



New Capabilities and Developments in

**HYPACT**

HYbrid PArticle and Transport Model

*Presented by Marty Bell*

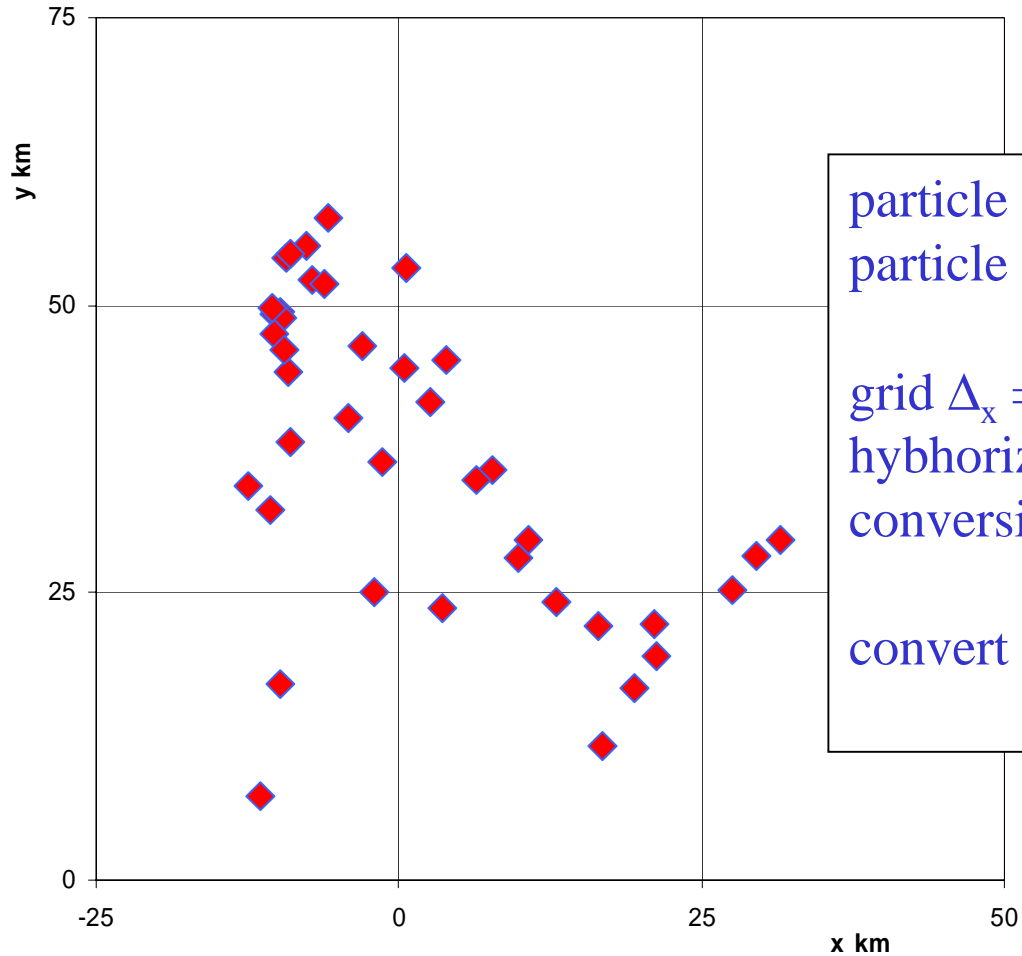


## What's hot...

- **Hybrid Mode**
- **Polygon Source Shape**
- **Dry Deposition**
- **Wet Deposition**
- RAMS 4.x Port
- **Parallel HYPACT**
- Atmospheric Chemistry
- **Gridded Source Data**
- Database Input
- **History Restart**
- Visualization Utilities



# Hybrid Scheme



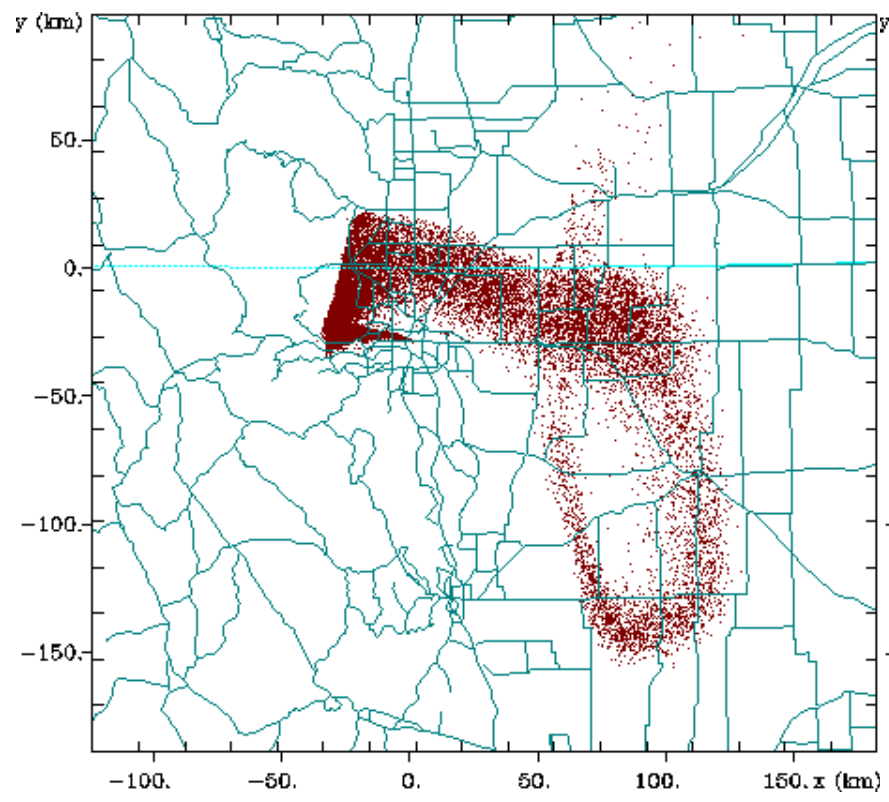
particle spread<sub>x</sub> = 6 x sd = 81 km  
particle spread<sub>y</sub> = 6 x sd = 78 km

grid  $\Delta_x = \Delta_y = 25$  km  
hybhoriz = 3  
conversion criteria = 75 km

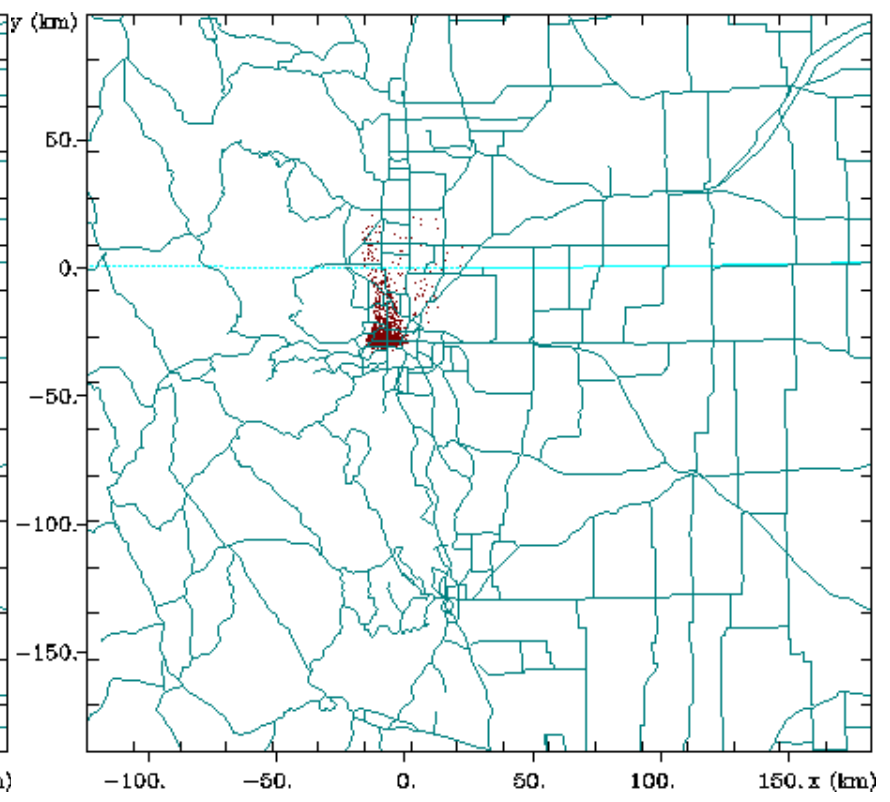
convert to Eulerian concentrations  
**yes**



# Lagrangian Particles



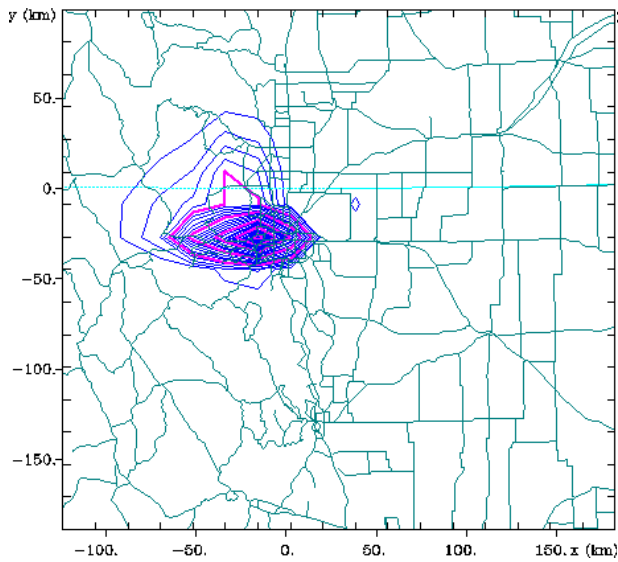
Lagrangian Run



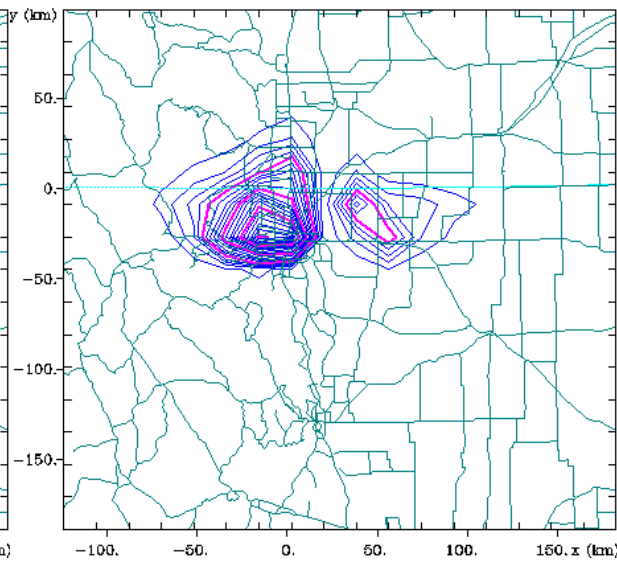
Hybrid Run



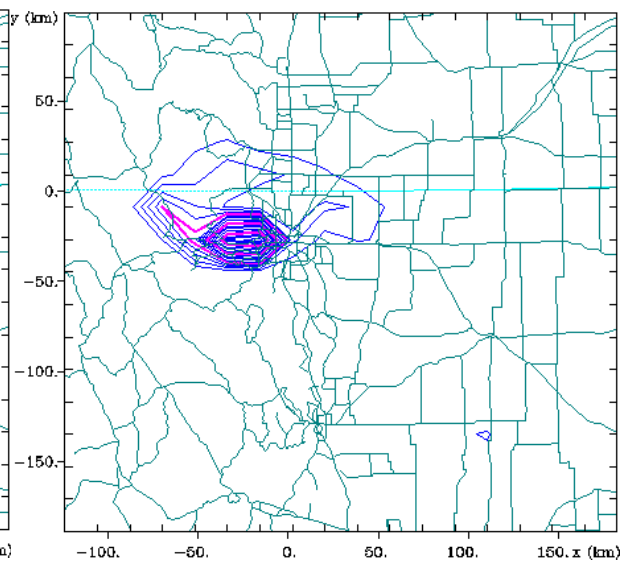
# Ground Level Concentrations



Lagrangian



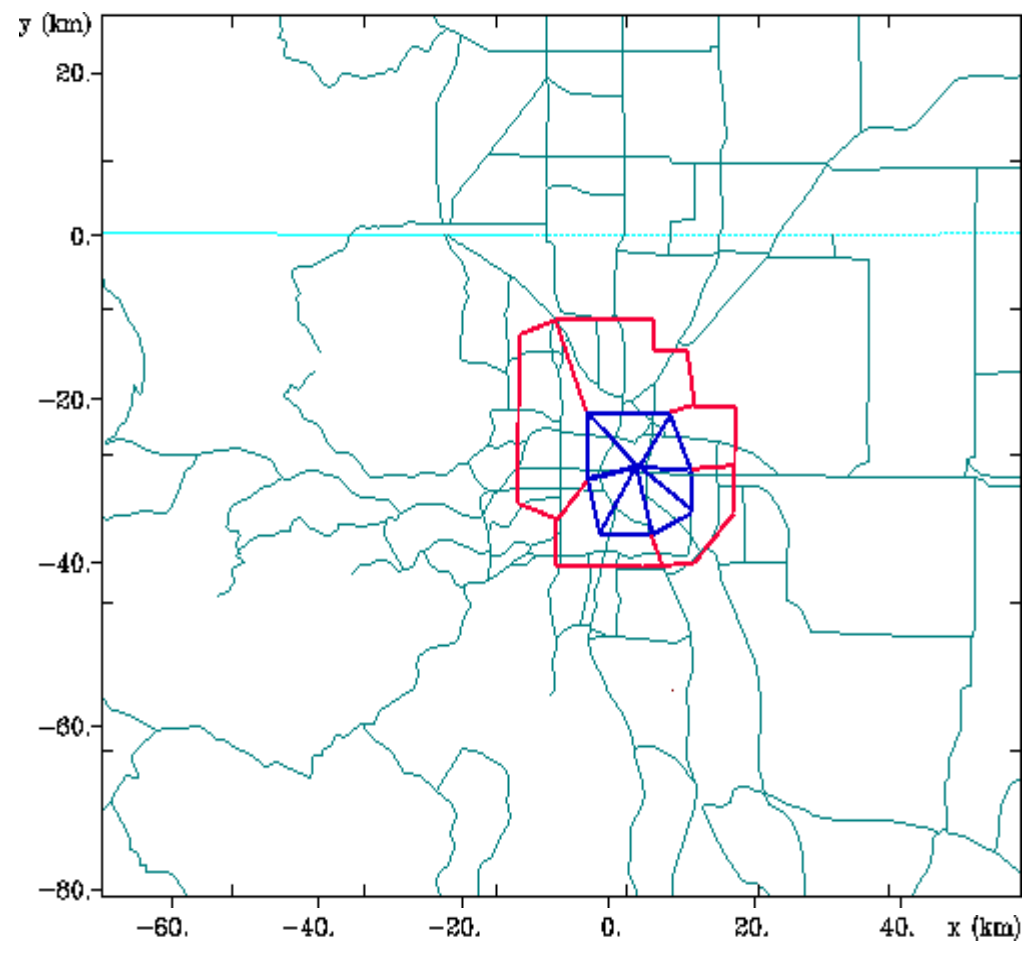
Eulerian



Hybrid



# Polygon Source Shapes





## Dry Deposition Scheme

$$V_d = (R_a + R_b + R_c)^{-1}$$

$R_a$  is the aerodynamic resistance

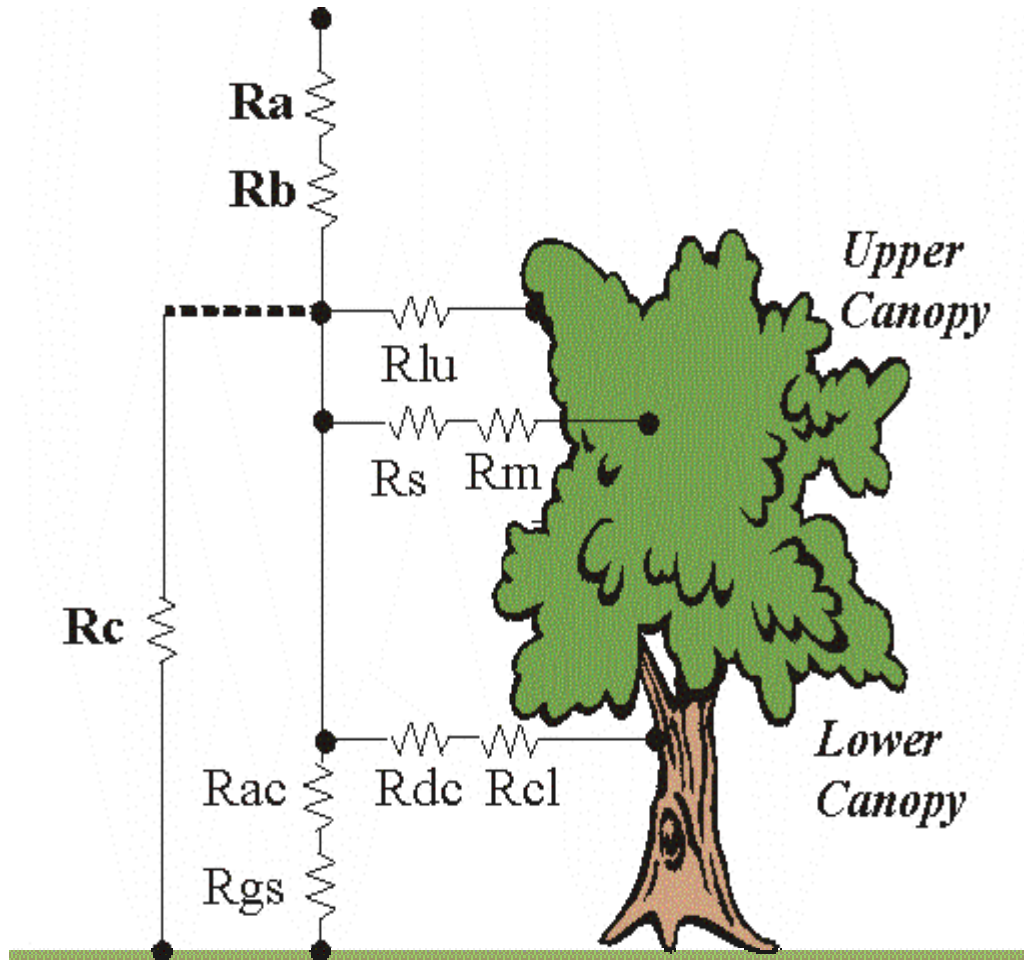
$R_b$  is the molecular diffusion resistance

$R_c$  is the bulk canopy resistance

*(Wesely - 1989, 1995)*



# Bulk Canopy Resistance

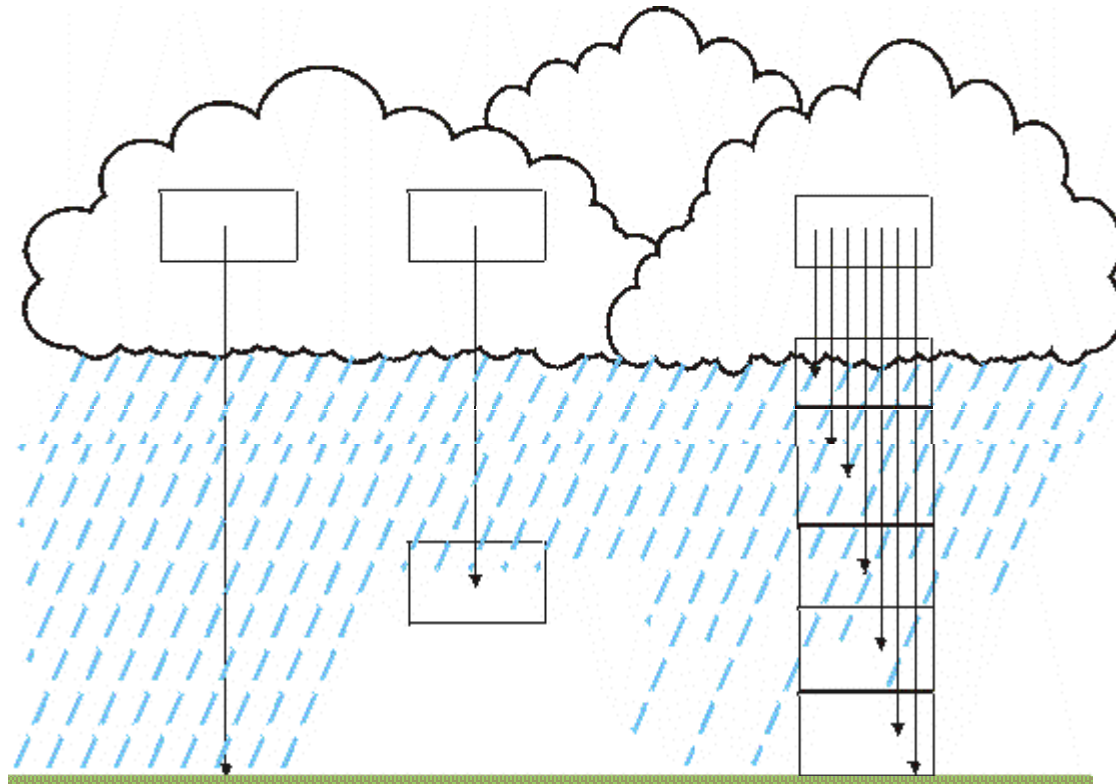


$$R_c = [ 1/(R_s + R_m) + 1/R_{lu} + 1/(R_{de} + R_{cl}) + 1/(R_{ac} + R_{gs}) ]^{-1}$$





# Wet Deposition Schemes



Options:

A

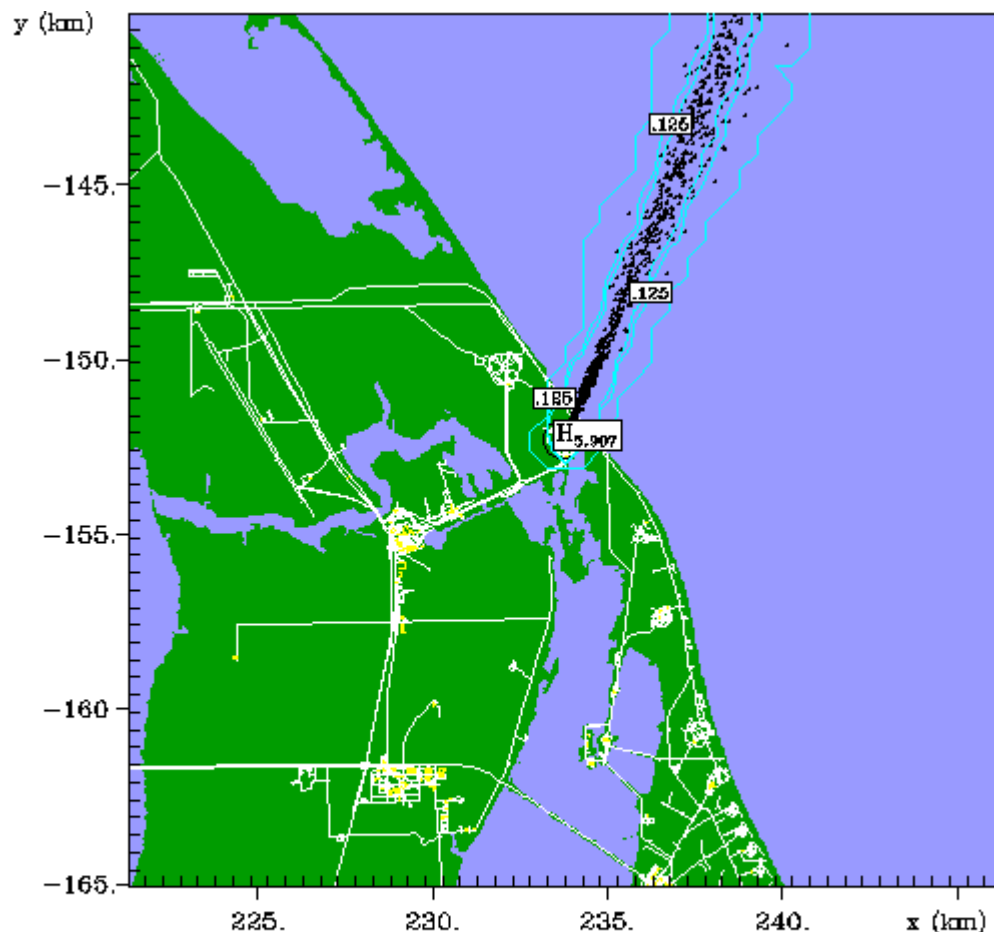
B

C



## In Summary...

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1999-01-03-1635 UTC - 0435 hhmm		RAMS/HYPACT - CCAFS/KSC			
z = 25.0 m	LC-39A - N <sub>2</sub> H <sub>4</sub>	Level 1	2	3	4
contours	Concentration (ppm)	4.00	0.360	0.126	0.100E-09
particles	Parts contained in slab	0. to 50. m			

**Update Plot** ?

**Concentration Grid**

Size (m) Points

Update North-South 500 51

Undo East-West 500 51

Vertical 50 41

Resolution Higher Lower Presets

Center Select from map...

Latitude 28.60538 Longitude -80.6041

**Options** ?

Concentrations

Particles  Accumulated Dosage

View all slab

Units ug/m<sup>3</sup> ppm

**Slab** ?

Height 0.0 - 50.0 m

X-Y

Zoom Unzoom 51 by 51 pts X-Z

Y-Z

**Time** ?

3 Jan 1999 1635 UTC

Create Loop from 1 to 1 View Loop