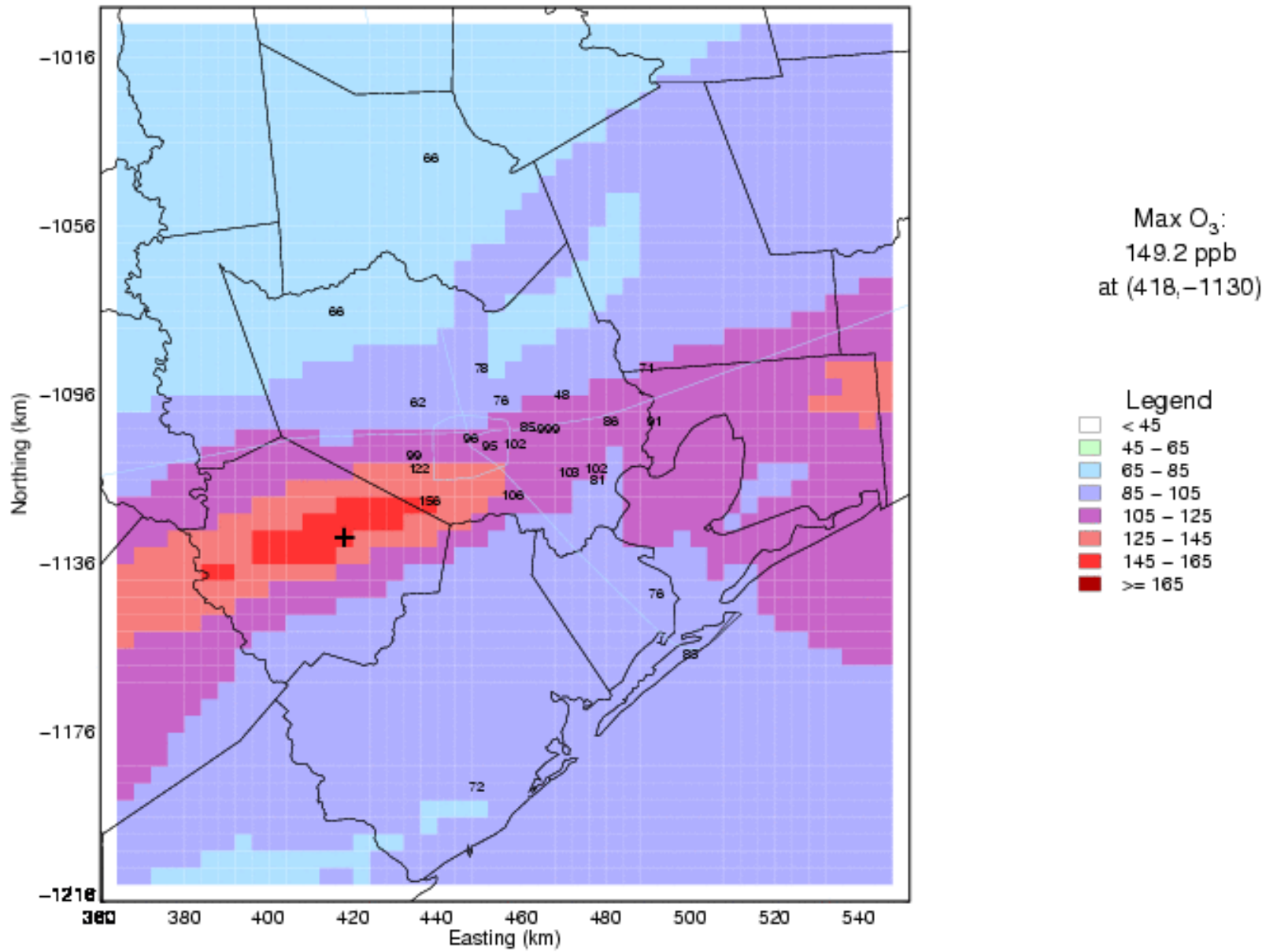


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 09/06/2000

camx431_cb4.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

Layer 1

CB4

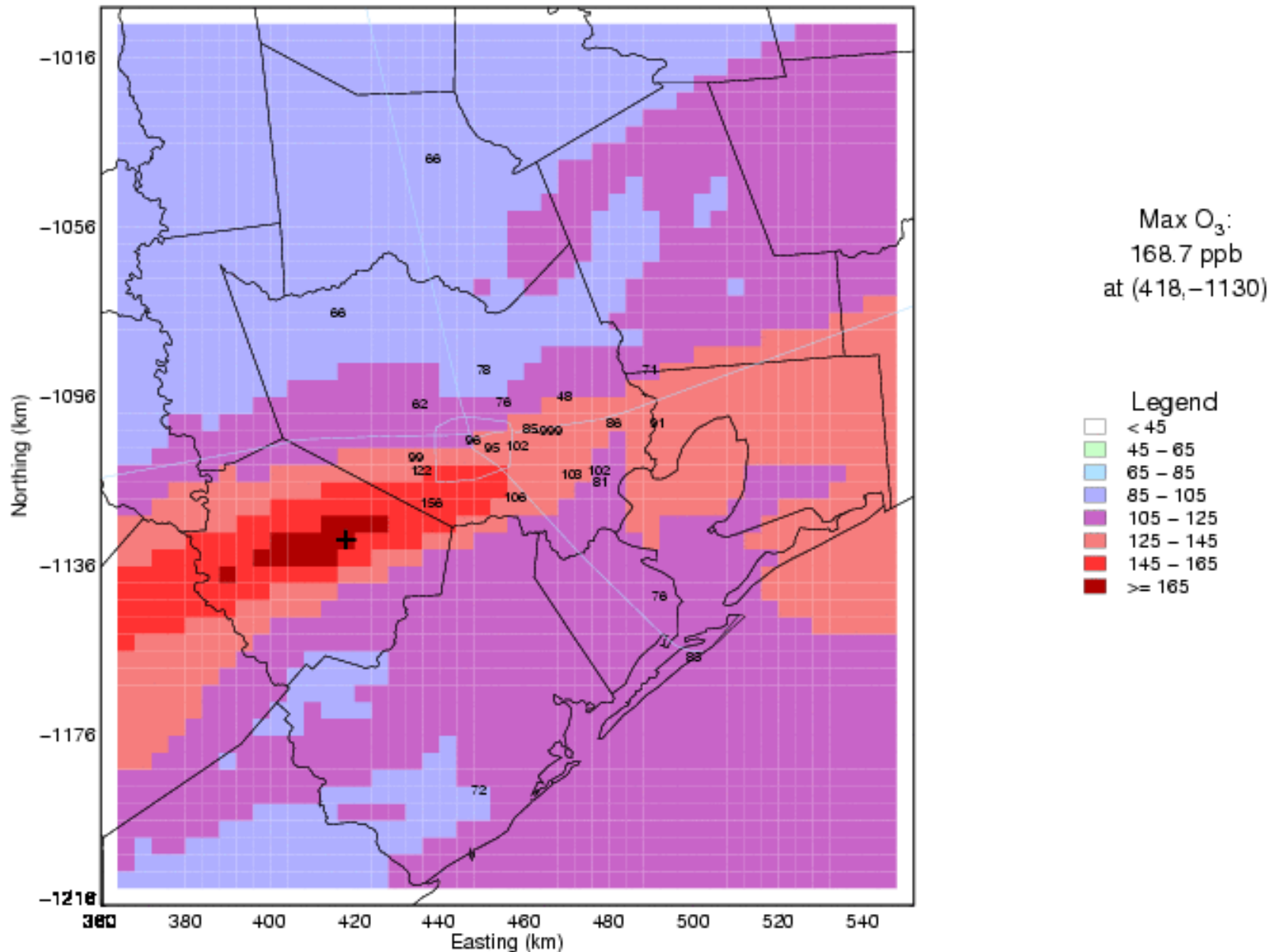


Daily Maximum Hourly Average O₃ Concentrations (ppb) for 09/06/2000

camx431_s99.hgb8h.base1c.psito2n2.TCEQuh1_eta_tke

SAPRC99

Layer 1



Previous studies

- Other comparisons of SAPRC99 and CB4 have shown that often SAPRC99 is more responsive to controls than CB4 (Arnold and Dennis, 2006).
- Faraji et al. (2005) modeled Houston with SAPRC99 and CB4, and found that SAPRC99 gave larger reductions to NOX controls than CB4.

Preliminary results

- SAPRC99 gives higher ozone, which yields a high bias in ozone in the last part of the episode, but is an improvement on some episode days.
- Further analysis (process analysis and other diagnostic runs) may reveal why SAPRC99 is giving a different answer from CB4.