Modelling mid-range radionuclide dispersion and deposition from an hypothetical NPP accident: Trillo NPP scenario

Preliminary modelling results

University of Seville

Model description

Lagrangian particle-tracking model

Advection with wind:

$$\frac{d\vec{r}}{dt} = \vec{u}$$

3D wind profile:

$$u_z = \frac{u\sqrt{c_d}}{k}\ln\left(\frac{z}{z_0}\right)$$

Turbulent diffusion and radioactive decay: Monte Carlo method

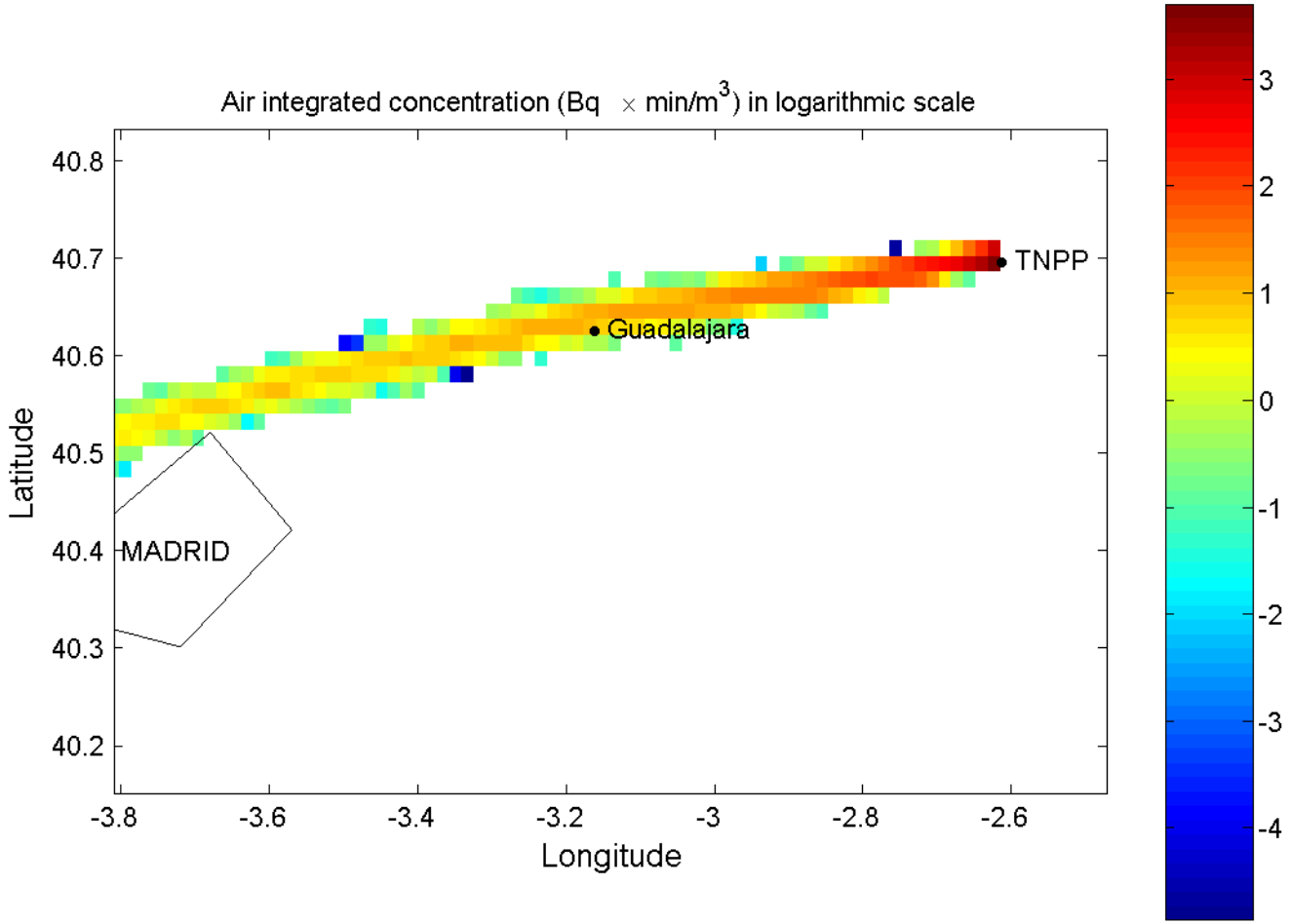
200 particles are released each time step

Particle deposition occurs if $z \leq 0.10$ m

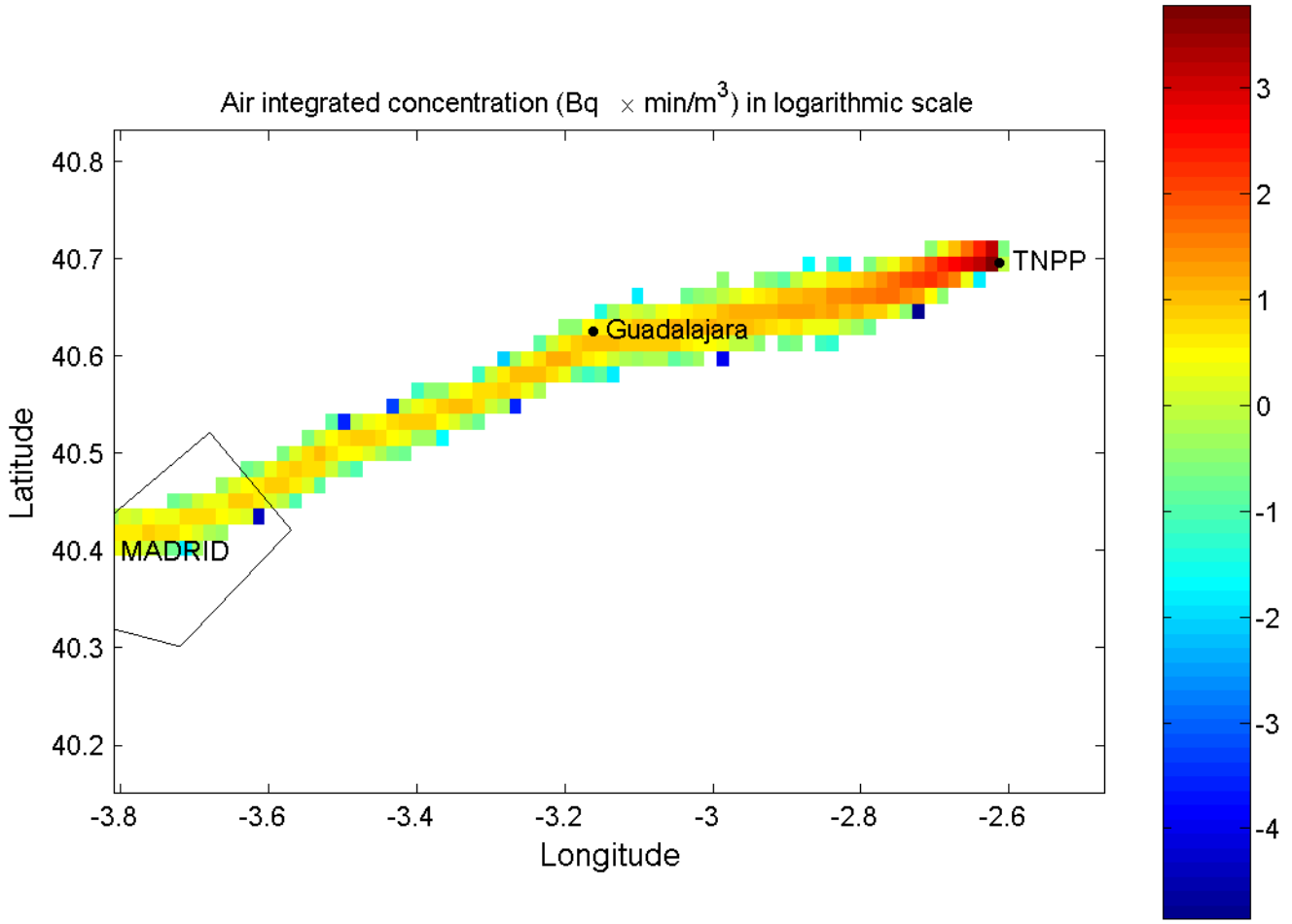
Example of input file

```
INPUT DATA FOR ATMOSPHERIC DISPERSION MODEL
1409. 1853.      dx,dy (m)
-3.82 -2.47      geographyic limits (long)
40.15 40.83      geographyic limits (lat)
82,42            nx,ny
10.              time step (s)
1000.            boundary layer height
3.0              geostrophic wind magnitude
trillost.OUT     output file from WINMOD
trillo.xyz       topography (lon,lat,height)
60. 30.          horizontal and vertical diffusivities
10.              simulation time (hours)
-2.62 40.7 50.   release pos (lon,lat), height (m)
iodine.dat       source data file
1.               release duration (hours)
1.               release data resolution (minutes)
9.98e-7          decay constant (s-1)
-2.80,40.65      intermediate point
-3.17,40.63      guadalajara
-3.68,40.43      downtown madrid
```

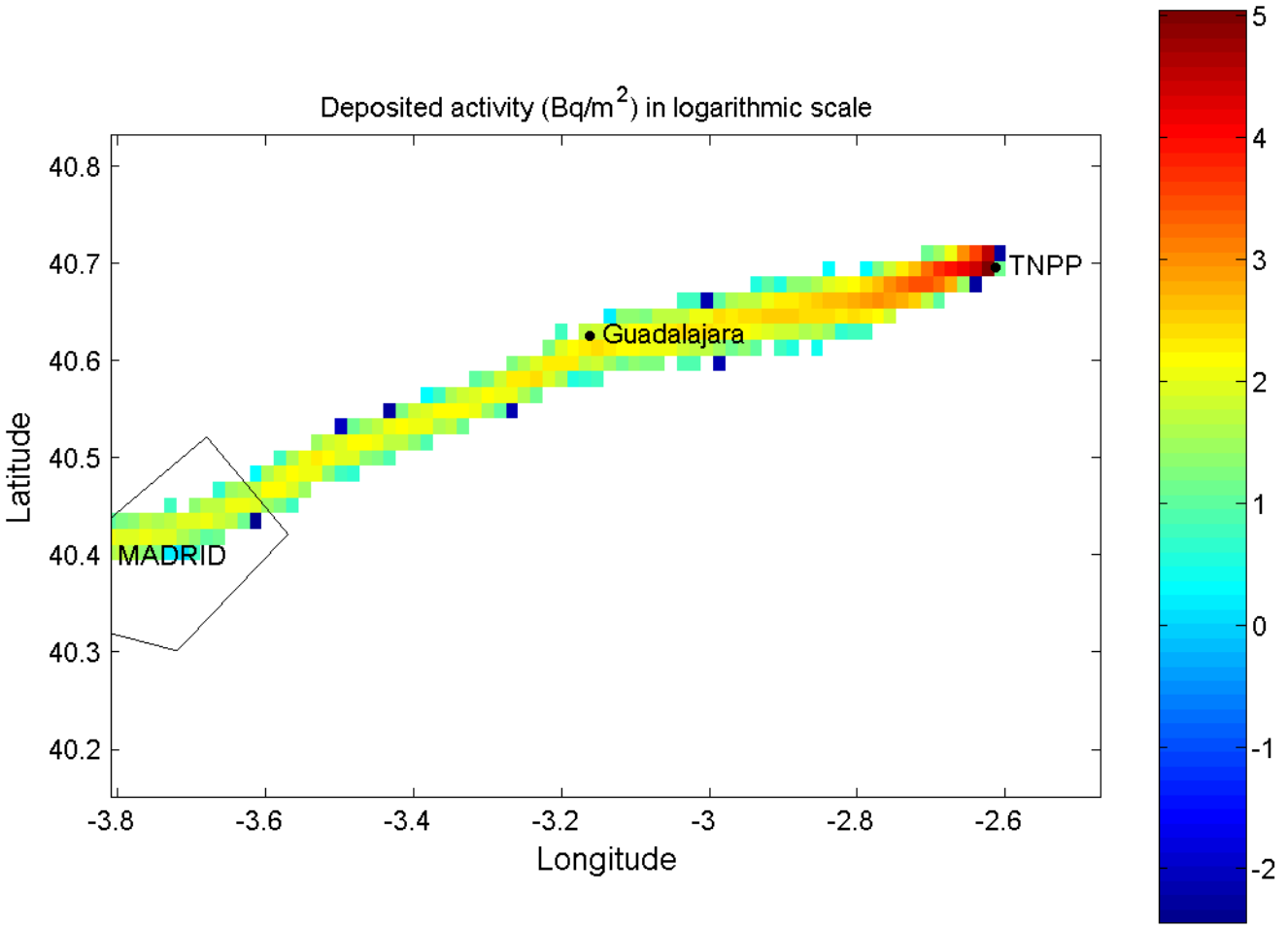
Air time-integrated concentrations: ^{137}Cs, neutral stability



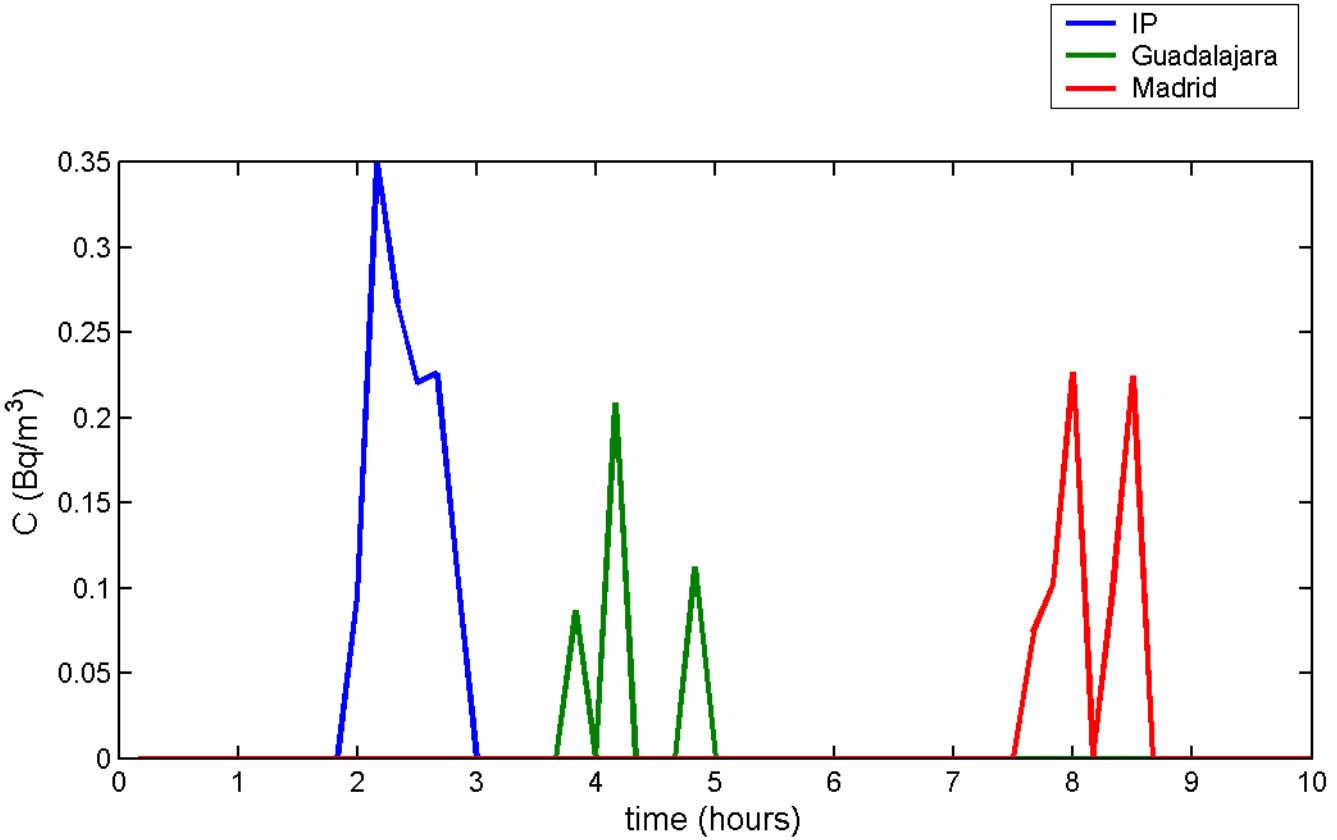
Air time-integrated concentrations: ^{137}Cs, stable atmosphere



Ground deposition: ^{137}Cs, stable atmosphere



Time series: ^{137}Cs, stable atmosphere



Time series: ^{137}Cs, neutral stability