Organization of Course

INTRODUCTION

1. Course overview
2. Air Toxics overview
3. HYSPLIT overview

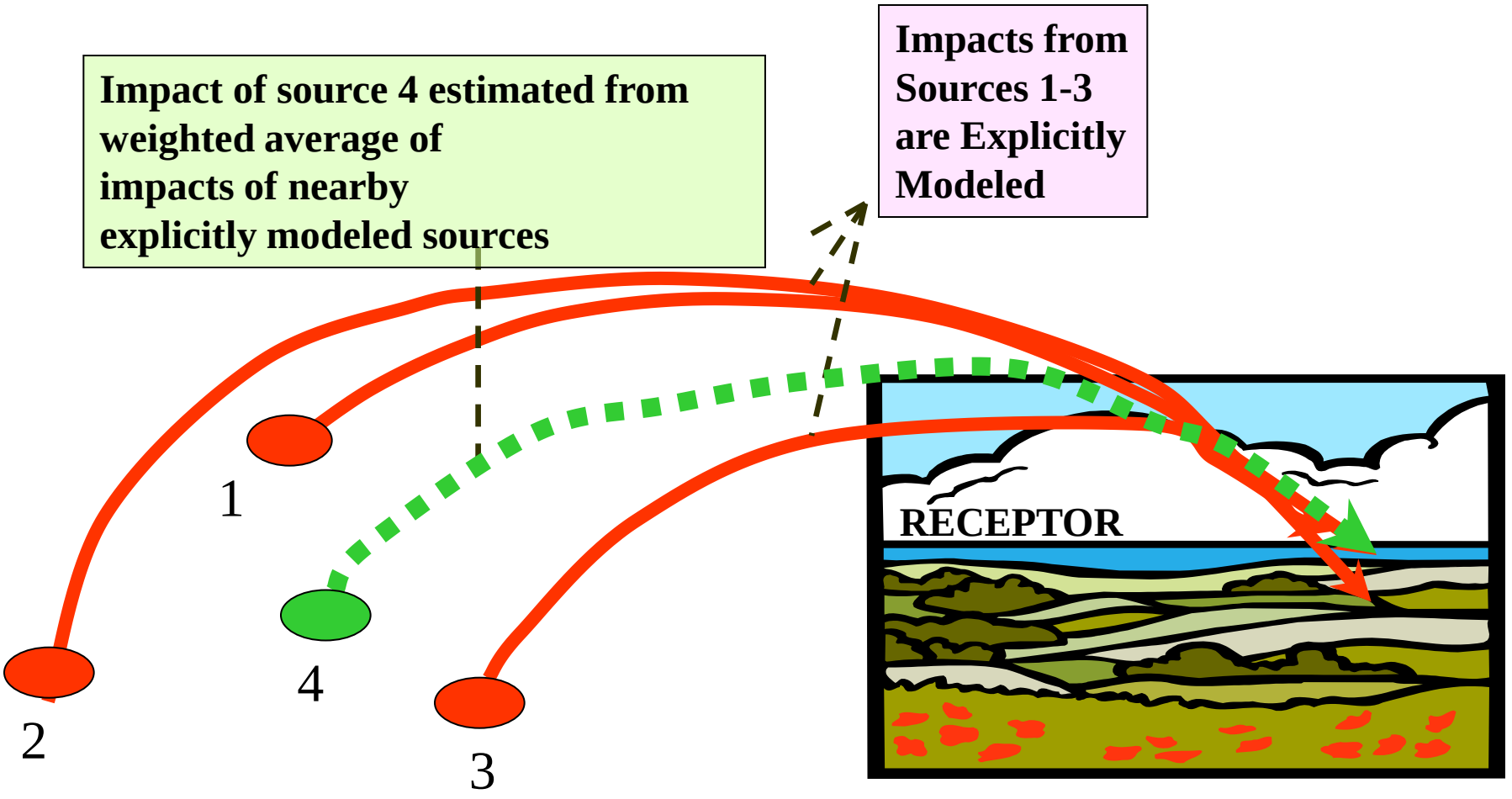
HYSPLIT Theory and Practice

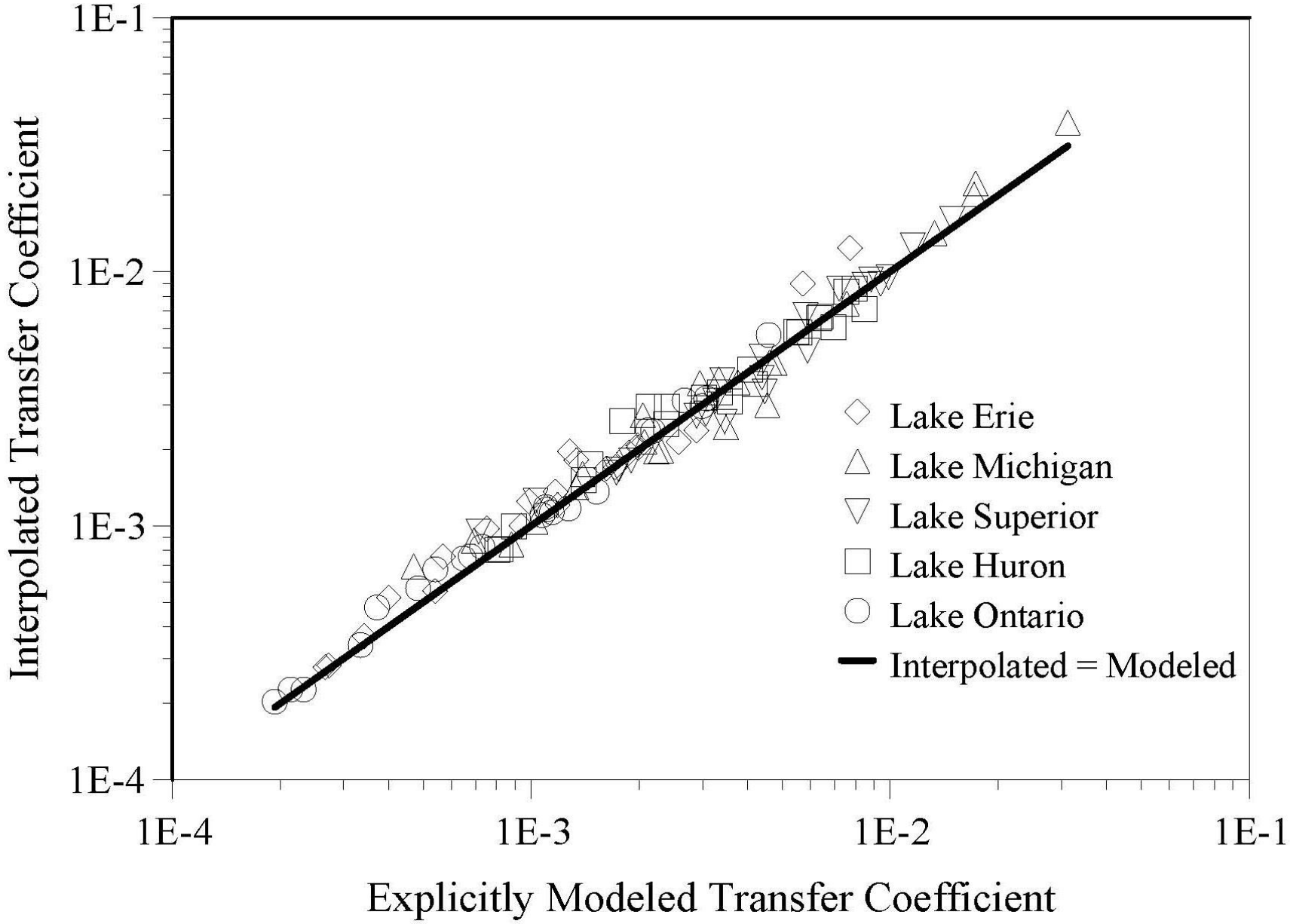
4. Meteorology
5. Back Trajectories
6. Concentrations / Deposition
7. HYSPLIT-SV for semivolatiles (e.g, PCDD/F)
8. HYSPLIT-HG for mercury

Overall Project Issues & Examples

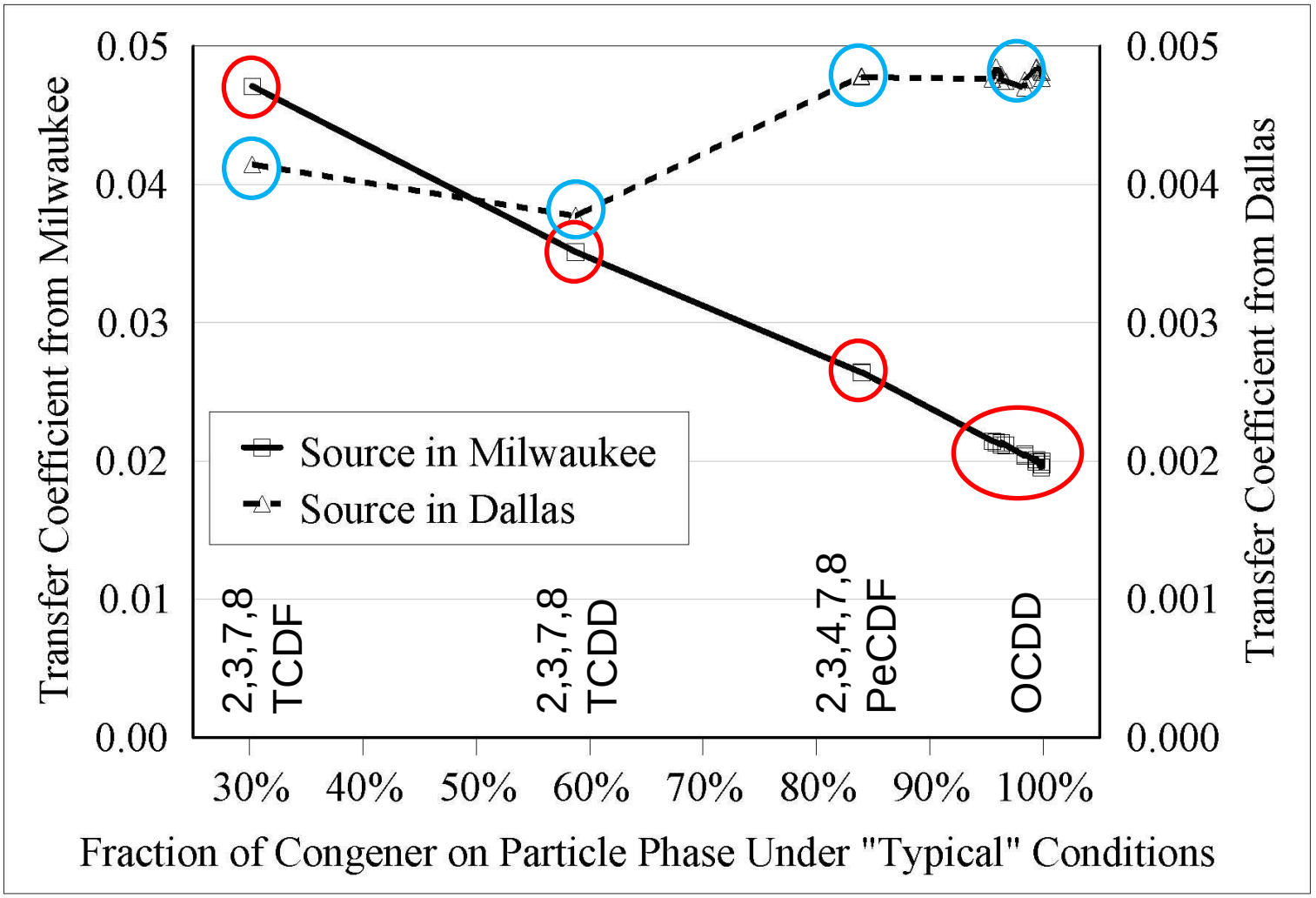
9. Emissions Inventories
10. **Source-Receptor Post-Processing**
11. Source-Attribution for Deposition
12. Model Evaluation
13. Model Intercomparison
14. Collaboration Possibilities

Spatial interpolation




1E-1
1E-2
1E-3
1E-4
Interpolated Transfer Coefficient
1E-4
1E-3
1E-2
1E-1
Explicitly Modeled Transfer Coefficient
Lake Erie
Lake Michigan
Lake Superior
Lake Huron
Lake Ontario
Interpolated = Modeled

Congener Interpolation Used in Dioxin Modeling



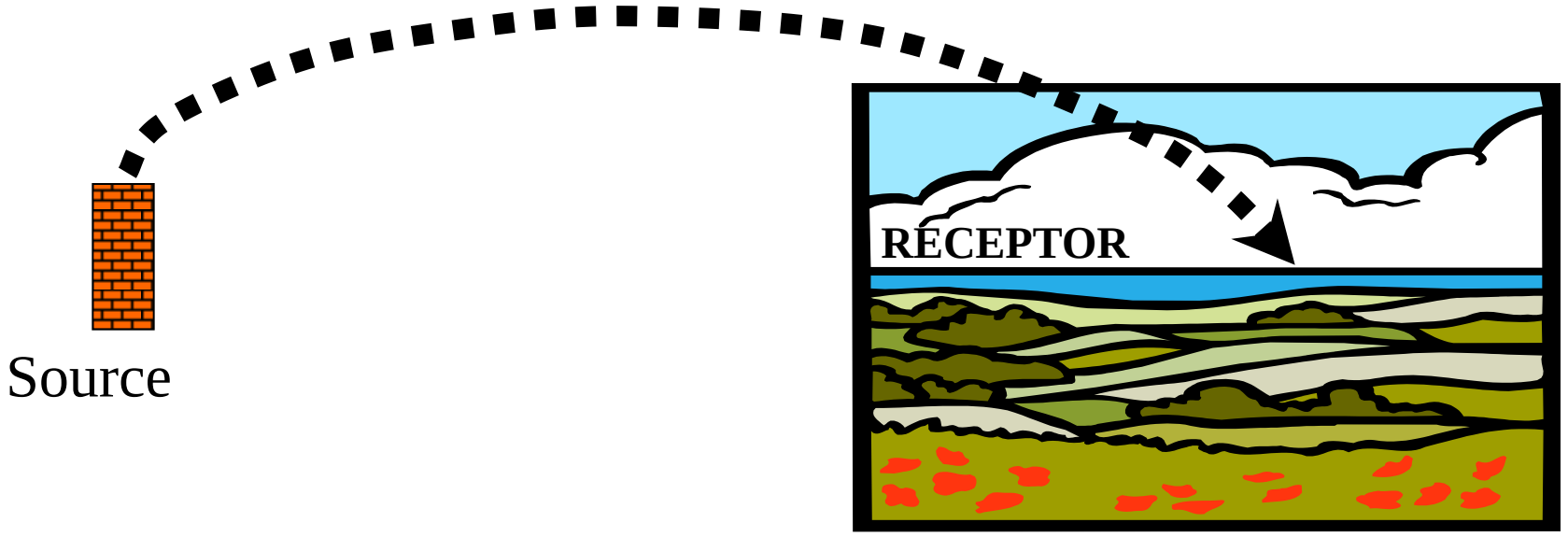
Only Four Congeners Actually Modeled:
2,3,7,8 TCDF 2,3,7,8-TCDD 2,3,4,7,8-PeCDF and OCDD
All the rest estimated from the results for these

- **Perform separate simulations at each location for emissions of pure Hg(0), Hg(II) and Hg(p)**

  [*after emission, simulate transformations between Hg forms*]

- **Impact of emissions mixture taken as a linear combination of impacts of pure component runs on any given receptor**

“Chemical Interpolation”



Impact of Source Emitting
30% Hg(0)
50% Hg(II)
20% Hg(p)

=

0.3 x **Impact of Source Emitting Pure Hg(0)**

+

0.5 x **Impact of Source Emitting Pure Hg(II)**

+

0.2 x **Impact of Source Emitting Pure Hg(p)**

Why might the atmospheric fate of mercury emissions be essentially linearly independent?

- **Hg is present at extremely trace levels in the atmosphere**
- **Hg won't affect meteorology (can simulate meteorology independently, and provide results to drive model)**
- **Most species that complex or react with Hg are generally present at *much* higher concentrations than Hg**
- **Other species (e.g. OH) generally react with many other compounds than Hg, so while present in trace quantities, their concentrations cannot be strongly influenced by Hg**
- **Wet and dry deposition processes are generally 1st order with respect to Hg**
- **The current "consensus" chemical mechanism (equilibrium + reactions) does not contain any equations that are not 1st order in Hg**