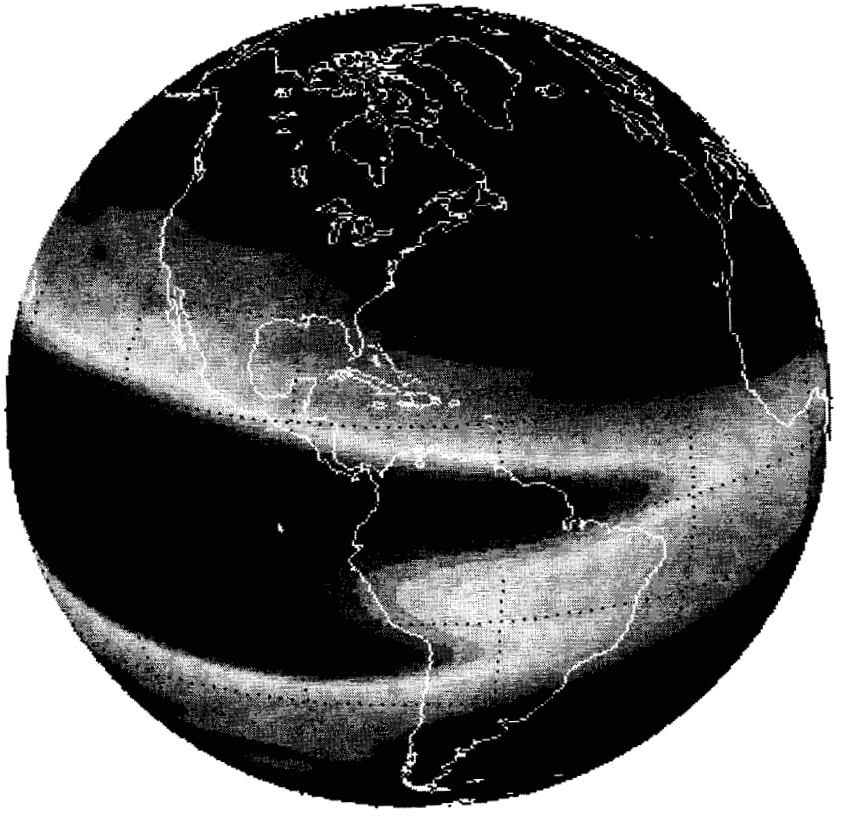
Forecasting Equatorial Spread-*F* Using a Global Assimilative Ionospheric Model



Xiaoqing Pi, JPL, USC

Chunming Wang, USC

Gary Rosen, USC

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Yogeshwar Sahai, UNIVAP

Eurico R. de Paula, INPE

Mangalathayil A. Abdu, INPE

EGS-AGU-EUG 2003, Nice, France, April 06-11, 2003.

Outline

- 4DVAR Approach and Process
- Simulation Experiments
  - Low latitude assimilation to estimate E×B drift and wind simultaneously
  - Drift and wind parameters and grid
  - Ionospheric weather under perturbations of drift and wind
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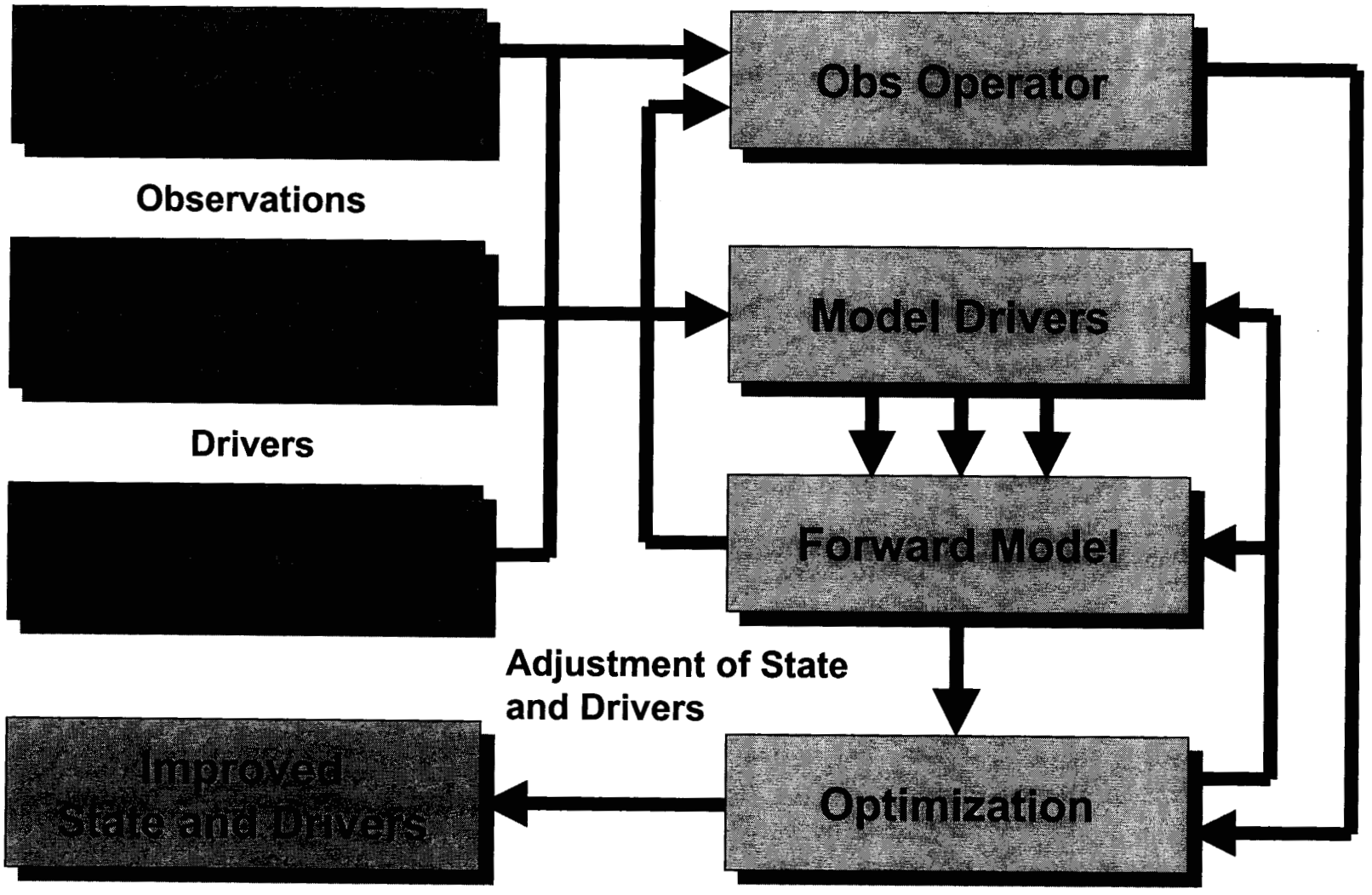

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$$\nabla \vec{J}(\alpha)$$

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To estimate ionospheric drivers and optimize the state

Observation System Simulation Experiments

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- GAIM
- GPS satellites
- Available IGS global network: ground measurements of TEC
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- Low latitude Ionosphere: ±30° latitudes
- Global in longitude dimension

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- Improvement of ionospheric state (*F*-region N_e and TEC)

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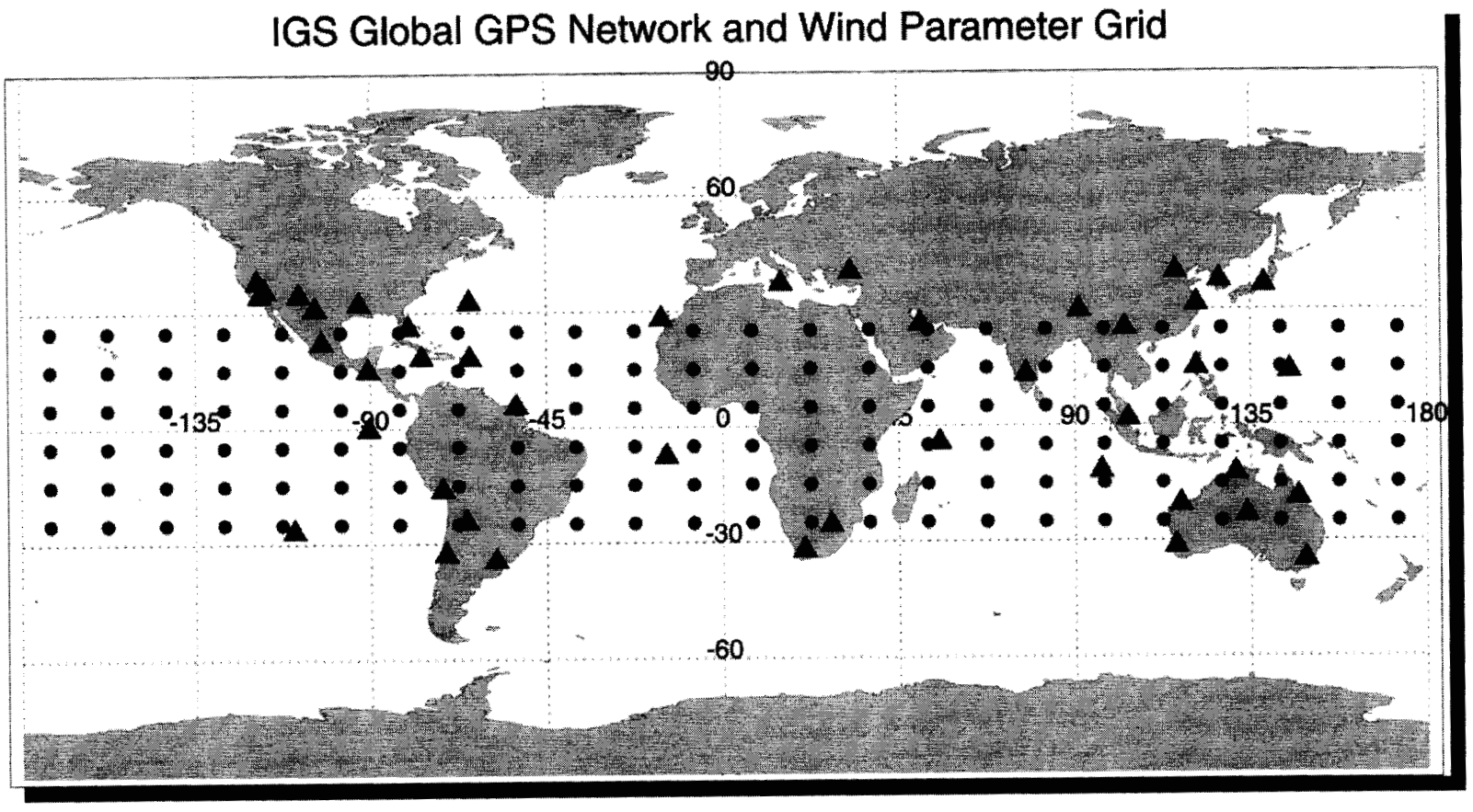

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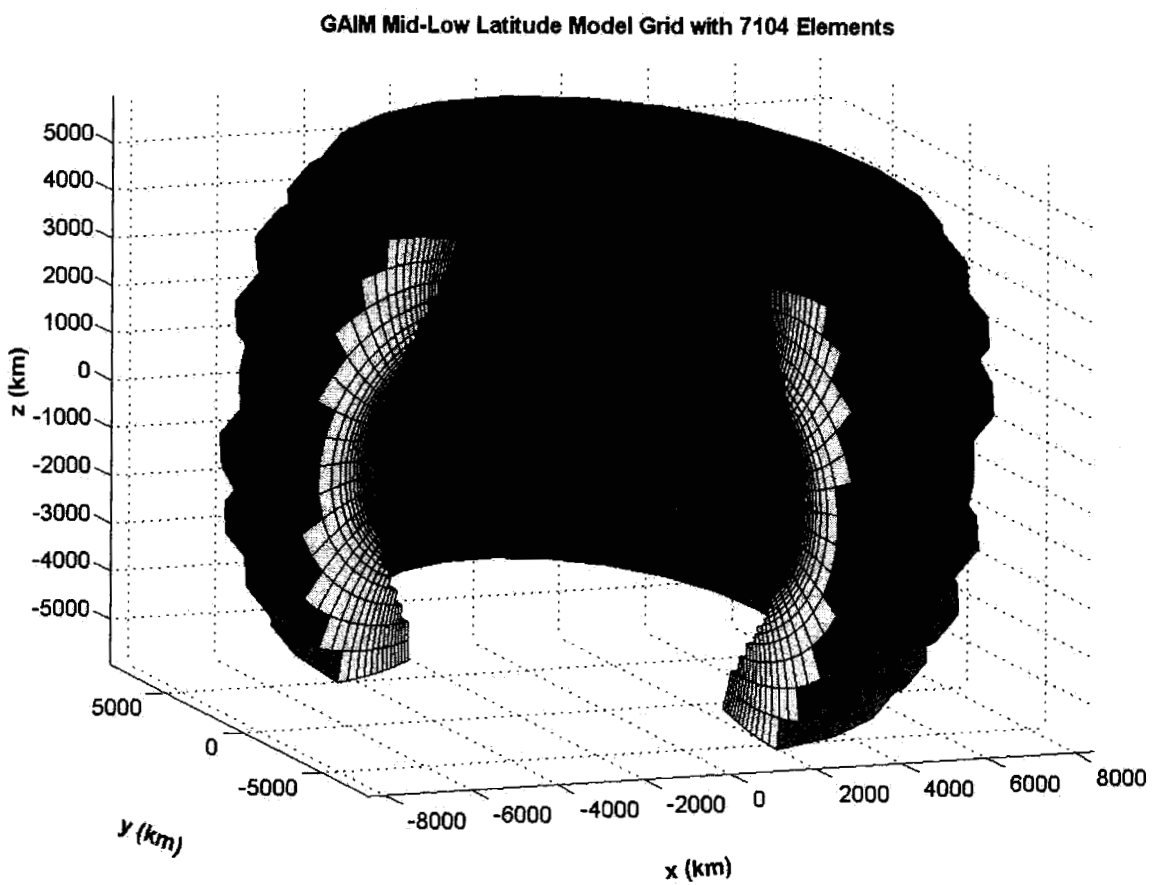

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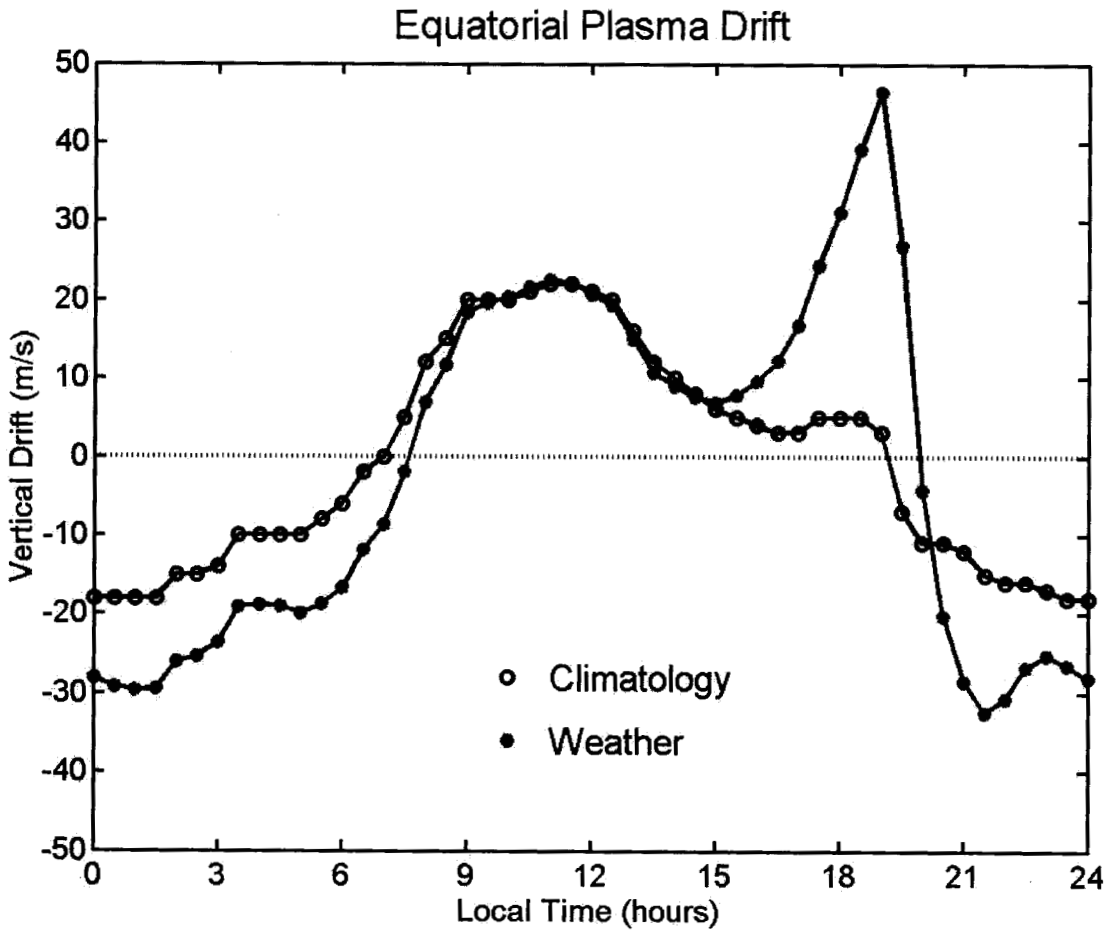
- The crucial driver for the equatorial anomaly and equatorial irregularities and scintillations



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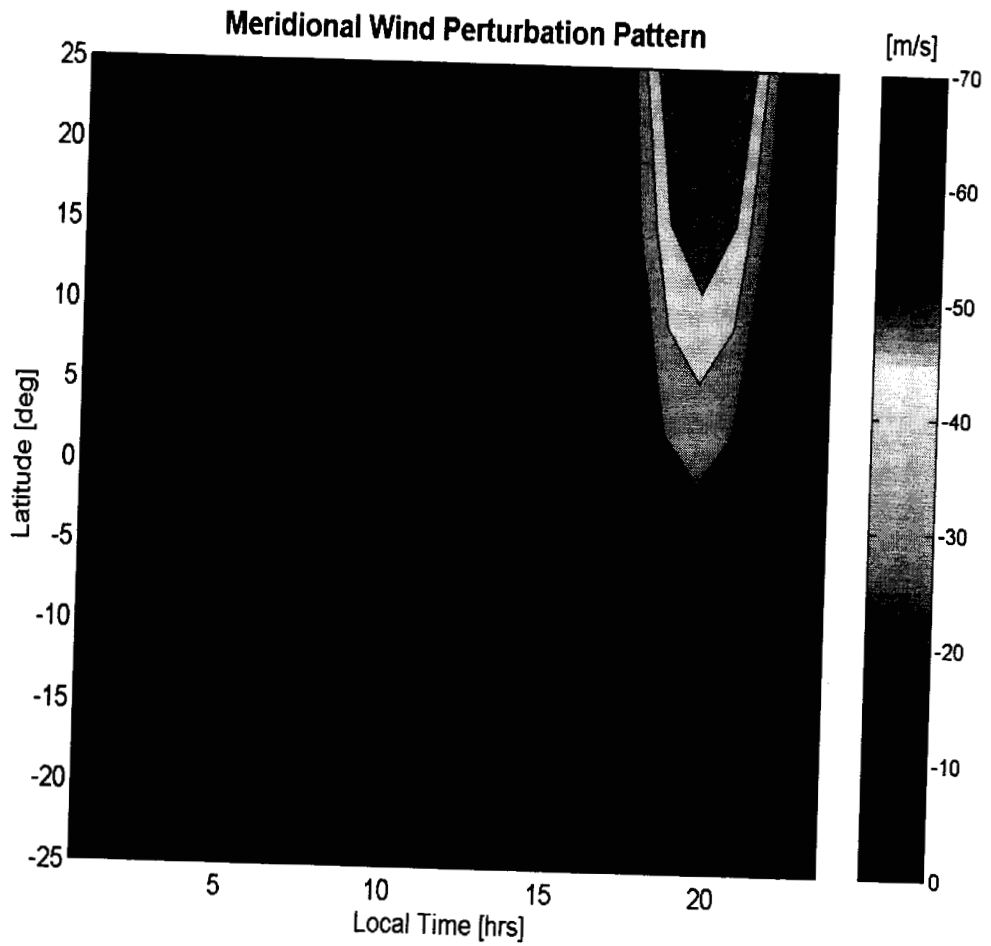

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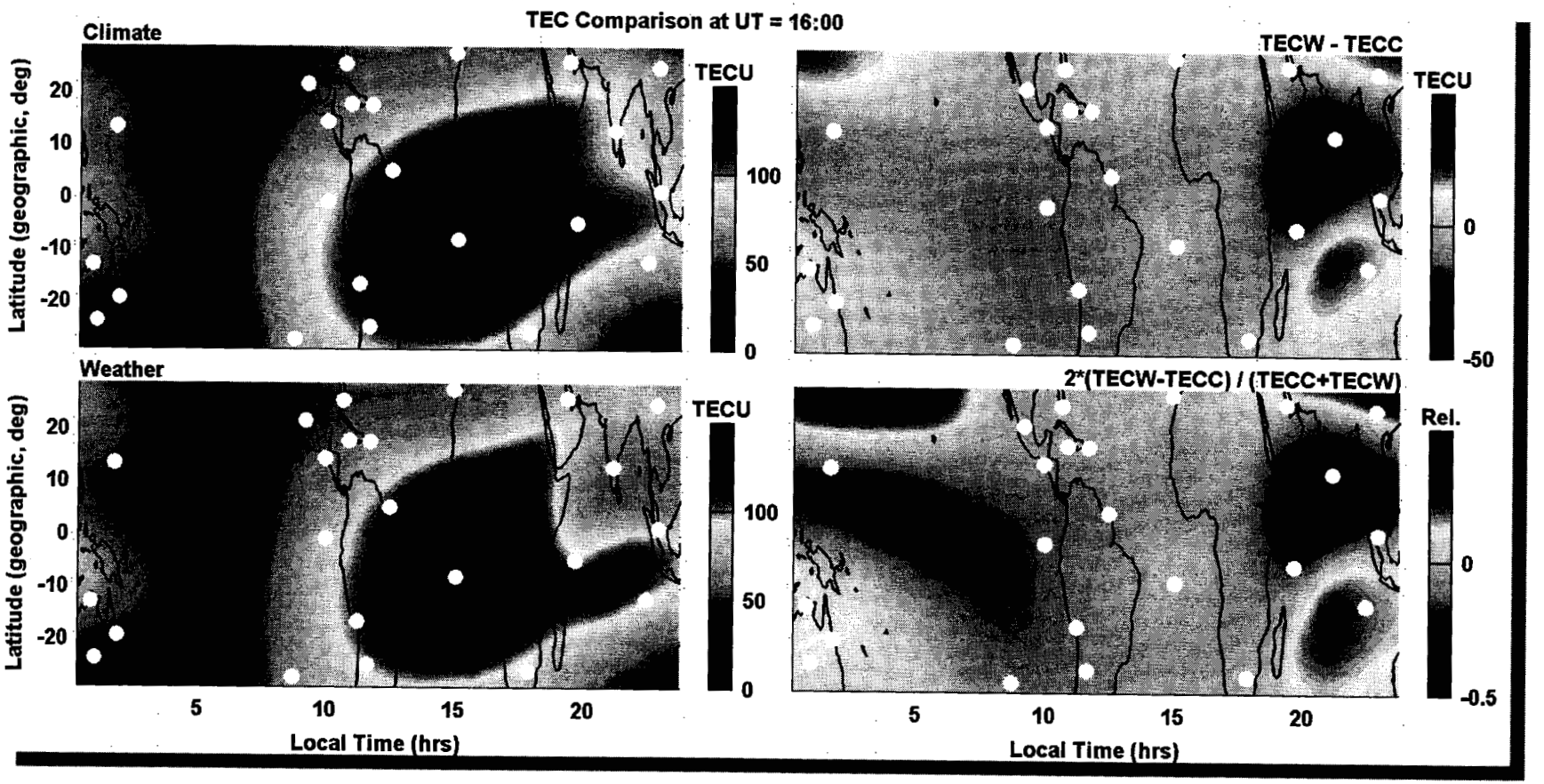
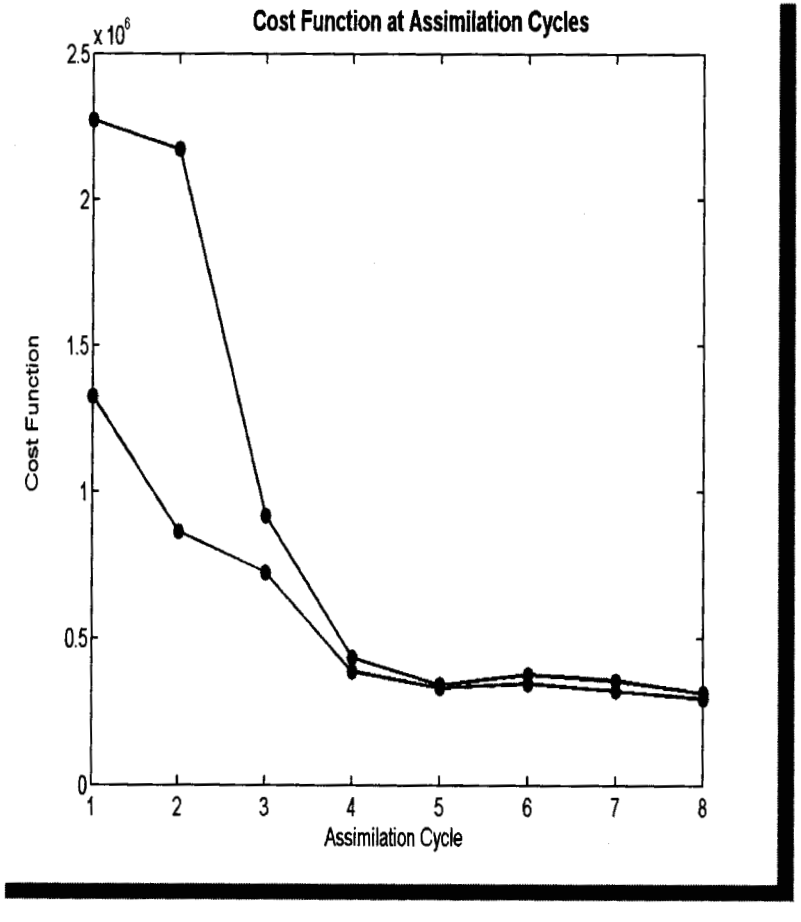
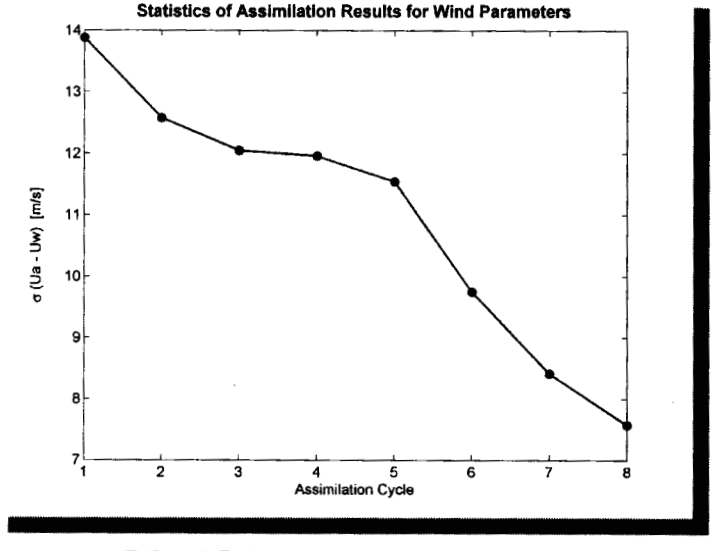


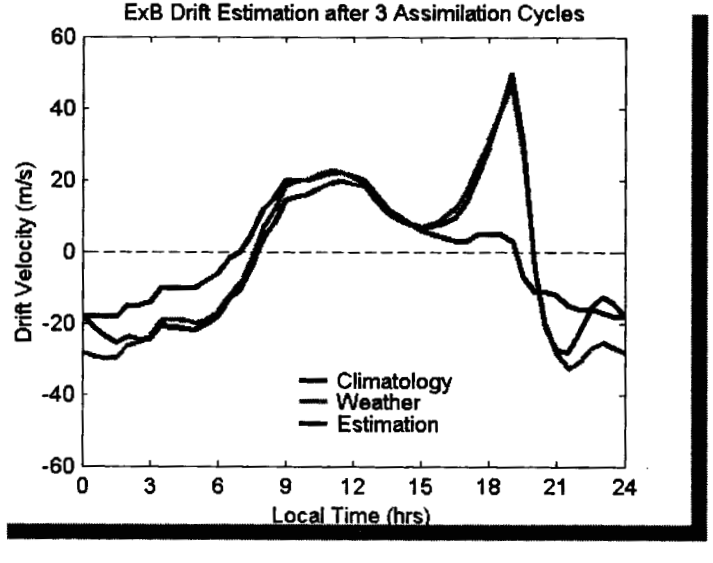
Assimilation Results



Cost Function

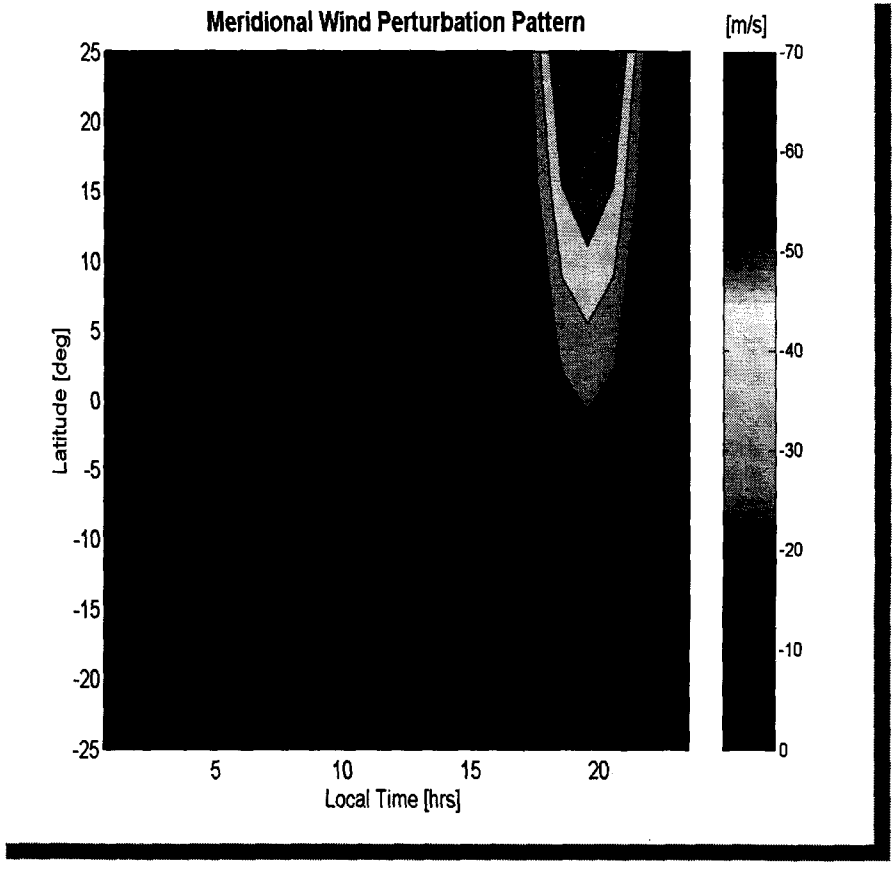


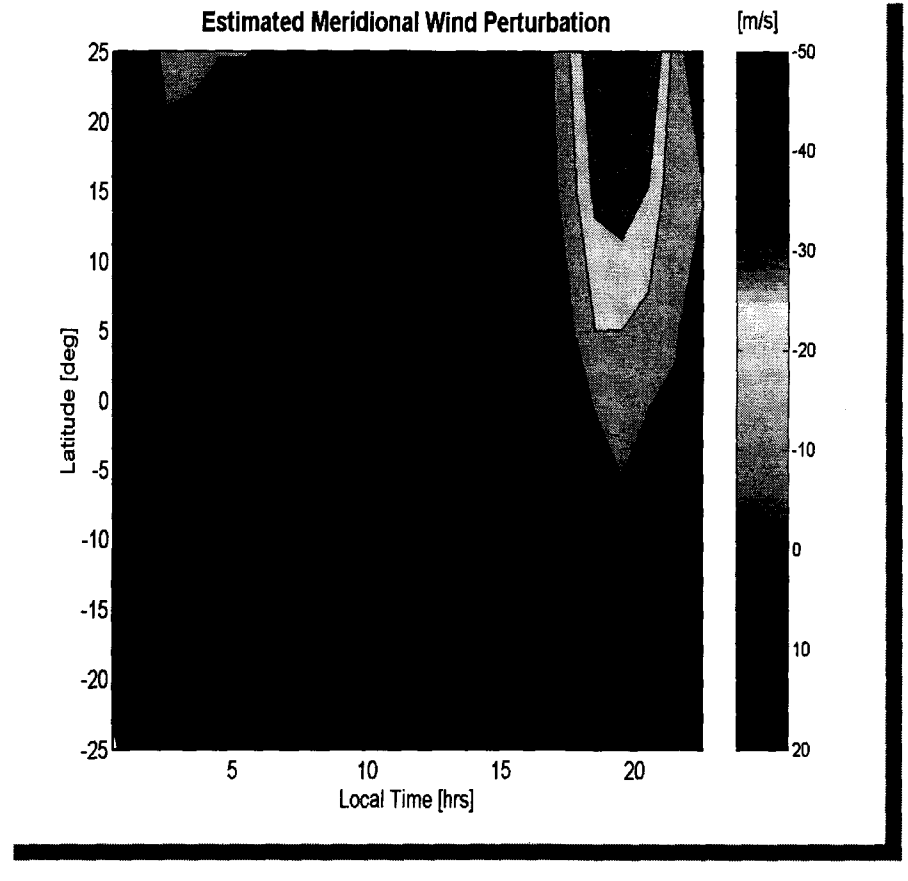
U_m



$V_\perp$

Wind Estimation





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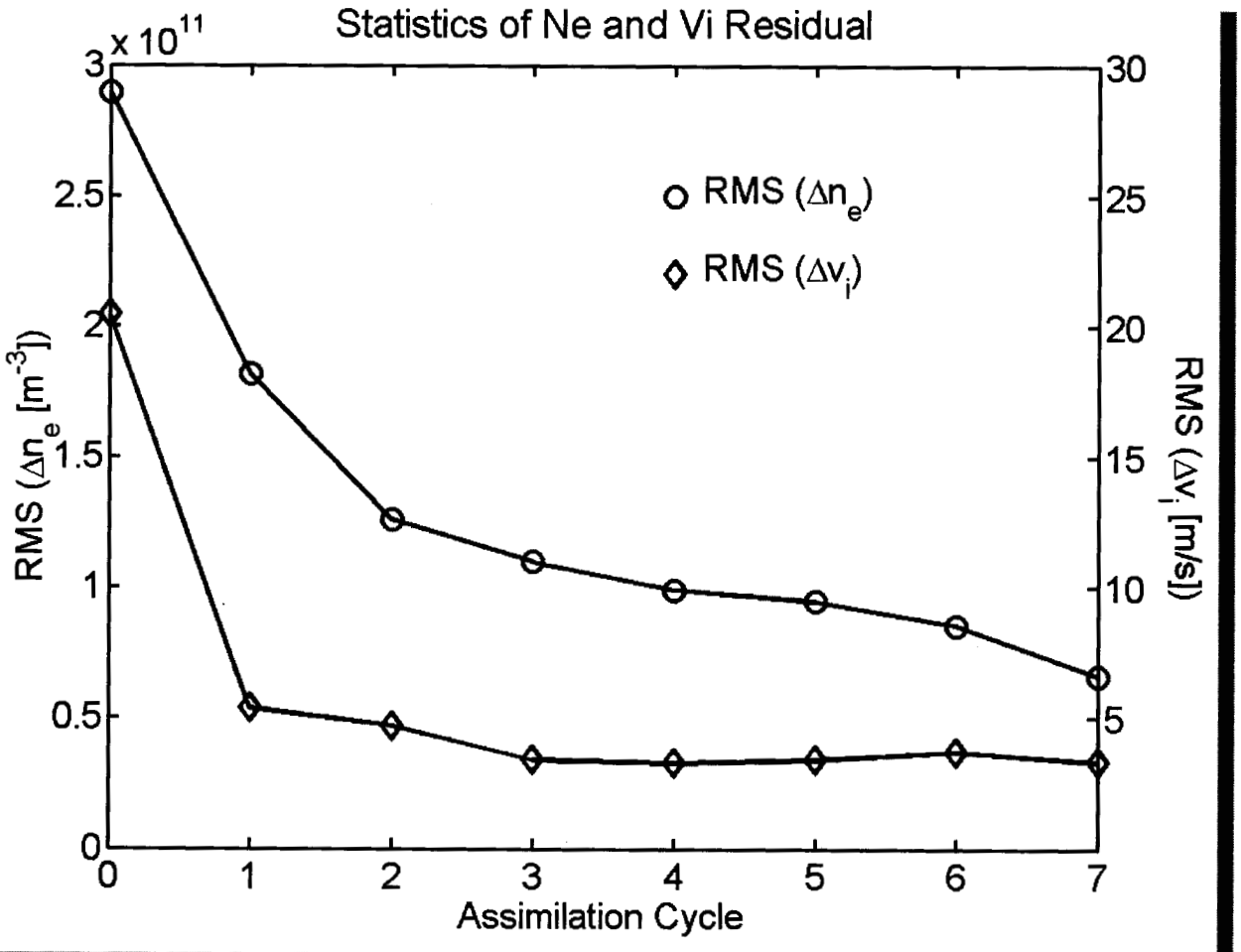

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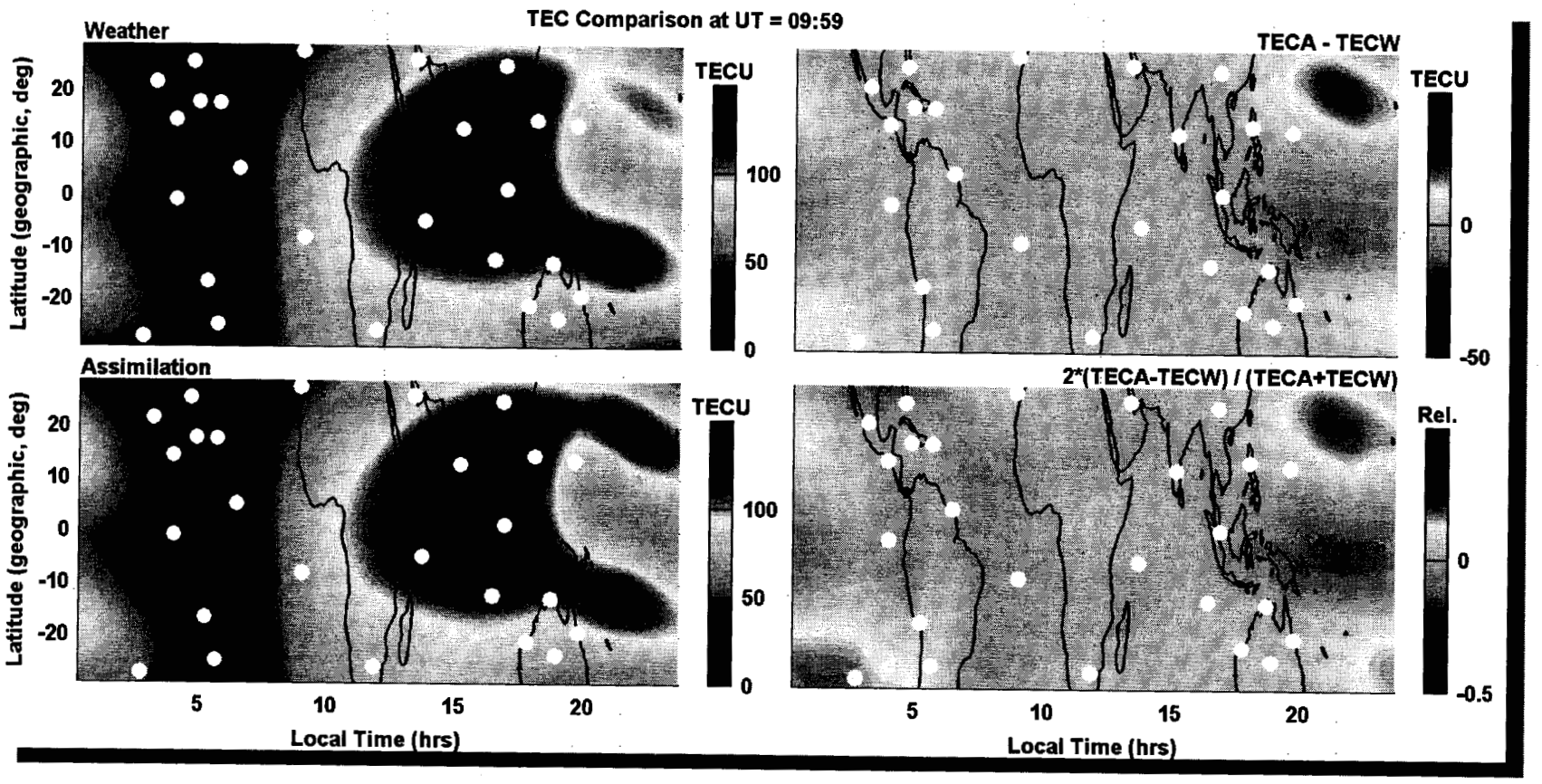

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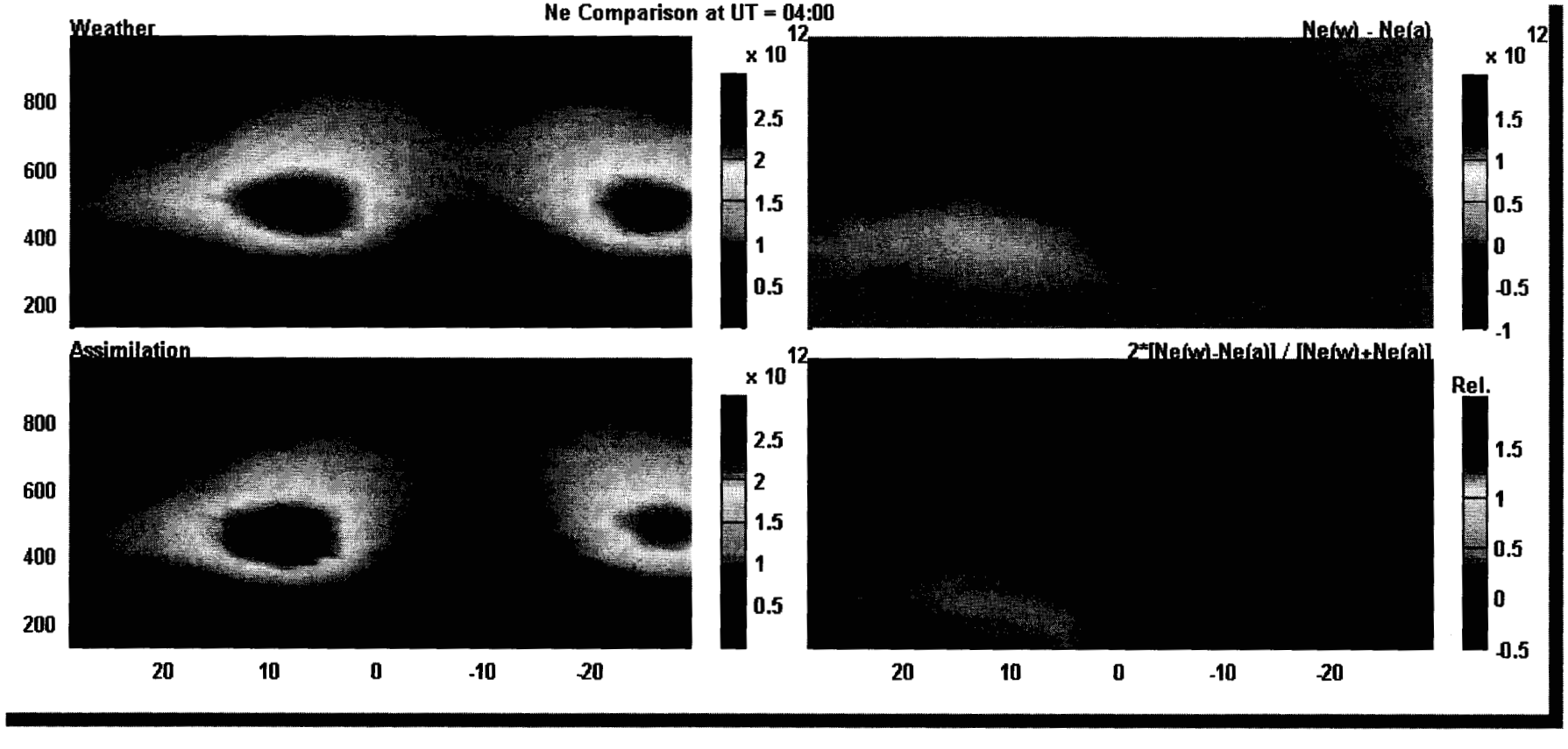

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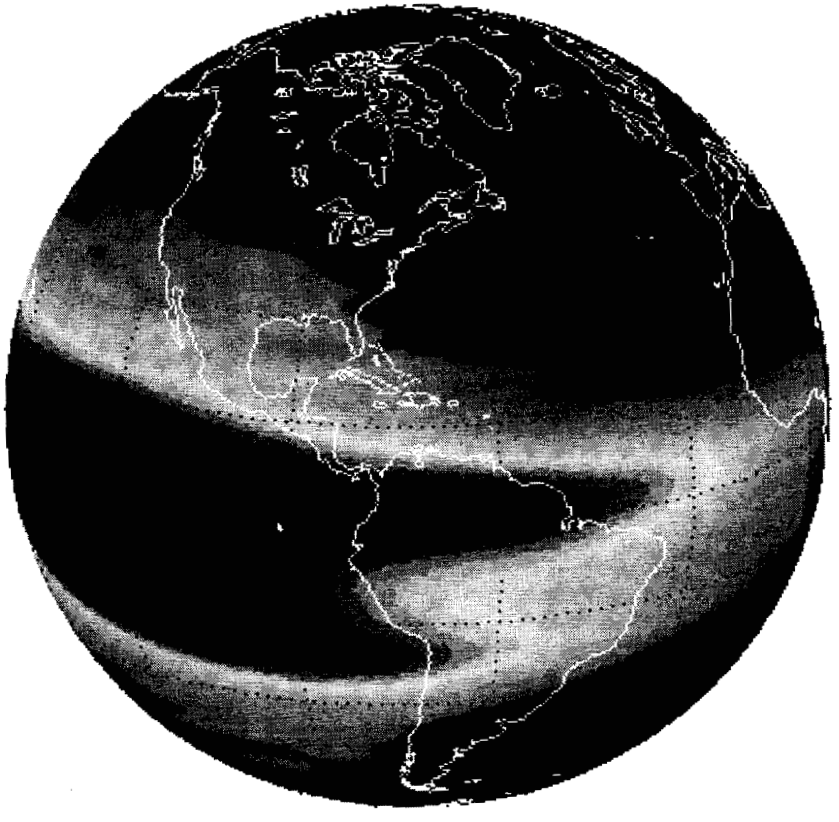

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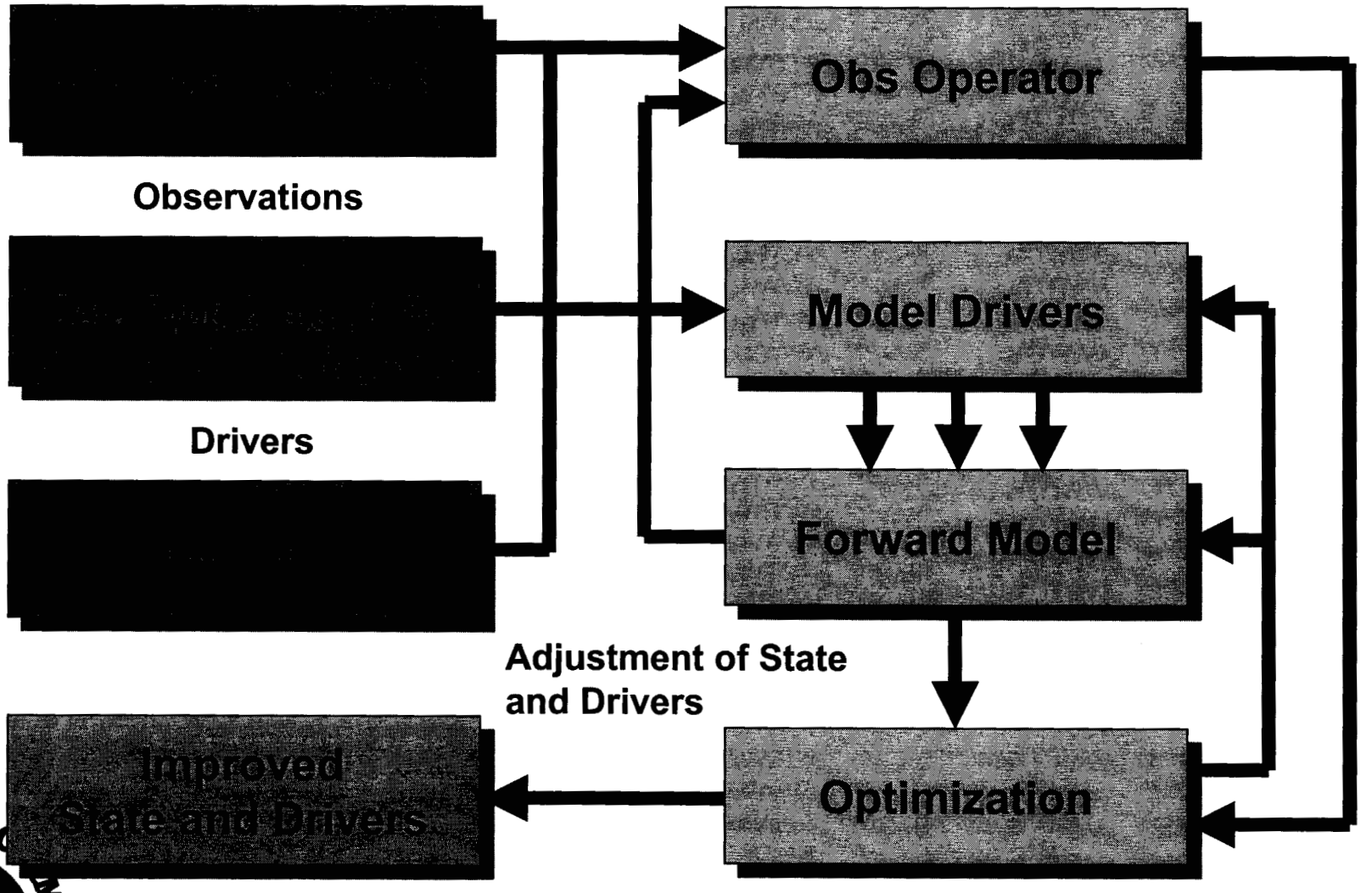

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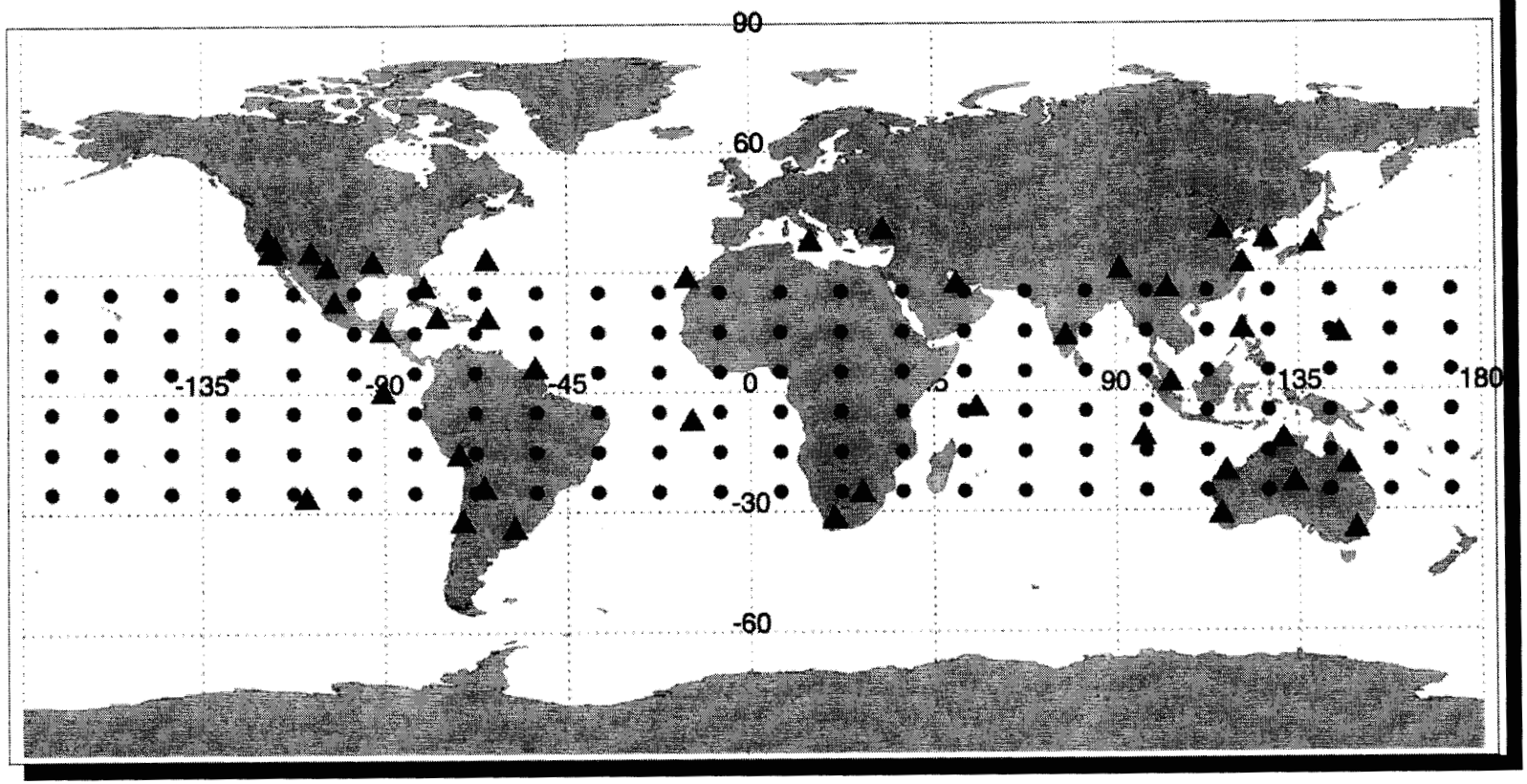

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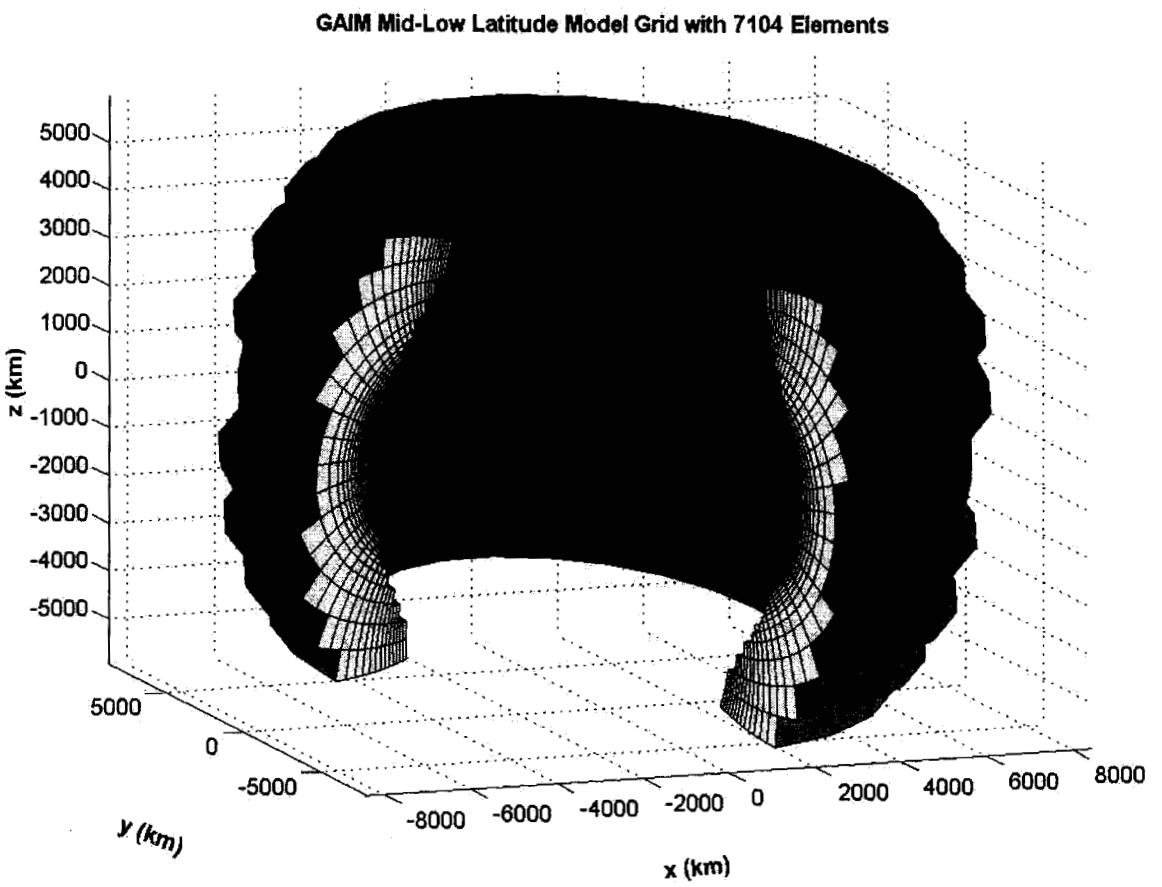

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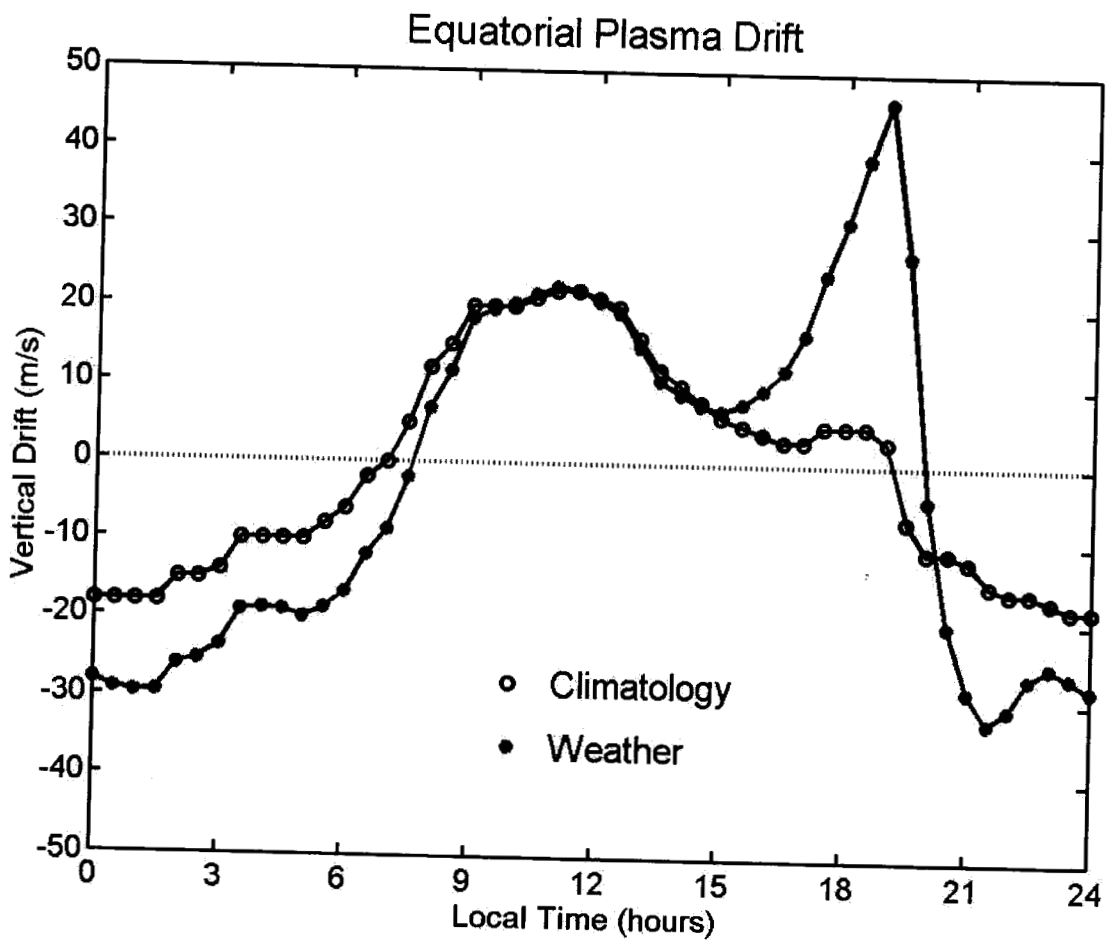

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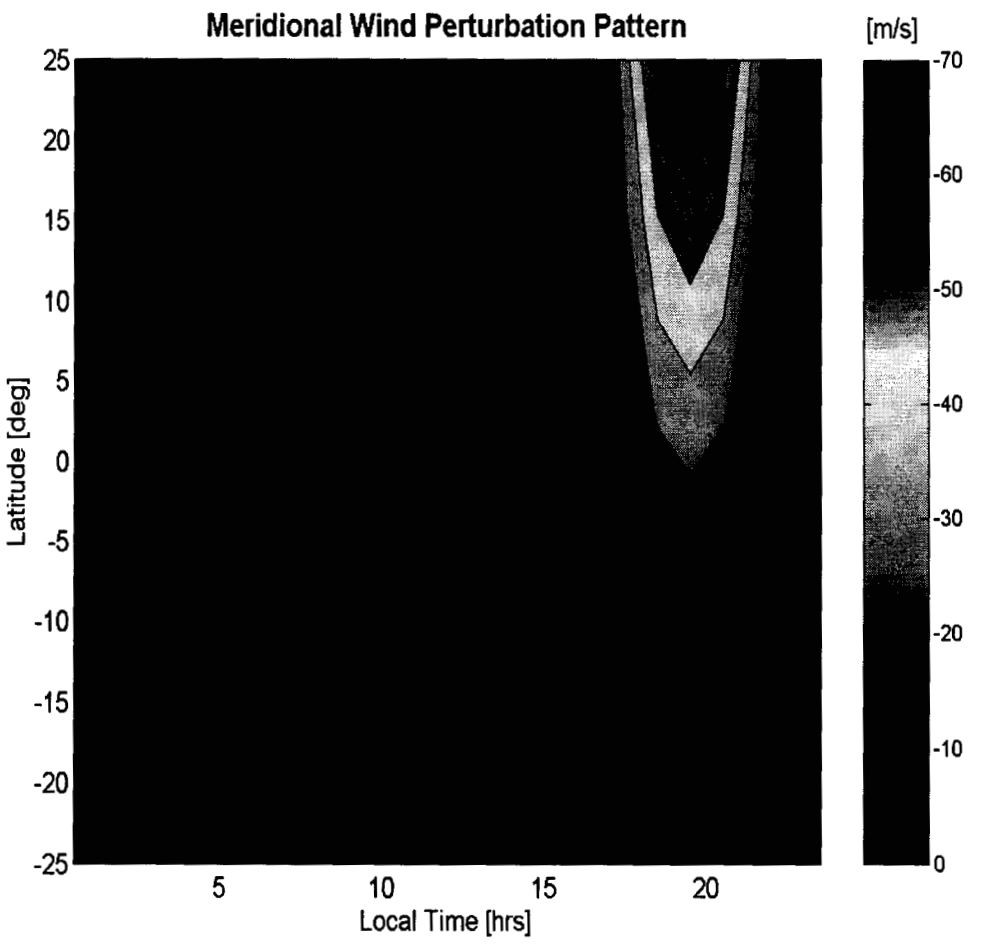

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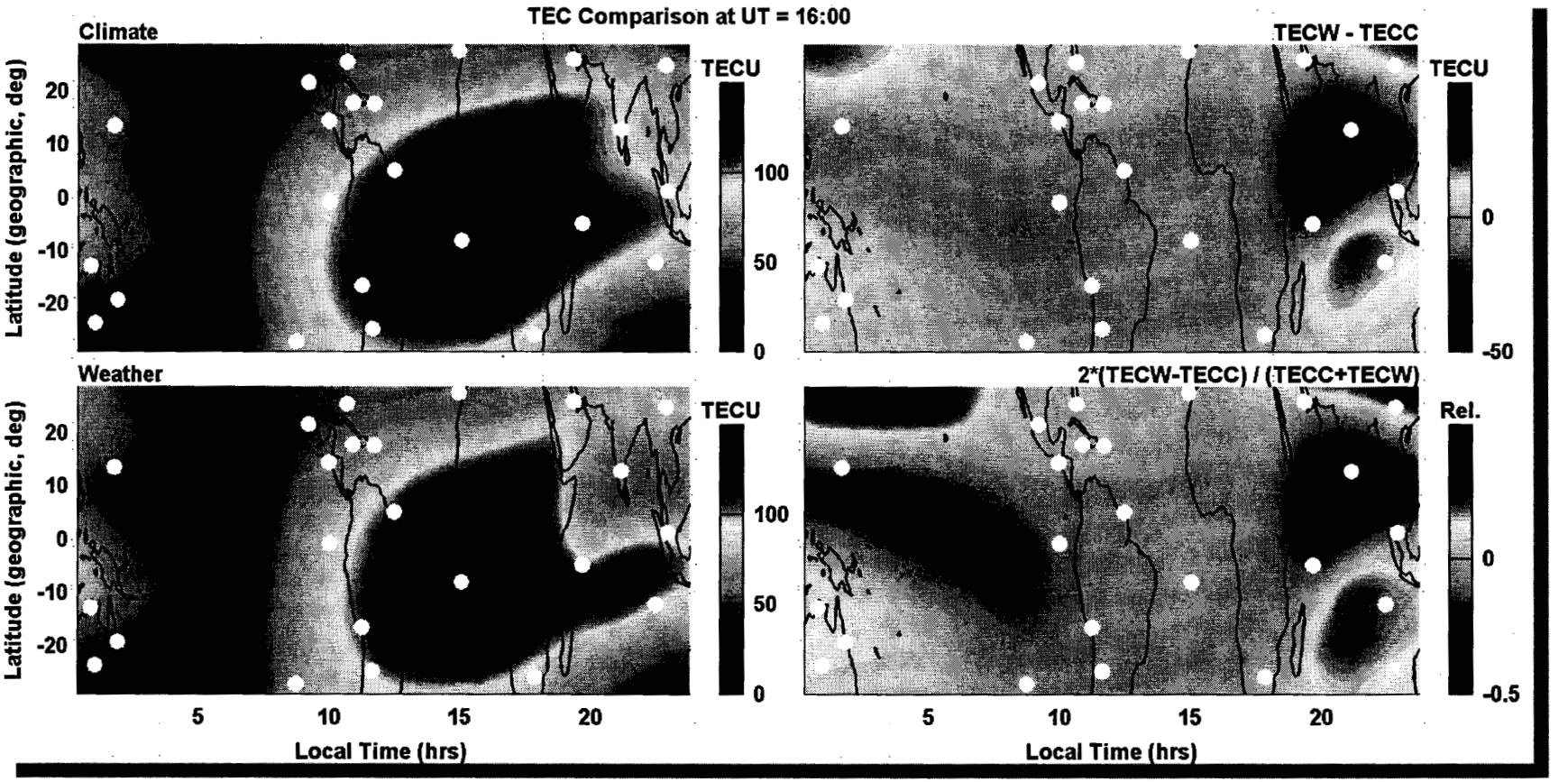

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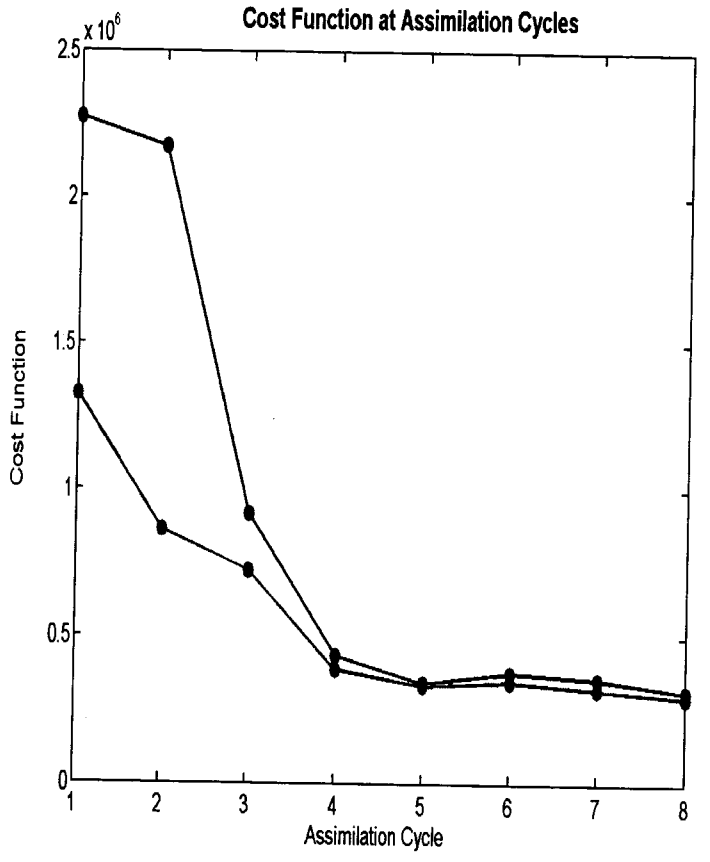
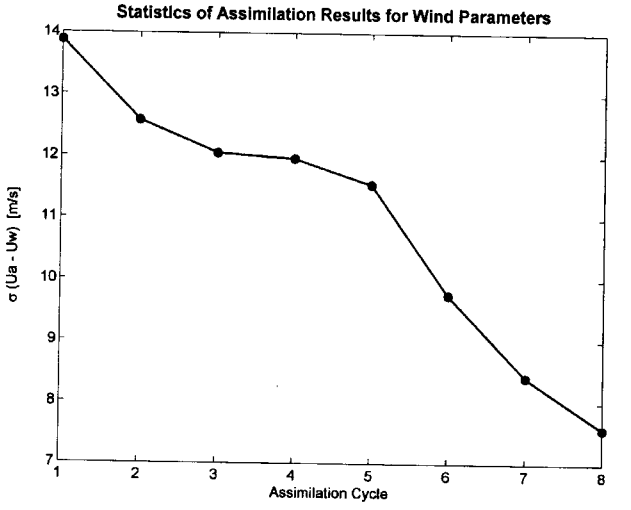
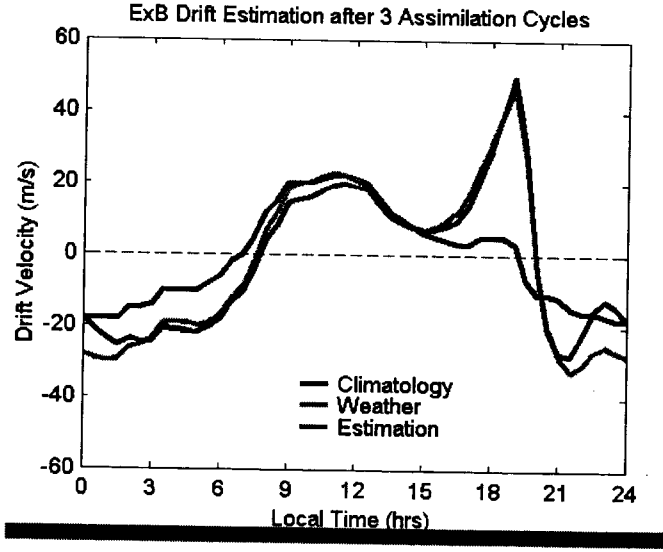




U_m



$V_\perp$

USC/JPL GAIM

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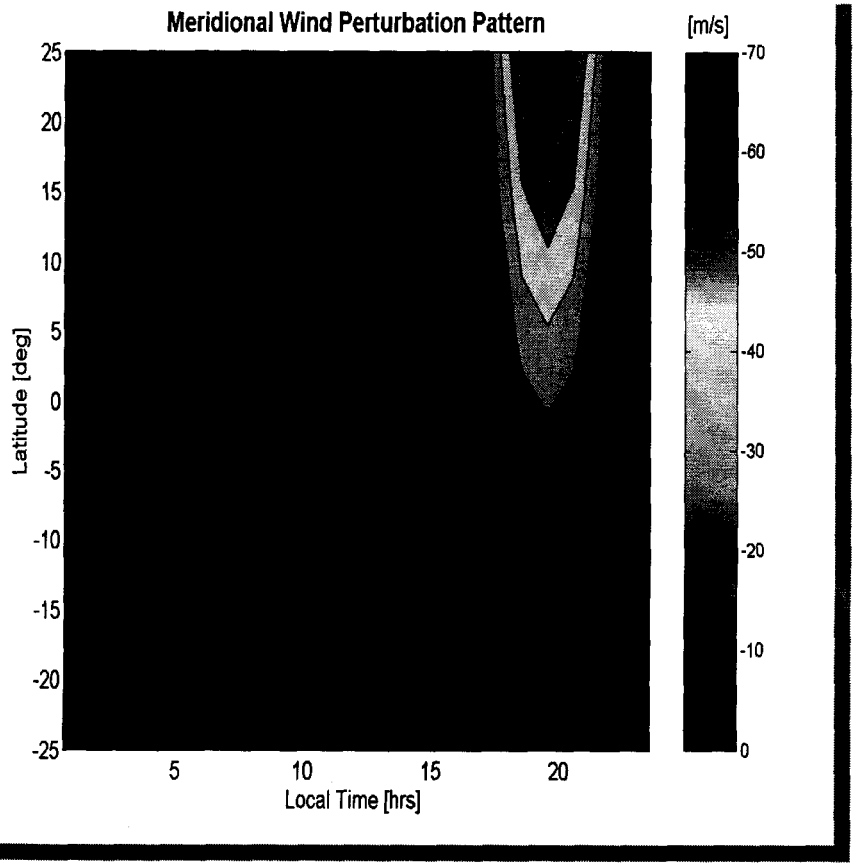

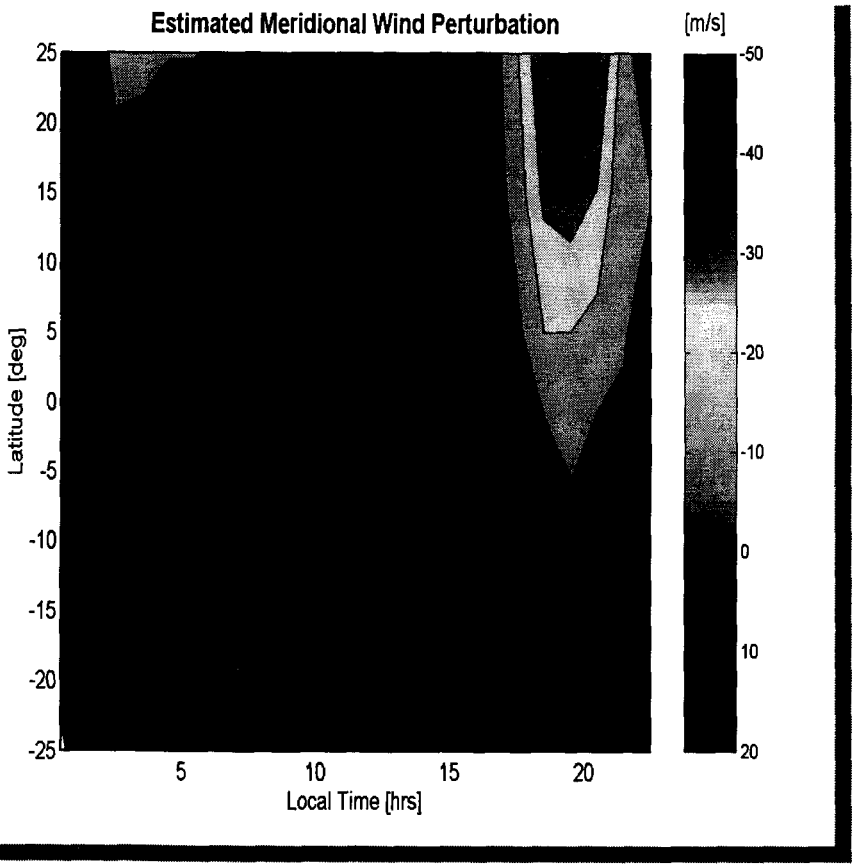

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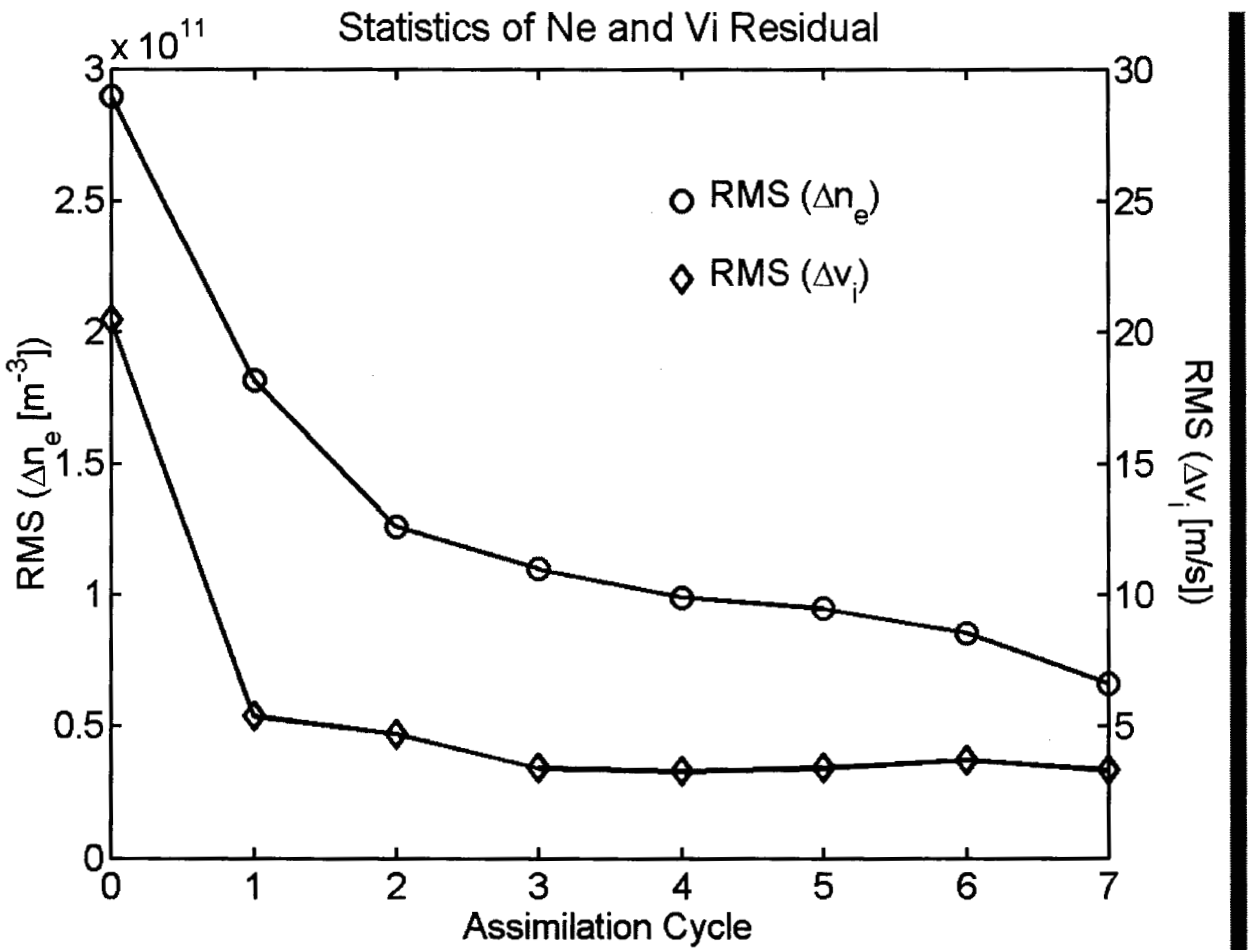

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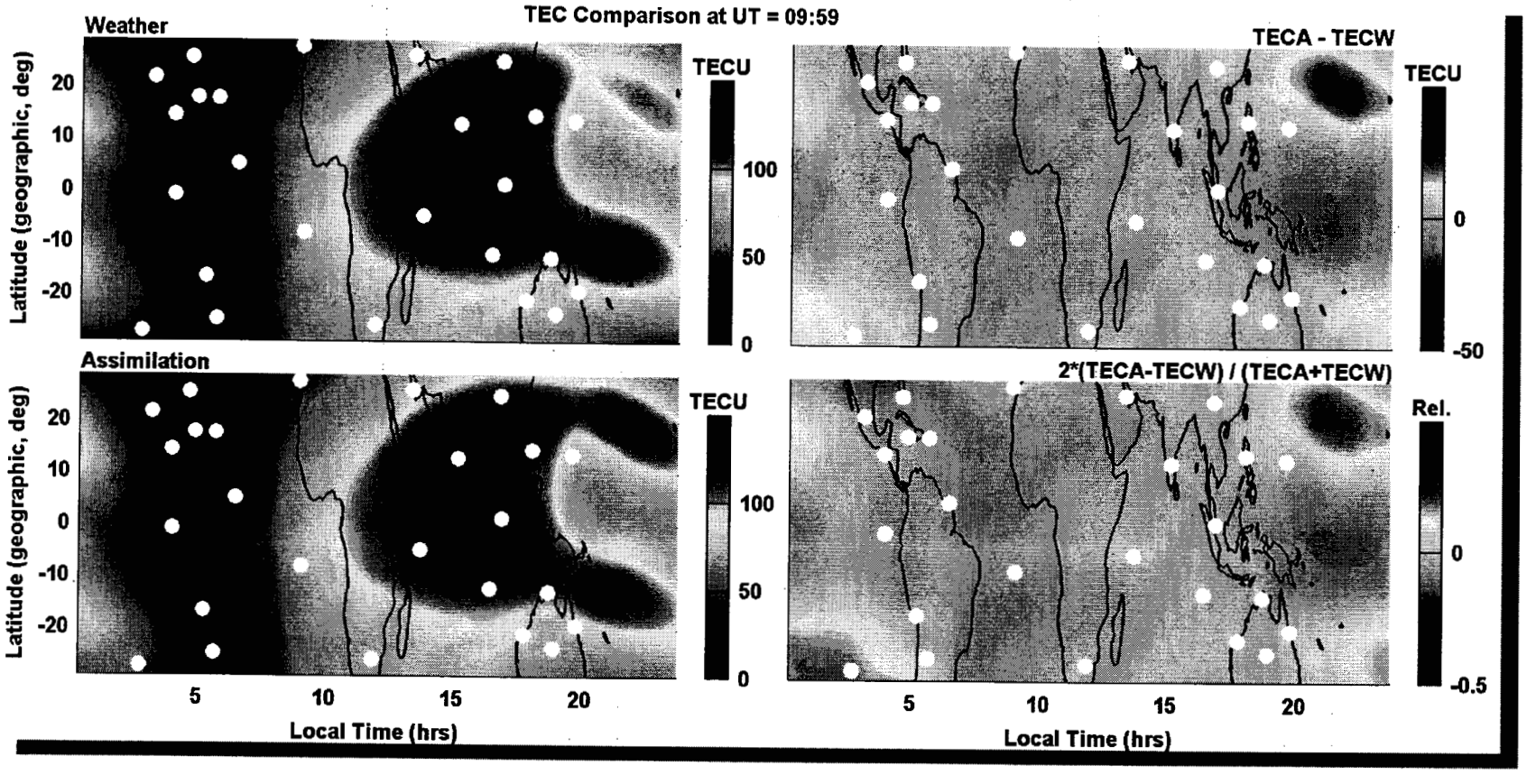

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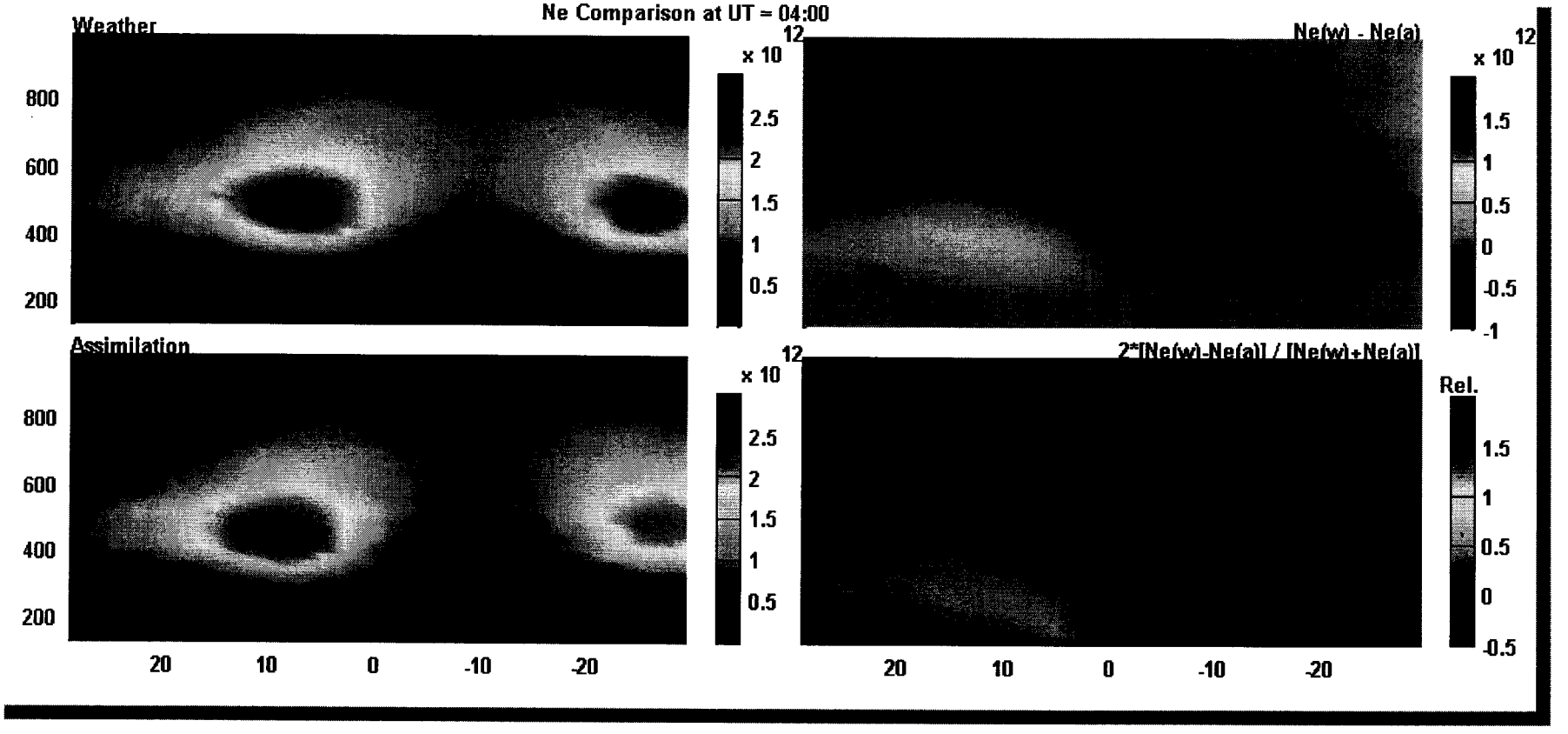

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