

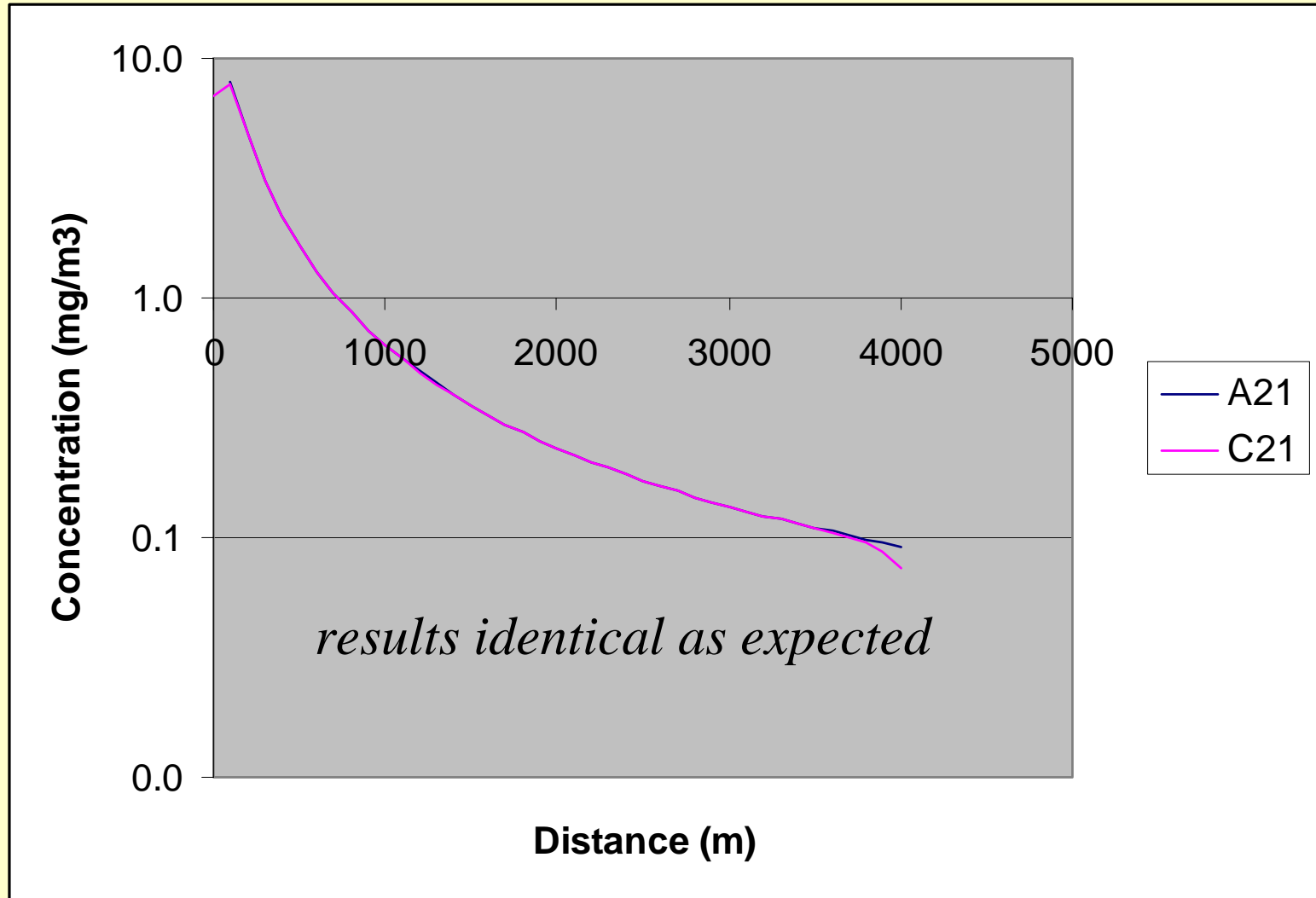
Comparison of Calpuff, Aermoc and Ausplume for a volume source

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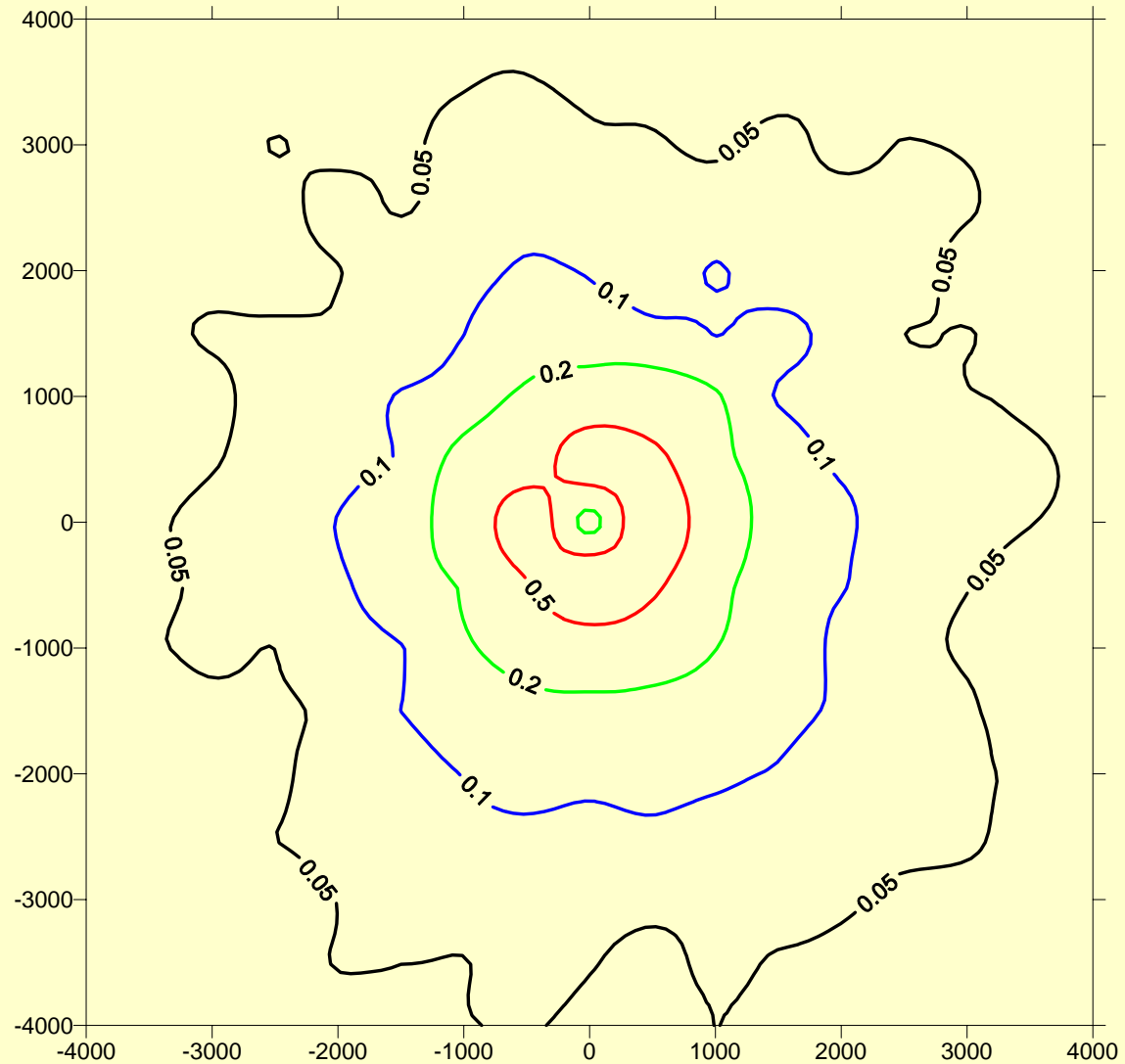
Simulation details

- 10m x 10m volume source, 1 g/s
- 8km x 8km grid, 500m spacing, source at centre. (met grid 19 x 19 cells)
- Calmet run 3 months autumn 2003, Caversham WA + Perth Airport (sondes and cloud). Aermet same period, same method.
- $z_0 = 0.2\text{m}$, 1 hour average maxima.

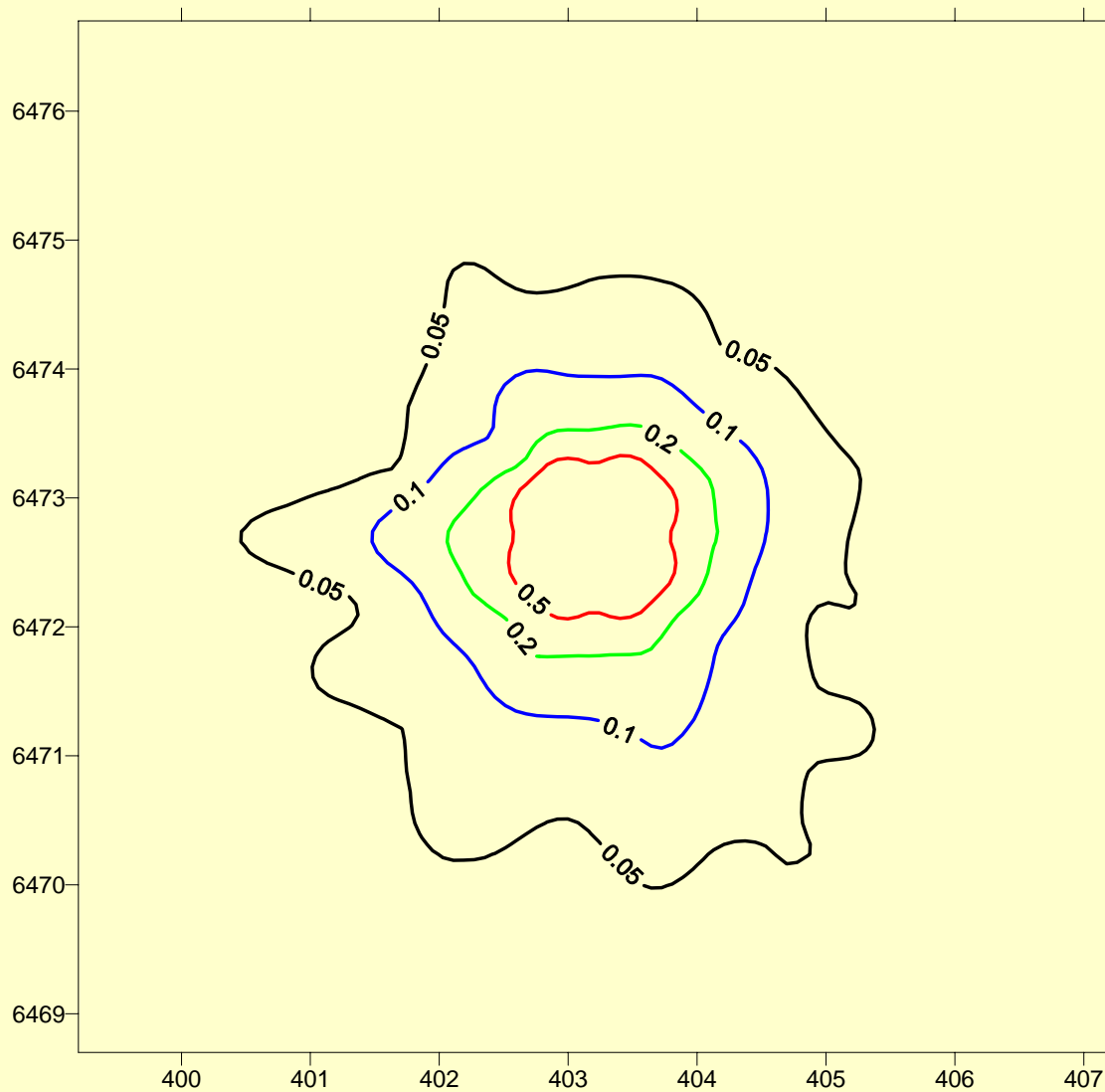
Ausplume vs Calpuff: PG curves, $T_{pg} = 3$ min, 48 hours single direction 0.5 m/s F.



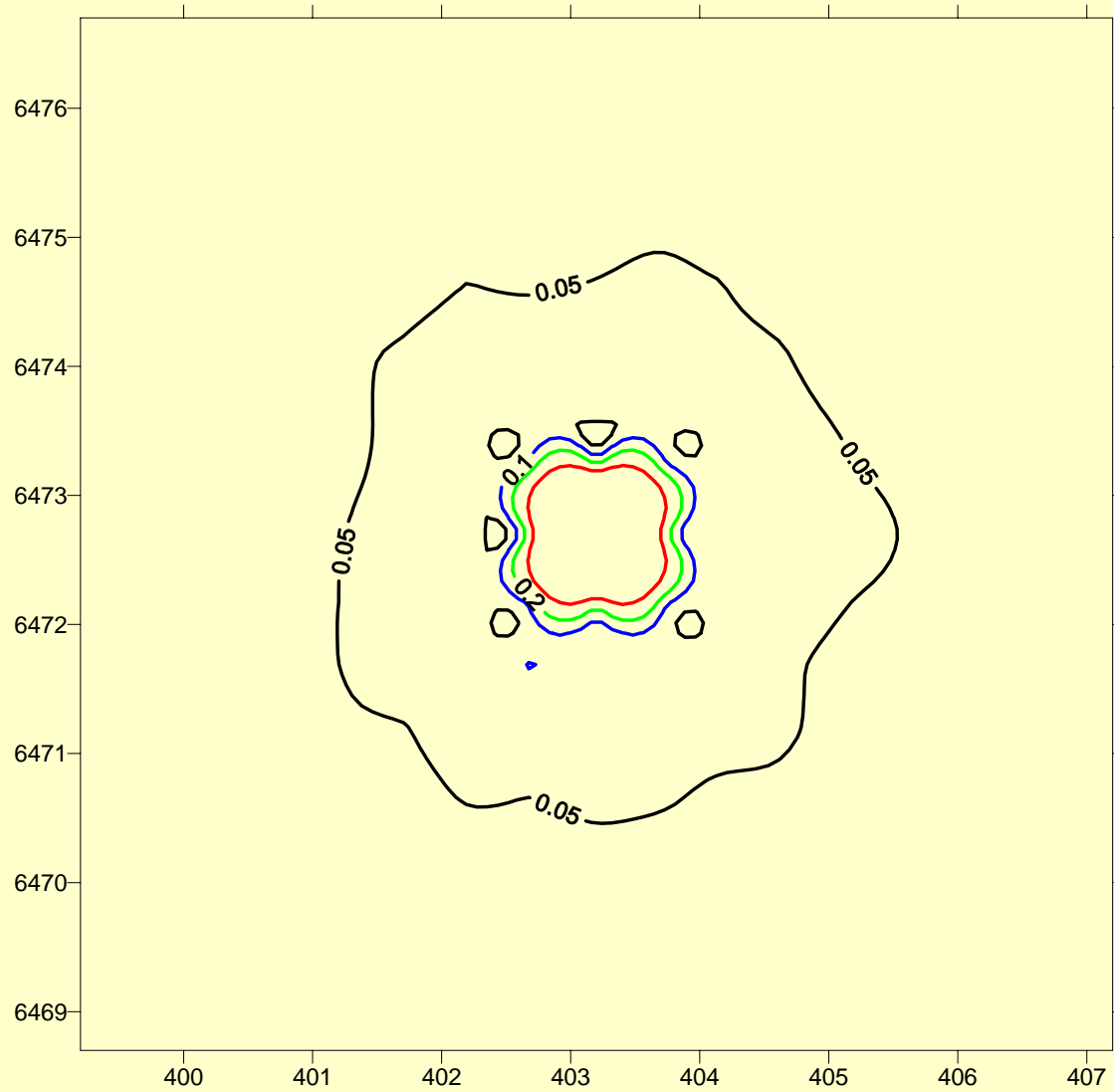
Ausplume: PG from Calmet, no trapping under Zim



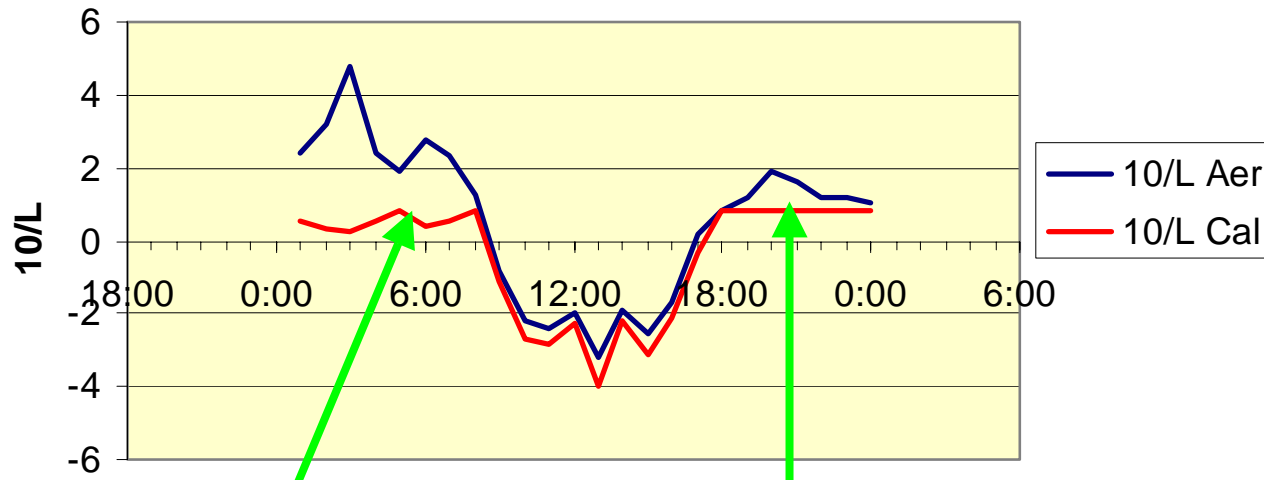
Cpuff: PG curves, $T_{pg} = 3$ min, Z_i limit = 500m



Cpuff: micromet



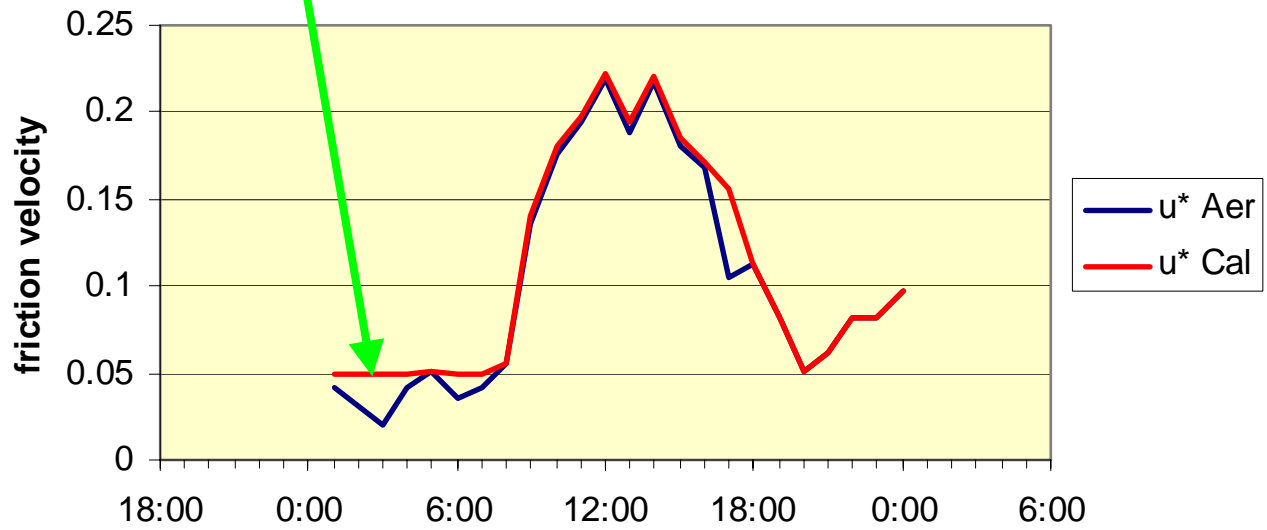
10/L for 24 May 03



$u_* > 0.05$

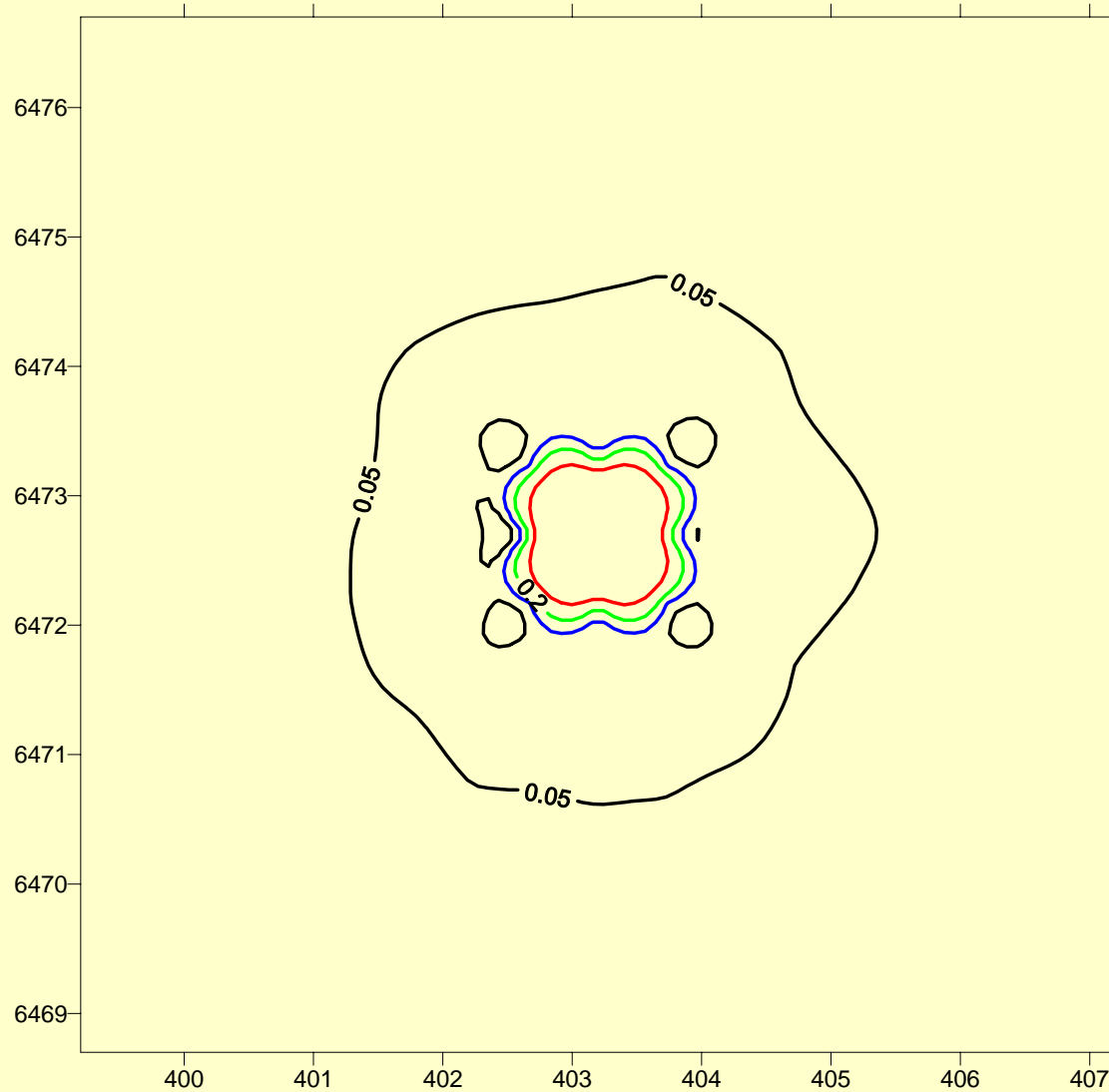
537 hours in 90 days

u^* for 24 May 03

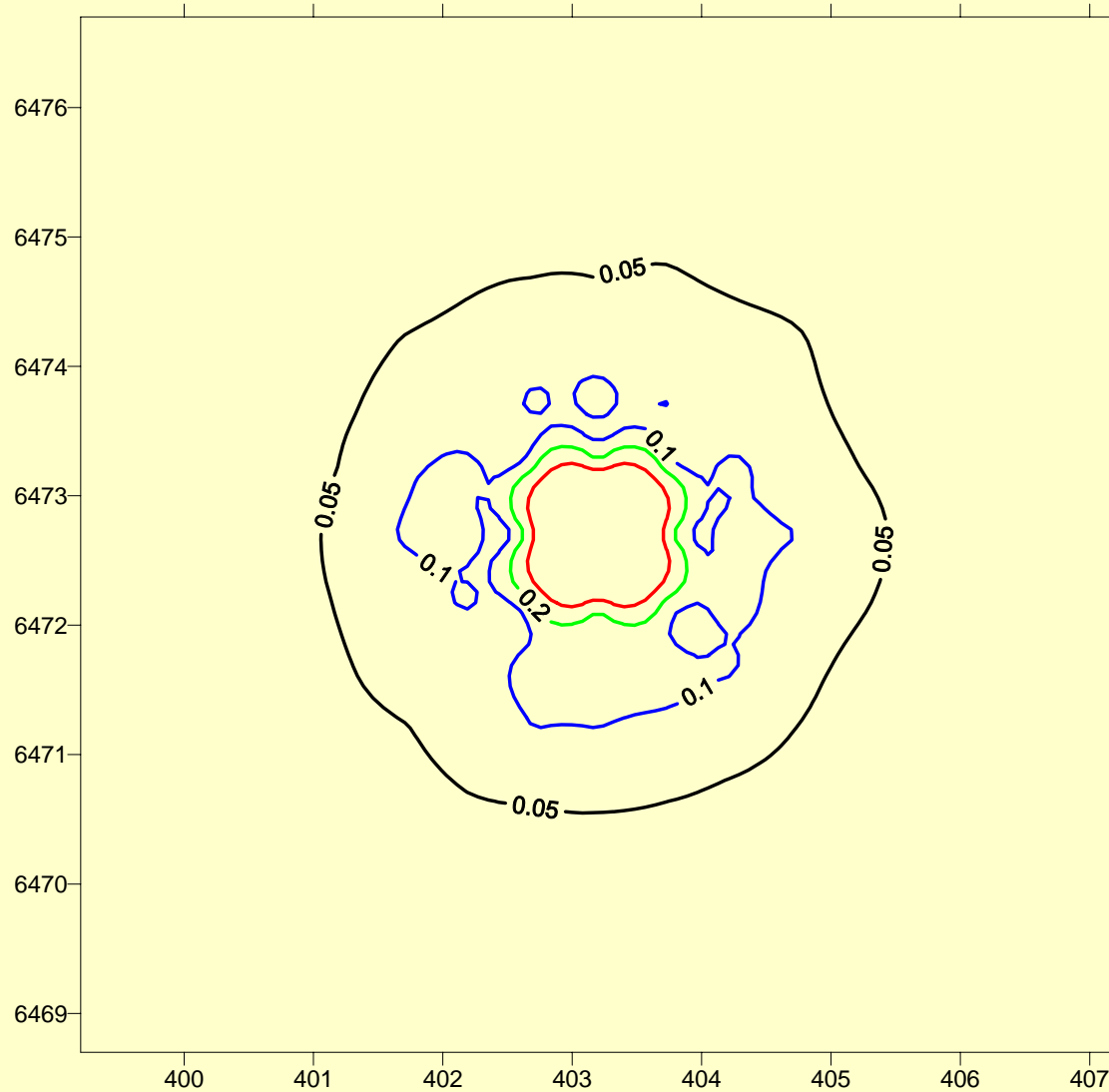


To examine the effect of Calmet limits on u_* and L, two CTDM-format files were produced, one from Calmet (with the limits) and one from Aermet (without limits). These were used to run Calpuff.

Cpuff: micromet - CTDM file from Calmet results



Cpuff: micromet - CTDM file from Aermet results



The effect of the Calmet limits on u^* and L are modest and do not account for the apparently high dispersion rate when using the micrometeorology option for dispersion

Concentrations were found to be strongly sensitive to the lower limits set by Calpuff on σ_v and σ_w (whether appropriate or not).

Default σ_v , σ_w settings

Dispersion (Advanced): C:\WORK\MOD_TEST\ODOUR\CPUFF\C62L.INP

Maximum length of slug in Met. Grid Units: Puff Splitting: No Yes

Slug-to-puff transition criterion factor:

Fractional Convergence Criterion for Numerical SLUG sampling integration:

Fractional Convergence Criterion for Numerical AREA source integration:

Maximum number of puffs released per source per time step:

Maximum number sampling steps per puff per time step:

Maximum travel distance of a puff per sampling step in Met. Grid Units:

Minimum sigma y (m): Minimum sigma z (m):

Stability Class:	A	B	C	D	E	F
Minimum sigma v (m/s):	<input type="text" value=".5"/>	<input type="text" value=".5"/>	<input type="text" value=".5"/>	<input type="text" value=".5"/>	<input type="text" value=".5"/>	<input type="text" value=".5"/>
Minimum sigma w (m/s):	<input type="text" value=".2"/>	<input type="text" value=".12"/>	<input type="text" value=".08"/>	<input type="text" value=".06"/>	<input type="text" value=".03"/>	<input type="text" value=".016"/>

Near-Field Vertical Distribution: Uniform Gaussian

Transition-Point for Building Downwash:

σ_v , σ_w settings like Aermod for E,F

Dispersion (Advanced): C:\WORK\MOD_TEST\ODOUR\CPUFF\C621L.INP

Maximum length of slug in Met. Grid Units: Puff Splitting: No Yes

Slug-to-puff transition criterion factor:

Fractional Convergence Criterion for Numerical SLUG sampling integration:

Fractional Convergence Criterion for Numerical AREA source integration:

Maximum number of puffs released per source per time step:

Maximum number sampling steps per puff per time step:

Maximum travel distance of a puff per sampling step in Met. Grid Units:

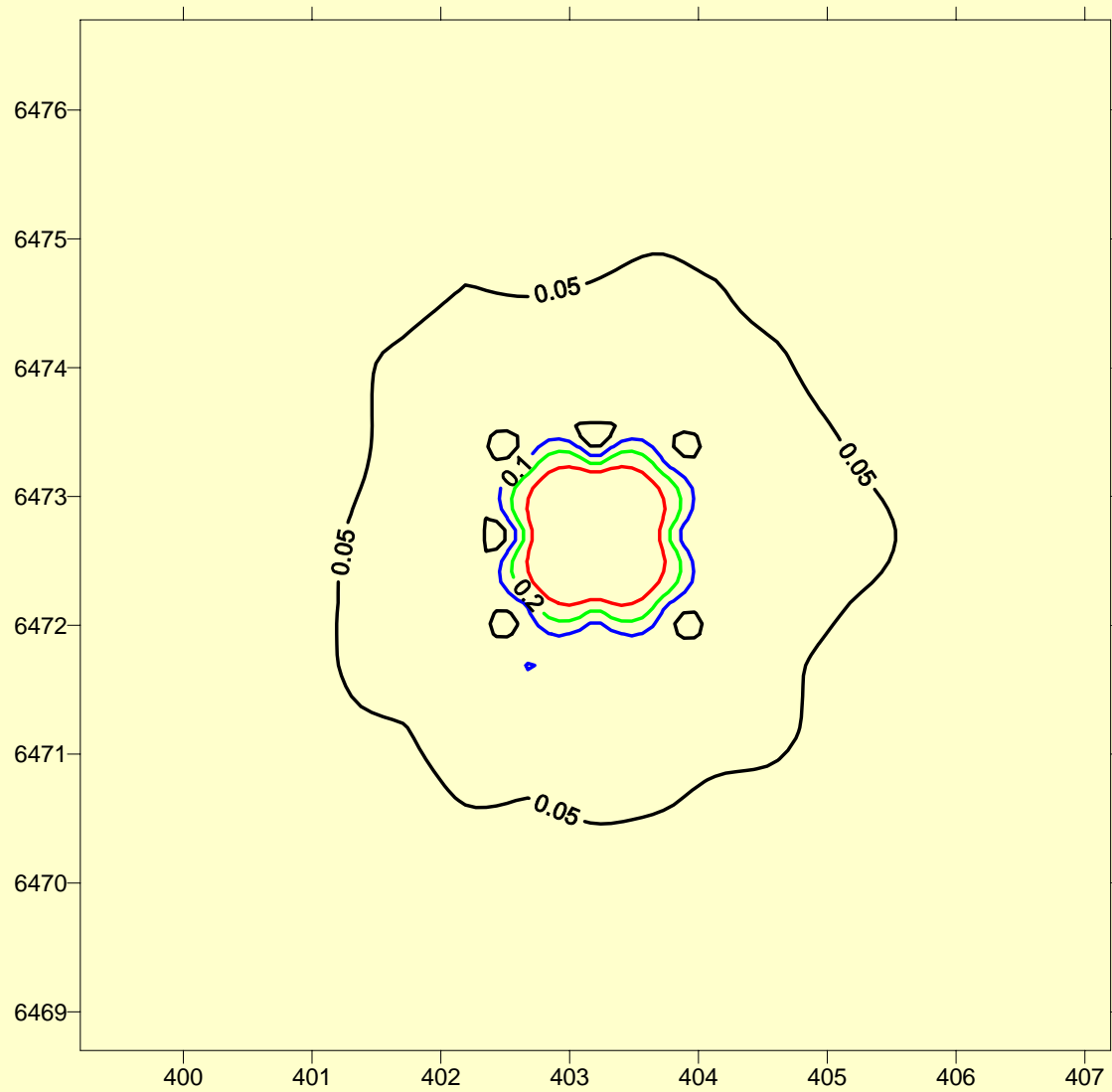
Minimum sigma y (m): Minimum sigma z (m):

Stability Class:	A	B	C	D	E	F
Minimum sigma v (m/s):	<input type="text" value=".2"/>	<input type="text" value=".2"/>	<input type="text" value=".2"/>	<input type="text" value=".2"/>	<input type="text" value=".2"/>	<input type="text" value=".2"/>
Minimum sigma w (m/s):	<input type="text" value=".02"/>	<input type="text" value=".02"/>	<input type="text" value=".02"/>	<input type="text" value=".02"/>	<input type="text" value=".02"/>	<input type="text" value=".02"/>

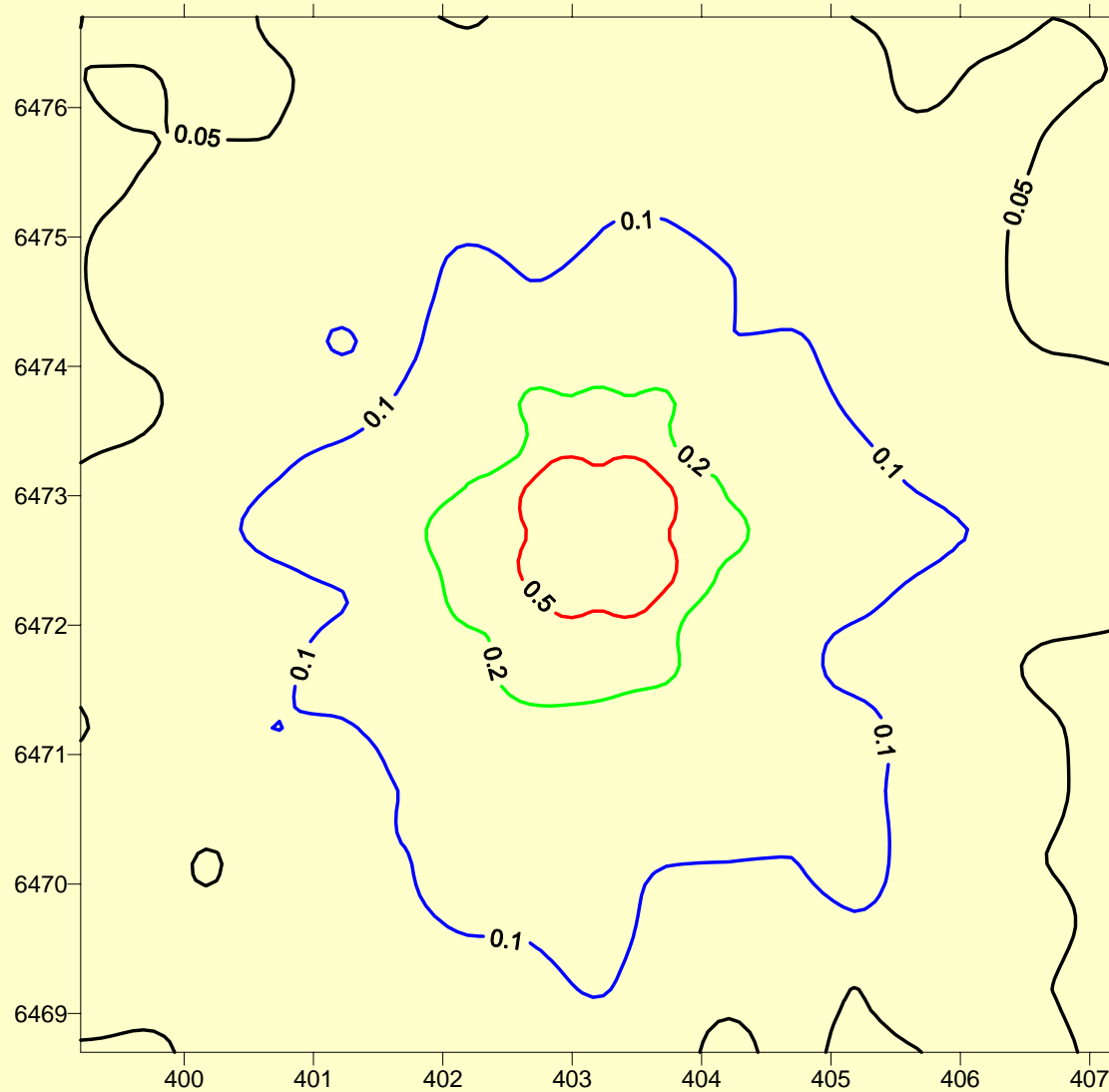
Near-Field Vertical Distribution: Uniform Gaussian

Transition-Point for Building Downwash:

Cpuff: micromet (*repeated*)



Cpuff: micromet – reduced limits $\sigma_v=0.2$, $\sigma_w=0.02$



Summary

- Calpuff results show modest dependence on u_* and L limits, and strong dependence on σ_v limits.
- Nose response times to odour are measured in seconds. If hourly averages are to be used for modelling odour (as is widely done), is it sensible to include the effect of wind meander in the hourly average (as per Calpuff default limits on σ_v , or by using measured 1-hour σ_θ), or is it more appropriate to effectively ignore meander (e.g. by using PG curves) in calculating an hourly average surrogate for odour impact?