

normal

lognormal

uniform

loguniform

triangular

piece wise uniform

'comfort' ... scientists are more comfortable with variation than with arbitrary exactness

'expert' system ... incorporates trends

encompass many minor scenarios
a measure of overall variability

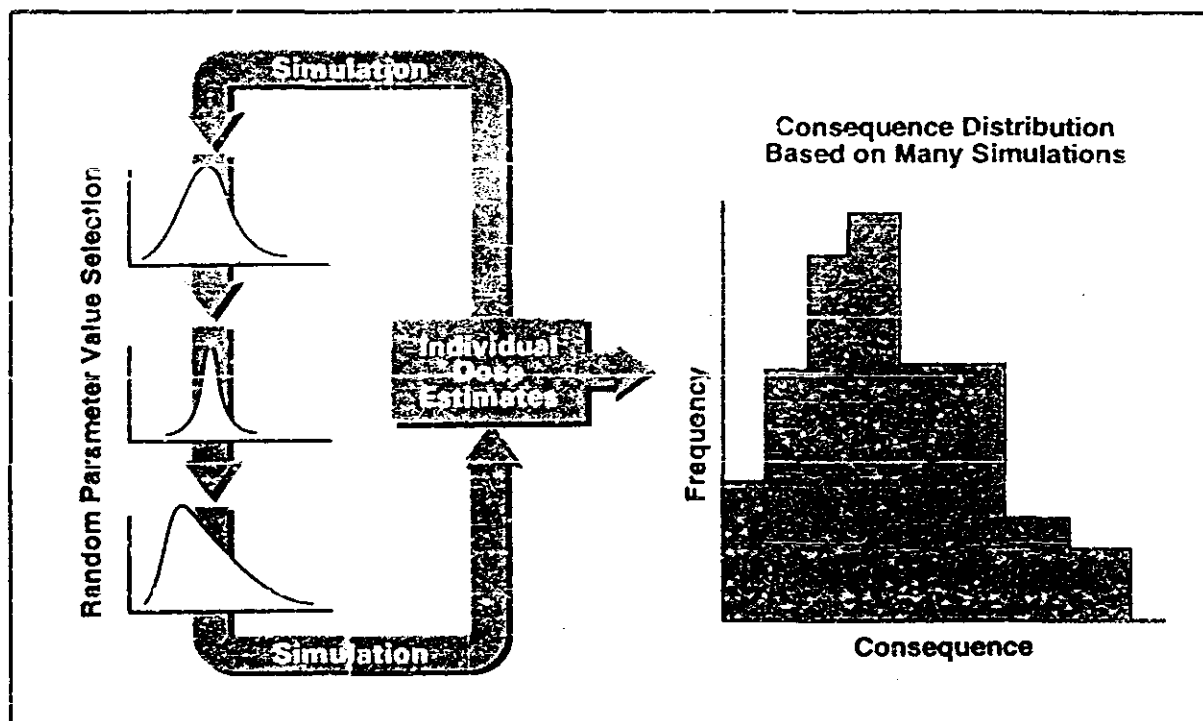
sums tend to be normally distributed

- *organism and tissue weights*
- *dietary inputs*

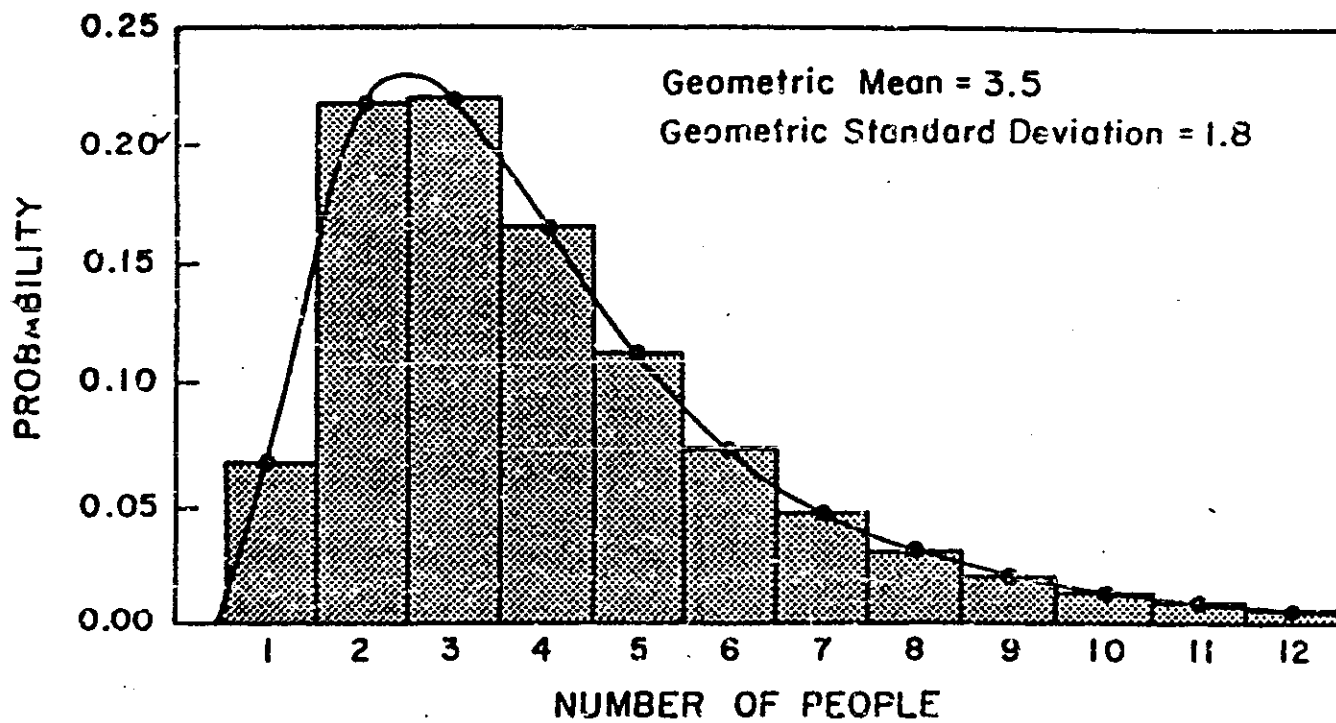
products tend to be lognormal

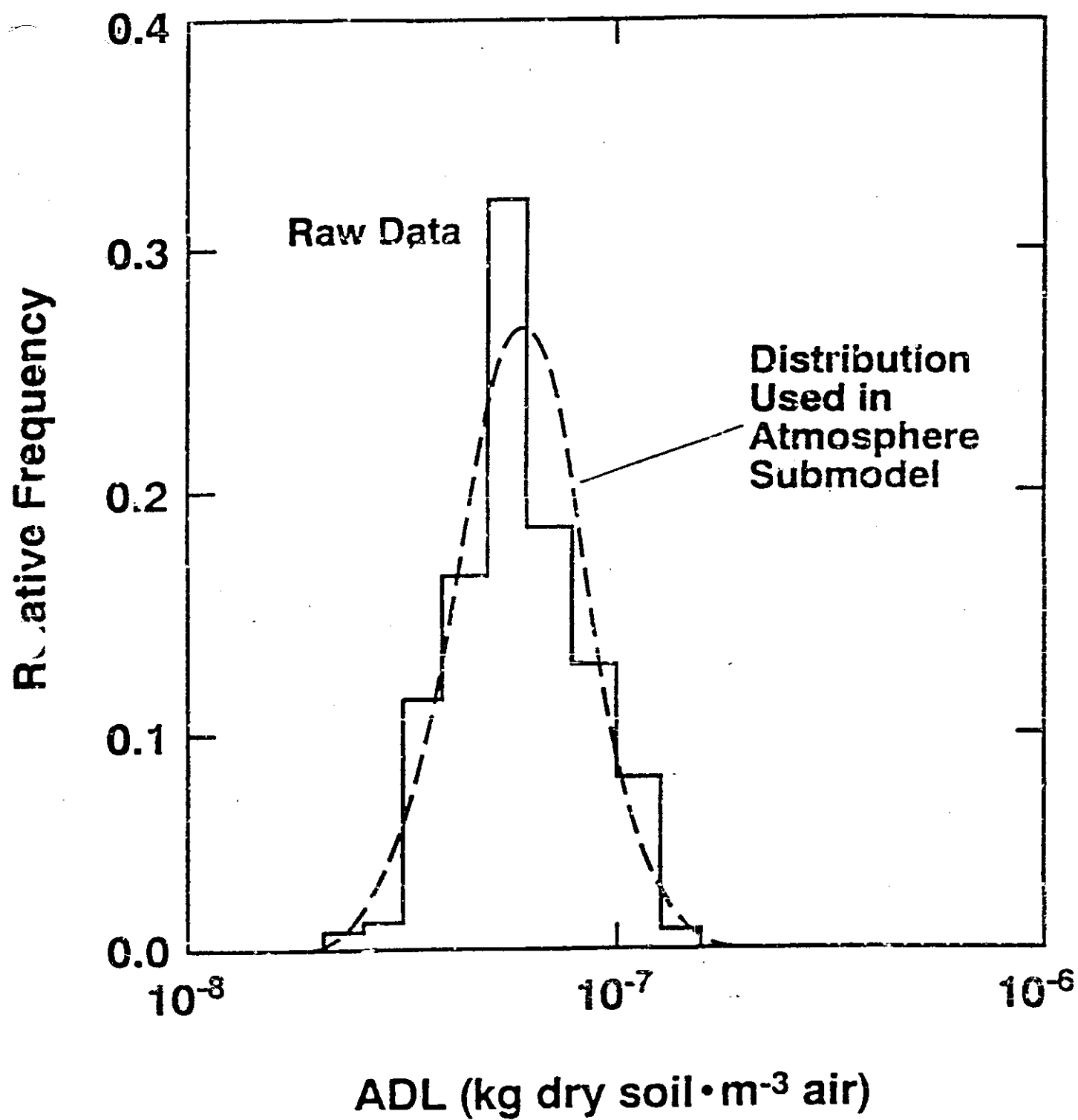
- *K_d, concentration ratios*
- *environmental contaminant concentrations*

Principles of Monte Carlo Simulation Showing Random Parameter Value Selection



SIZE OF THE CRITICAL GROUP





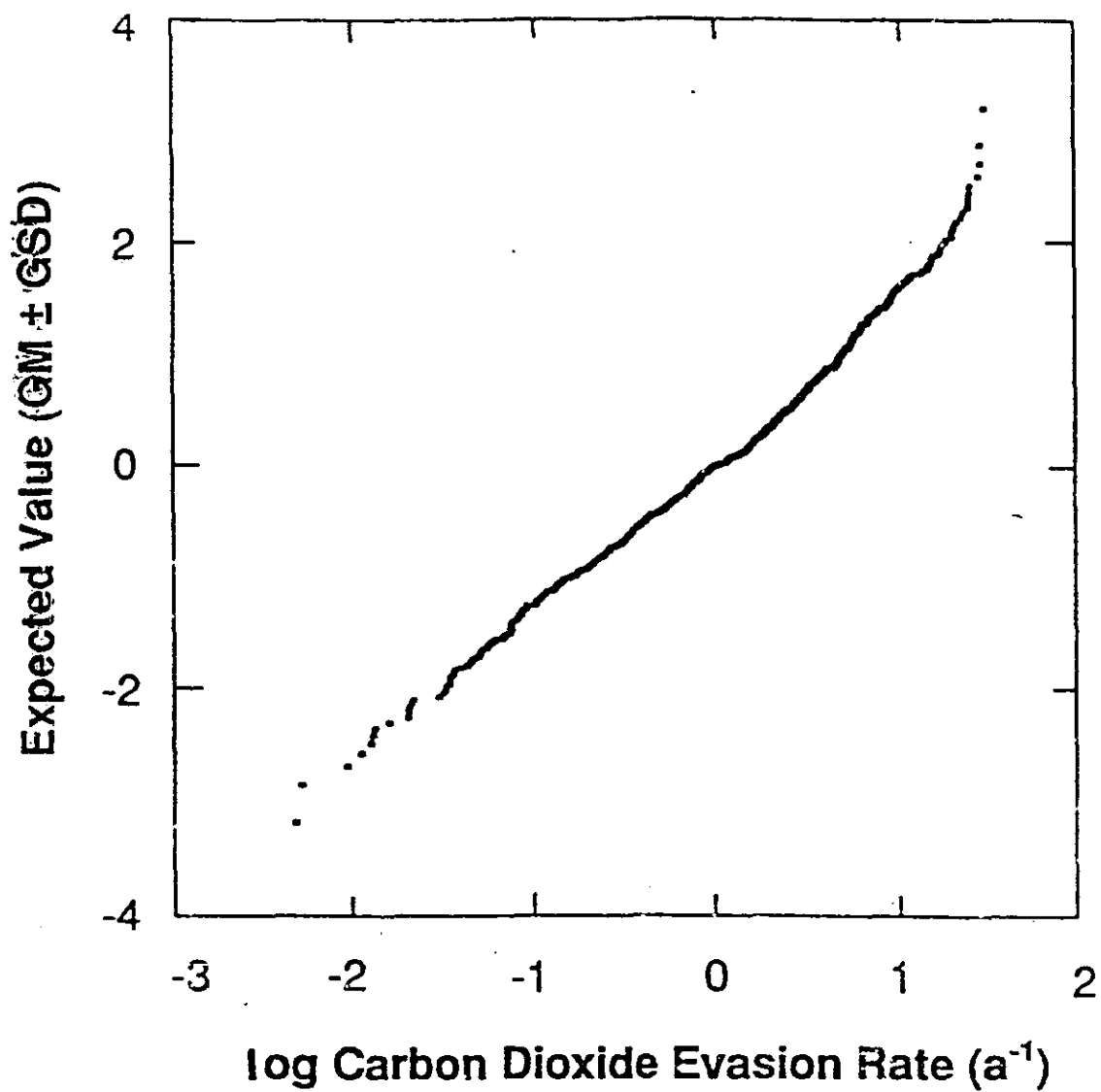
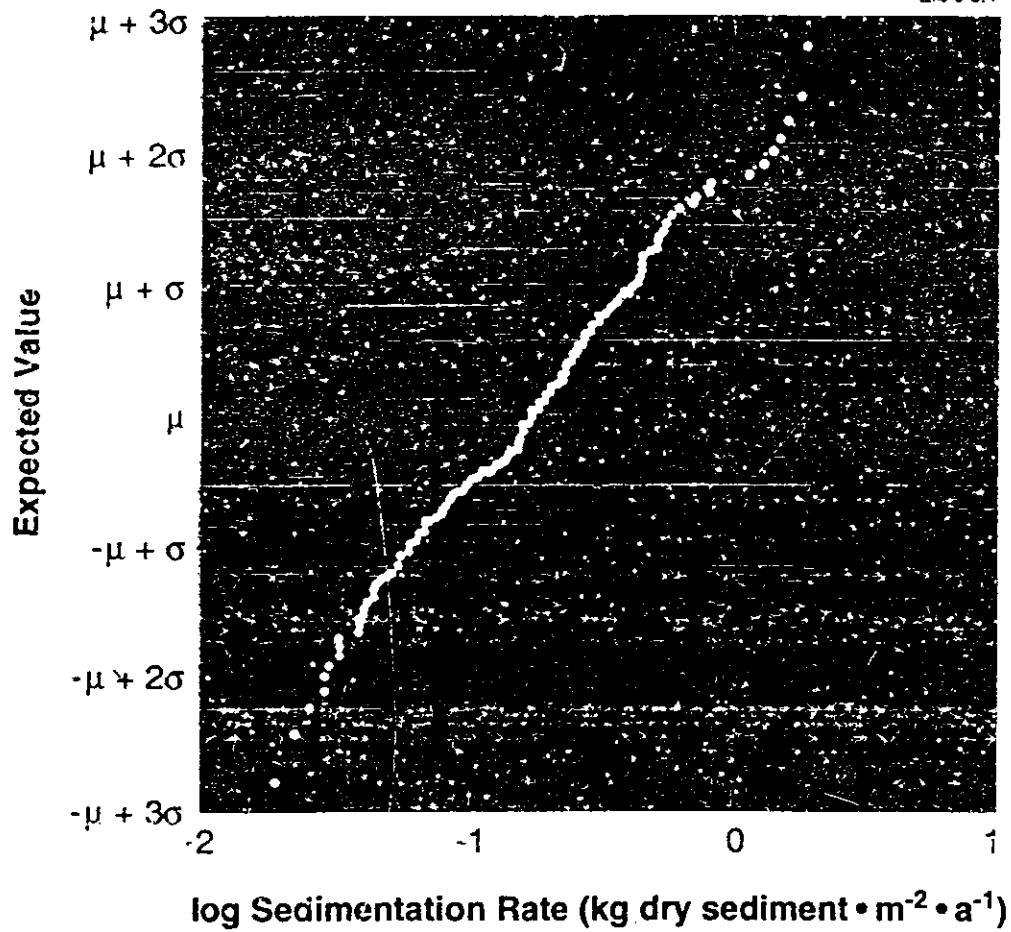


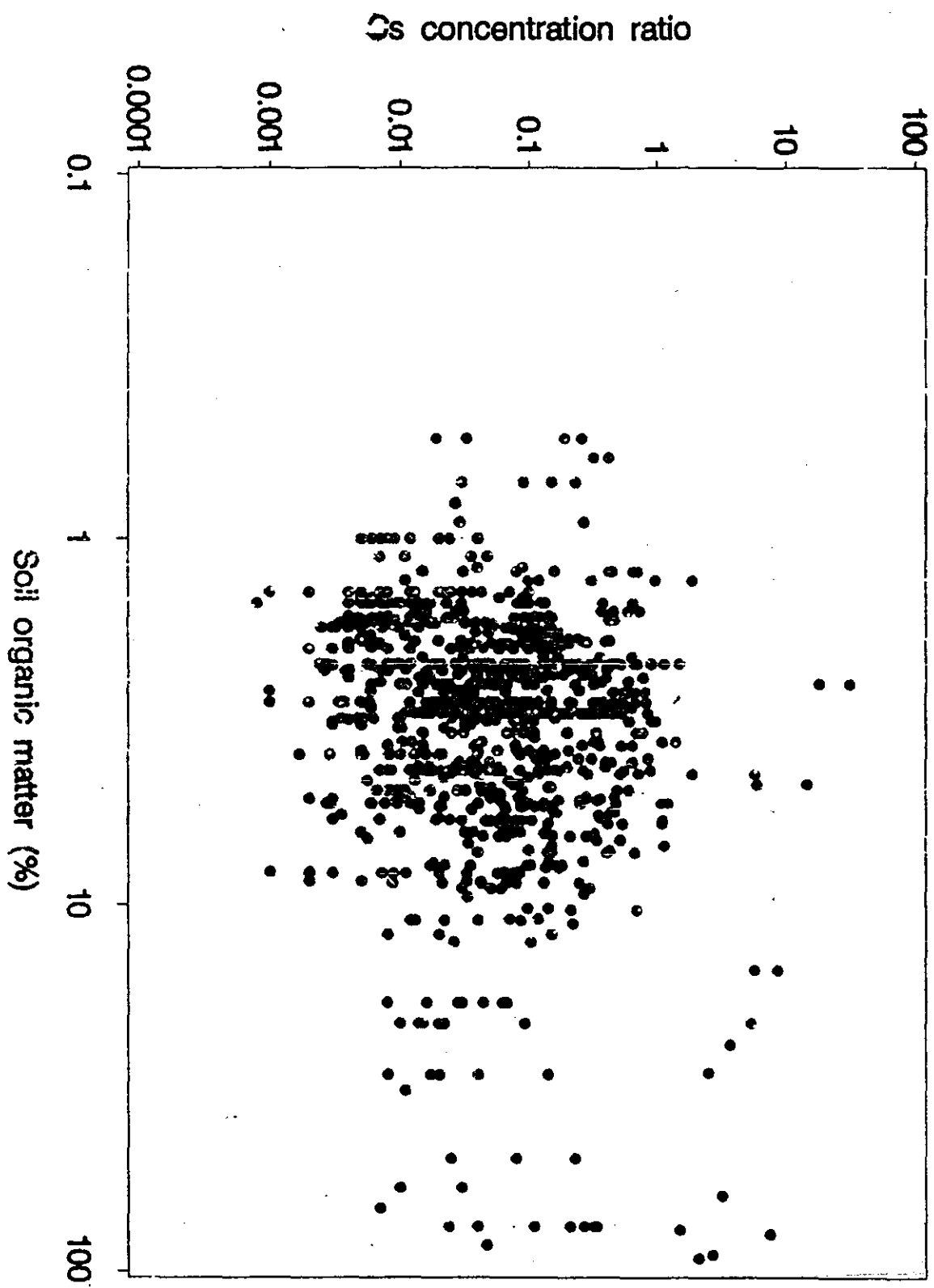
FIGURE 10: Probability Plot of the log-Transformed Gas Evasion Values Estimated for Shield Lakes. The nearly straight line indicates a lognormal distribution.

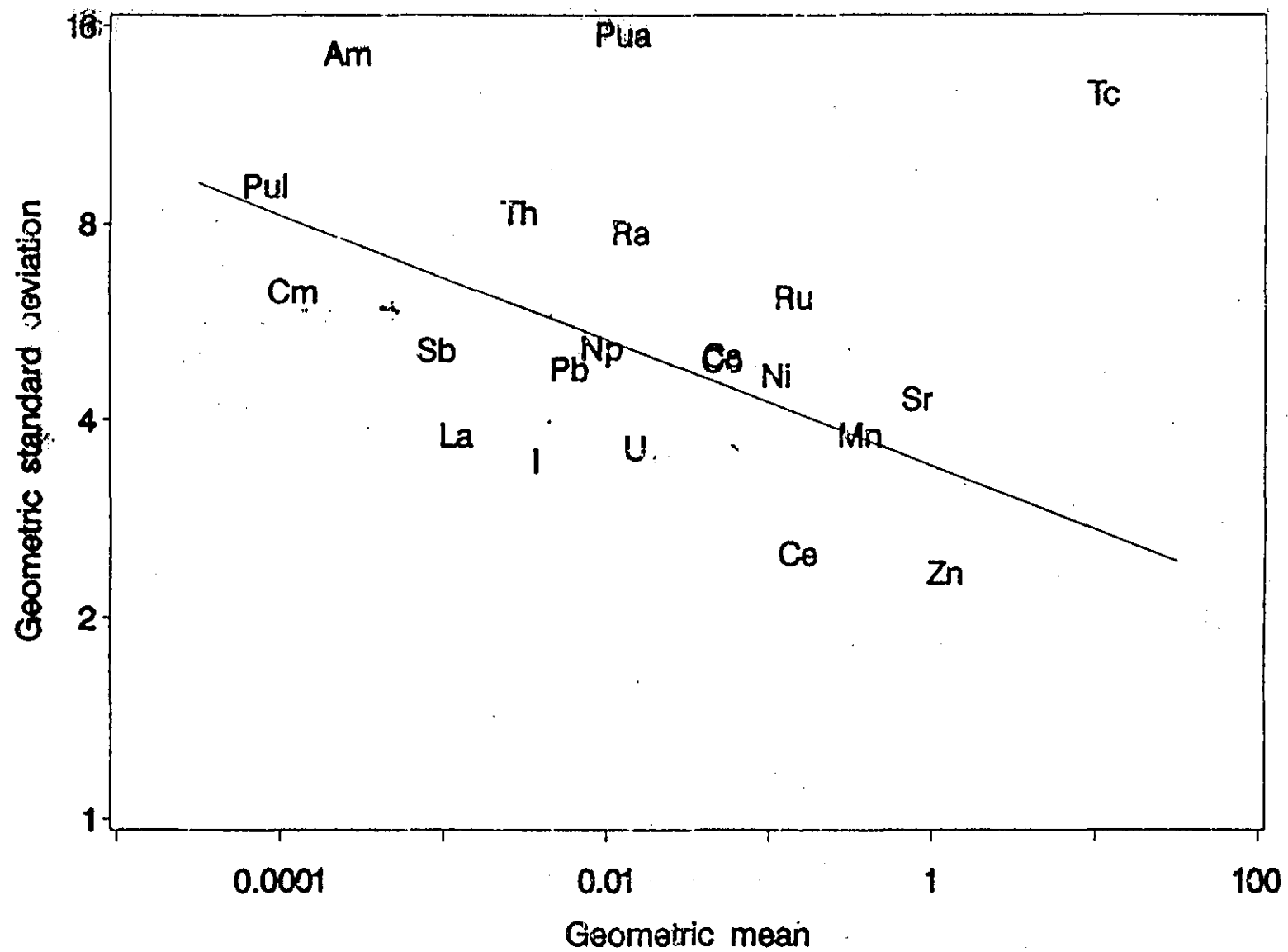
Probability Plot of Log Sedimentation Rate of Shield Lakes

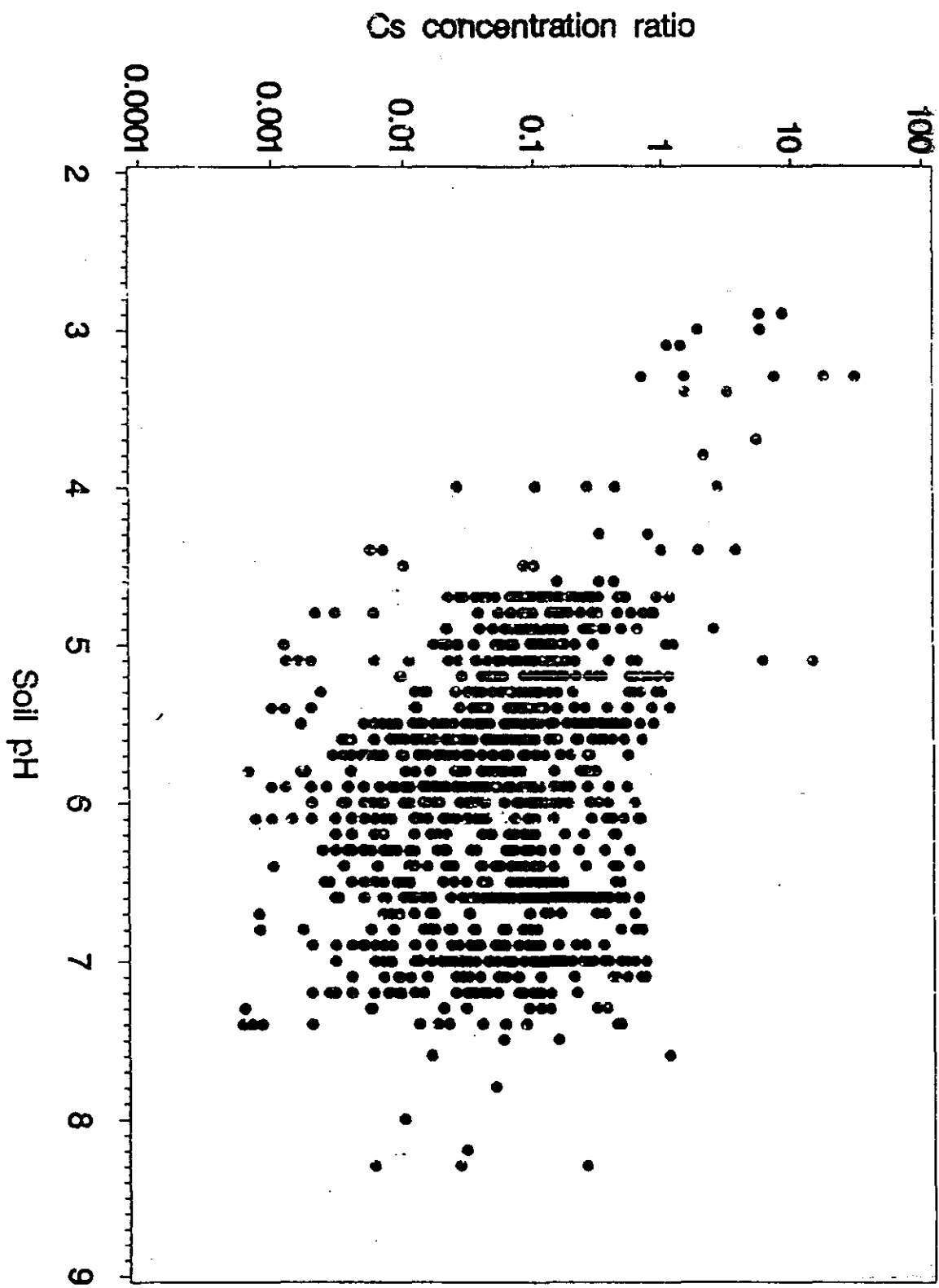
EIS 0-5.4

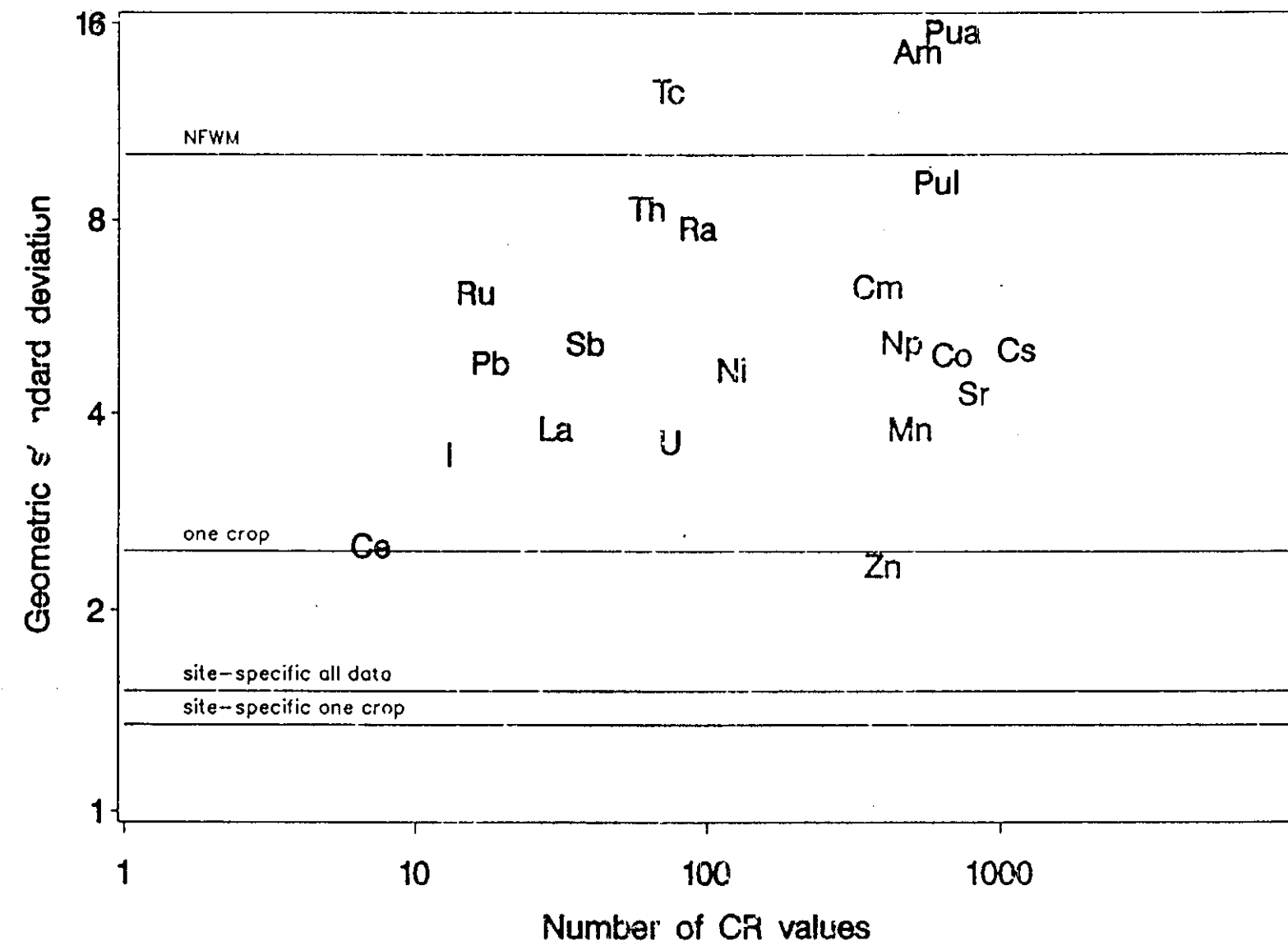


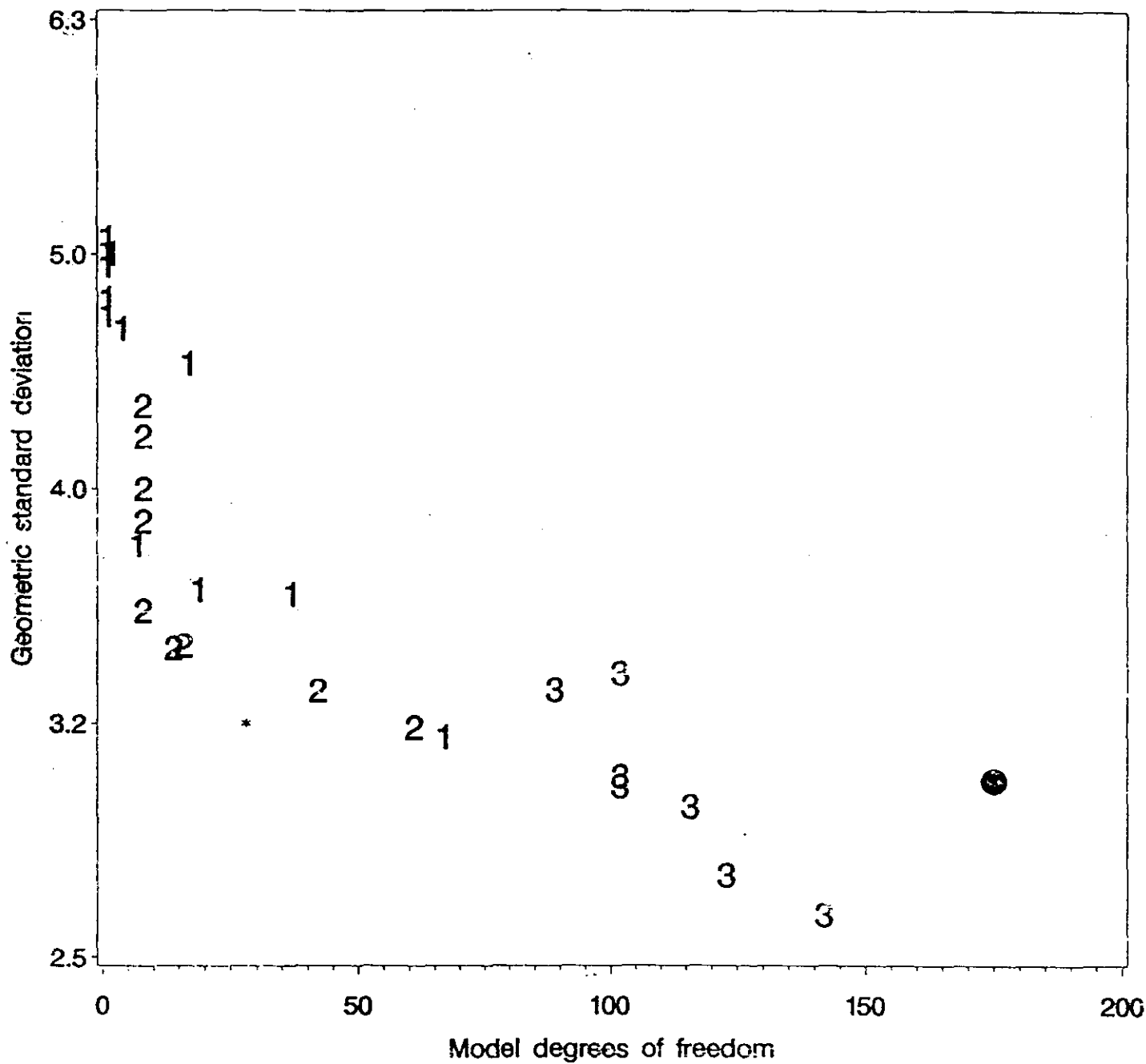
Geometric Mean 0.16 kg dry $\cdot$ m⁻² $\cdot$ a⁻¹
Geometric Standard Deviation 2.48











avoid impossible values

adhere to scenario assumptions

remove very improbable values

avoid unreasonable

combinations of values

'expert' system ... incorporate

inexact trends

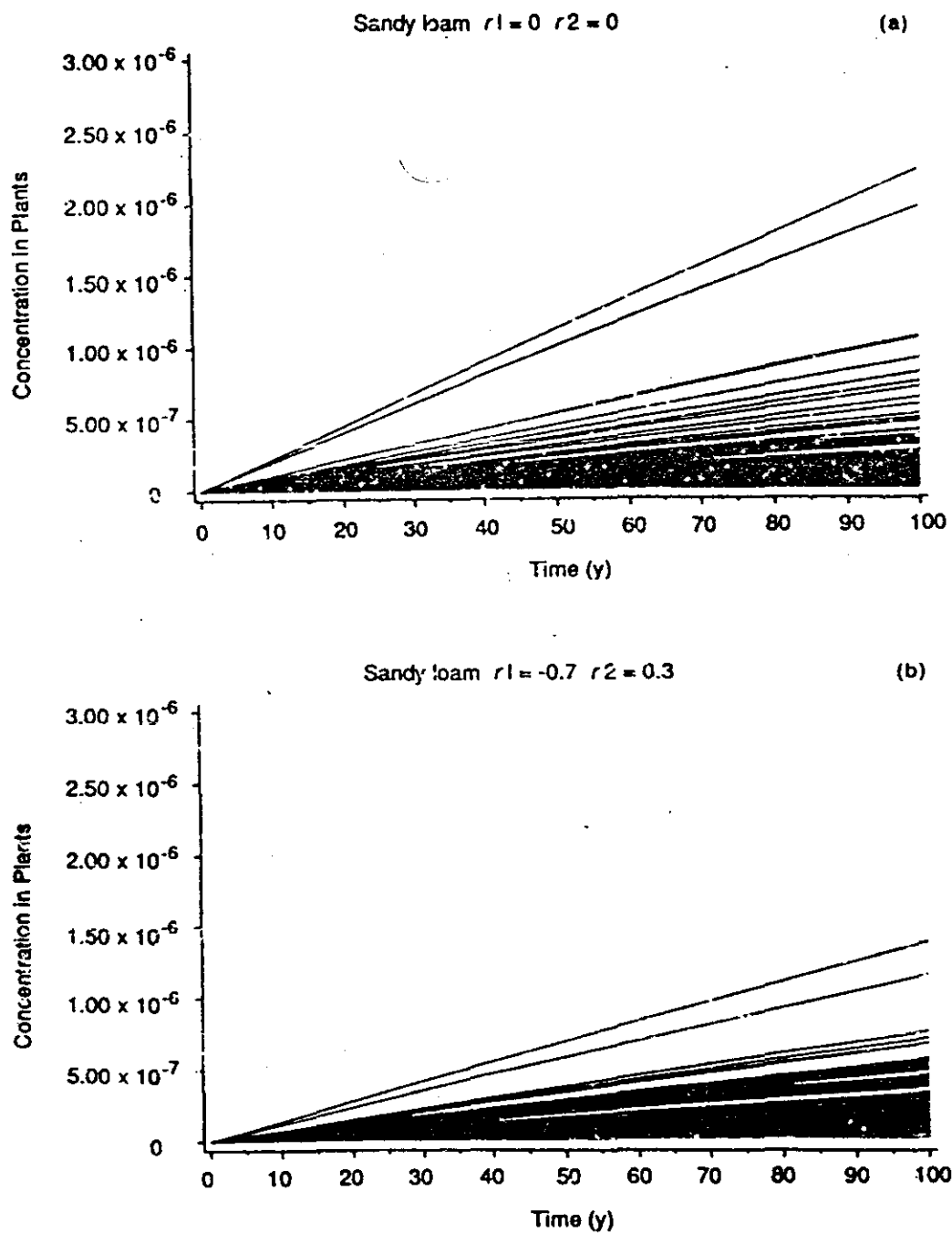
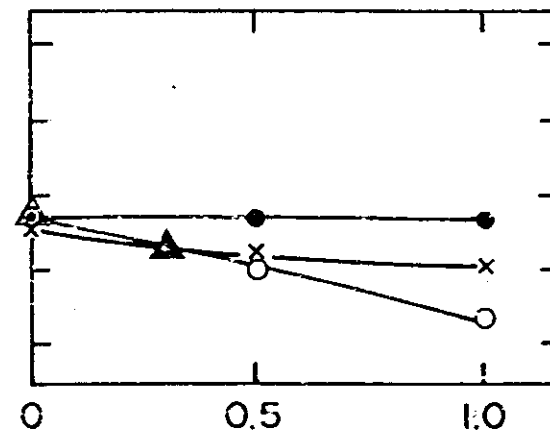
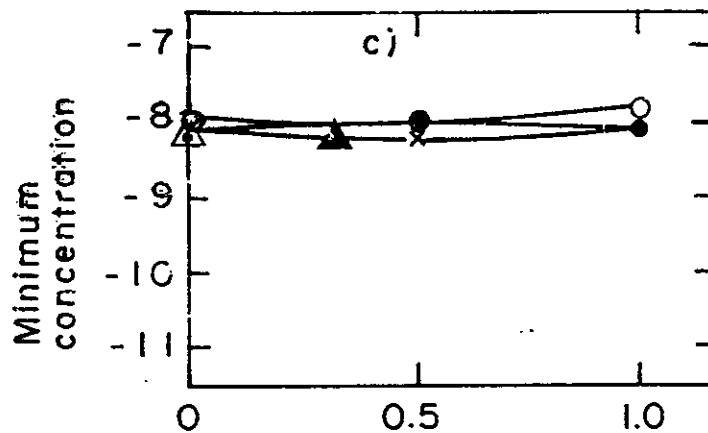
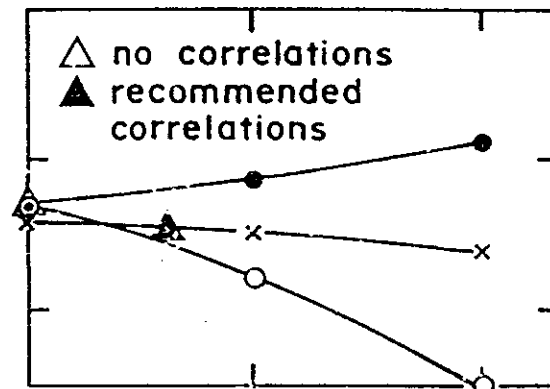
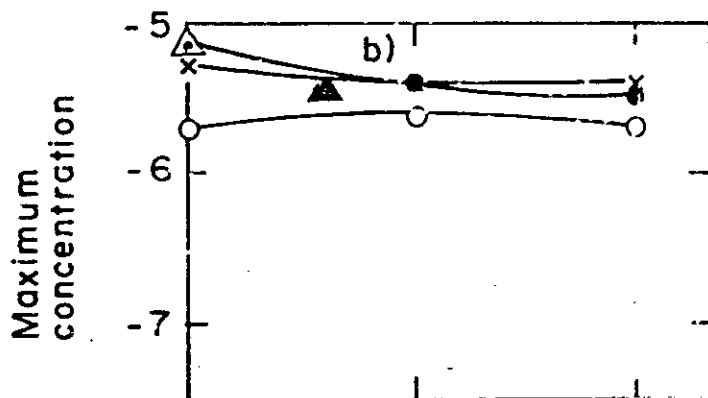
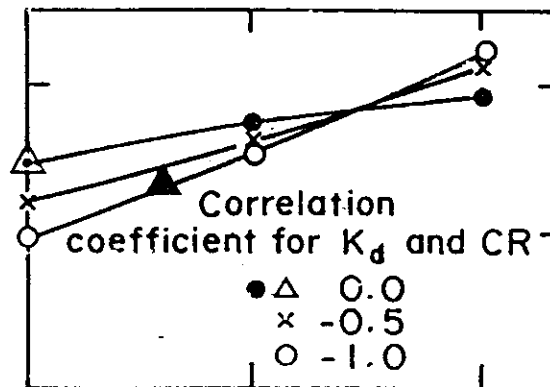
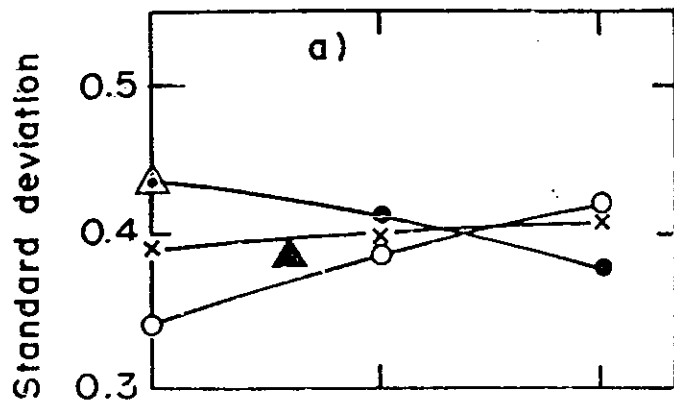


Fig. 1. Estimated plant concentration with time for a shallow sandy-loam soil over contaminated ground water for 1000 realizations, showing the effect of no parameter correlation (a) and the recommended parameter correlations (b). The coefficient r_1 represents the correlation between CR and K_d , and r_2 represents the correlation between K_d and soil texture.

sand

clay



Correlation coefficient for K_d and clay content

literature

experimentation and measurement

logic

best estimate

FEEDBACK ON ENVIRONMENTAL ASSESSMENT METHODOLOGY FROM EIS PARTICIPANTS

1. Full supporting data are needed to make an environmental assessment methodology credible
2. Physical, chemical, radiological and social stressors need to be integrated
3. Cumulative impacts need to be addressed
4. Monitoring needs to be considered as part of an environmental assessment methodology
5. Specific rather than generic organisms should be used
6. The most sensitive life stages of organisms should be used
7. An integrated ecological approach should be used considering components and functions
8. Model parameters should be based on wild and not domestic organisms
9. The environmental understanding and view of aboriginal peoples needs to be included
10. Multiple lines of reasoning or evidence are needed

Population Dose

- ♦ collective dose to a large population, not just individuals in the critical group
- ♦ different factors
- ♦ anti-cancer factors interested because decreases with distance
- ♦ specific approach useful

radio



ESTIMATED CONCENTRATION OF NON-
RADIOACTIVE CONTAMINANTS

Contaminant	Garden Soil (mol/kg)	Well Water (mol/m ³)	Indoor Air (mol/m ³)
Antimony	2×10^{-18}	1×10^{-17}	$<10^{-20}$
Bromine	3×10^{-9}	2×10^{-9}	2×10^{-16}
Cadmium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Cesium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Chromium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Molybdenum	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Samarium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Selenium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Technetium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$

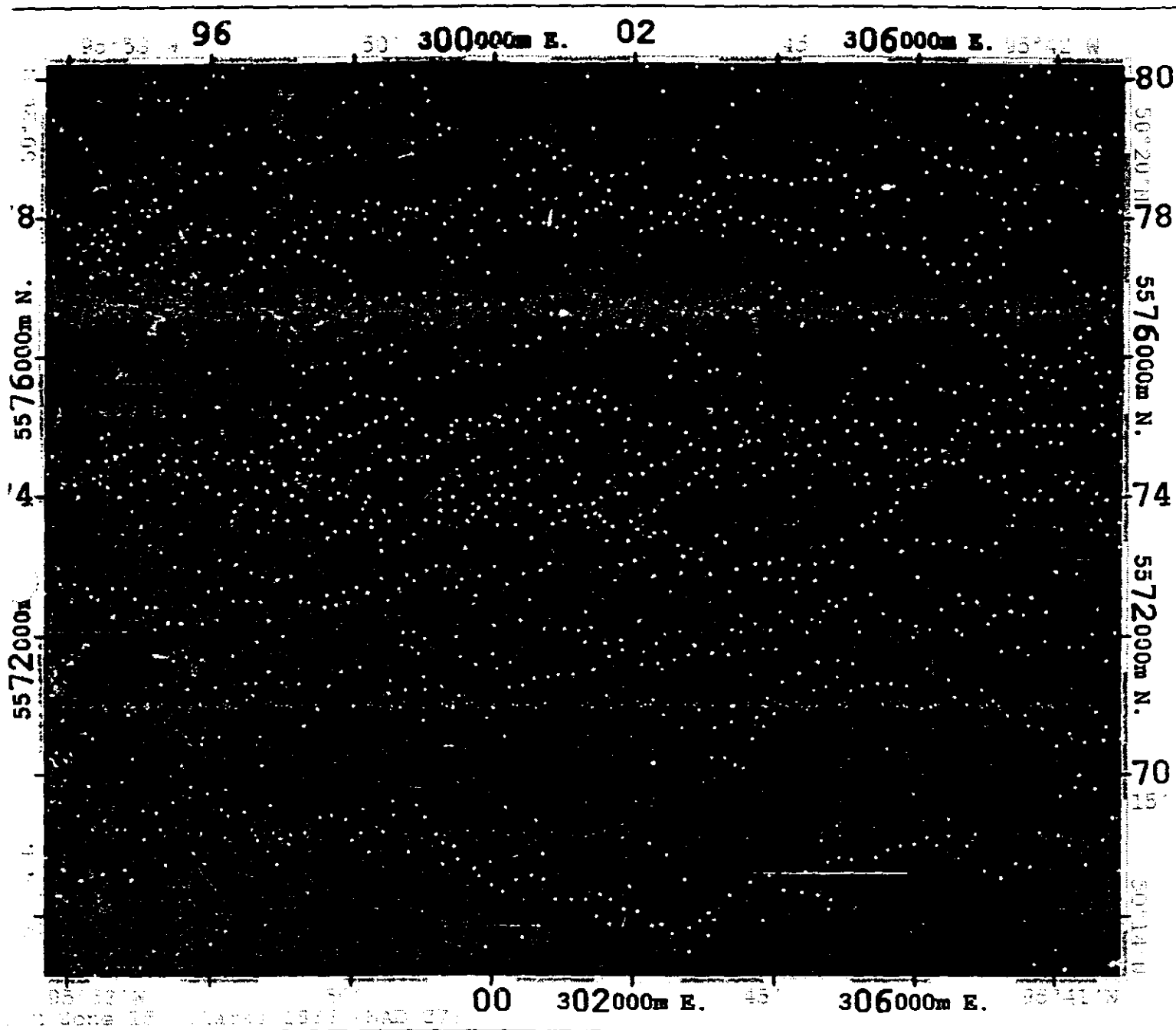
Values are mean maxima up to 100,000 years, based on 1000 simulations.

Values from Postclosure Primary Reference (page 205)

Landscape models

- ◆ departure from the critical group assessment
- ◆ better suited for population doses
- ◆ incorporates landscape processes
 - erosion, deltas, stream re-direction
- ◆ visualization ... may be a good public presentation tool

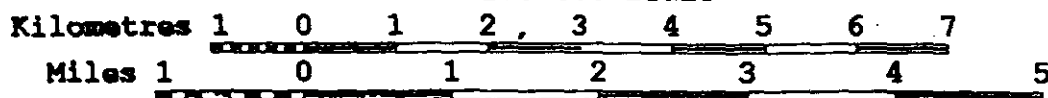


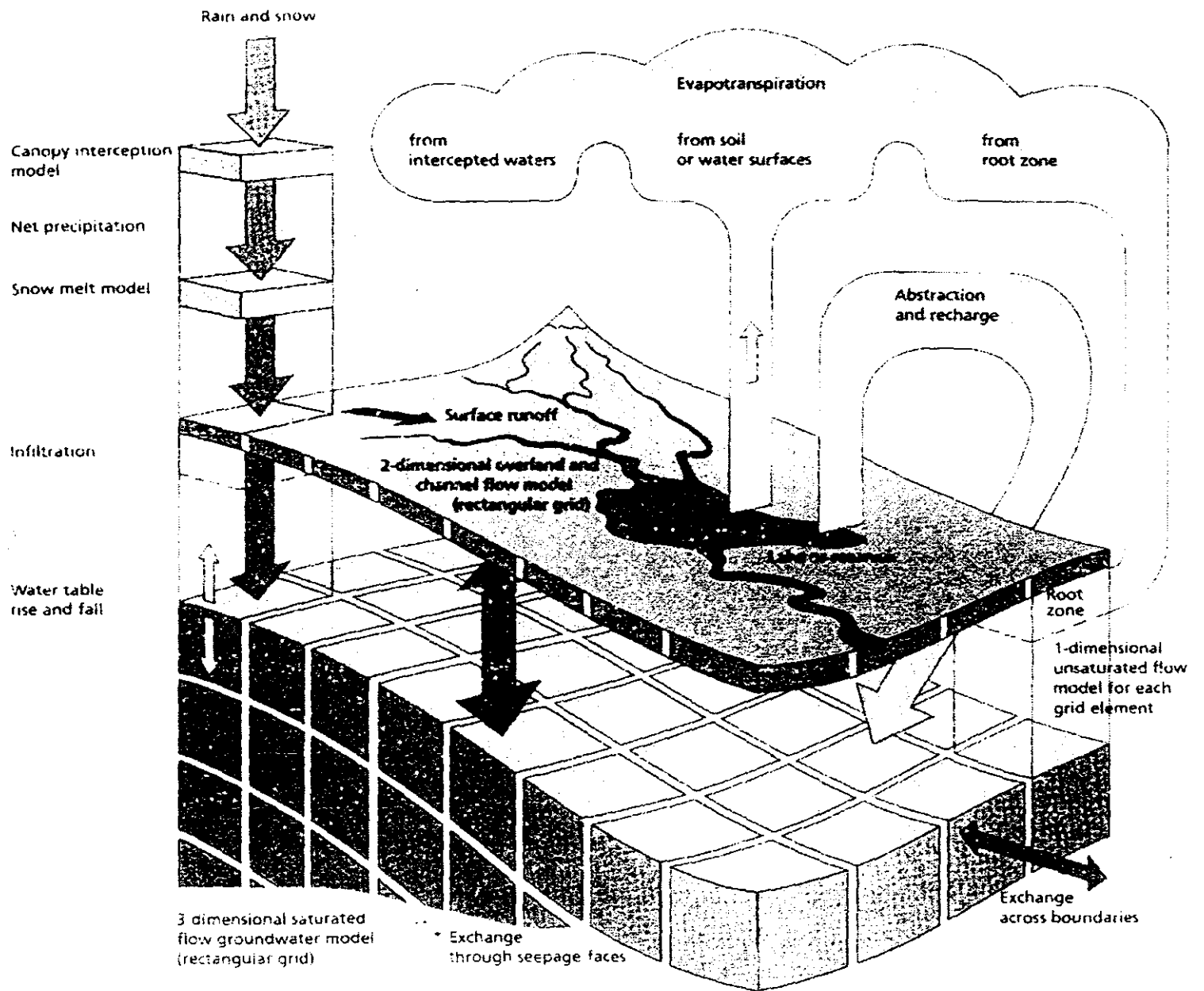


Whiteshell Detailed Model Area

PC

1:100 000 Scale





International programs

♦ BIOMOVs

♦ VAMP

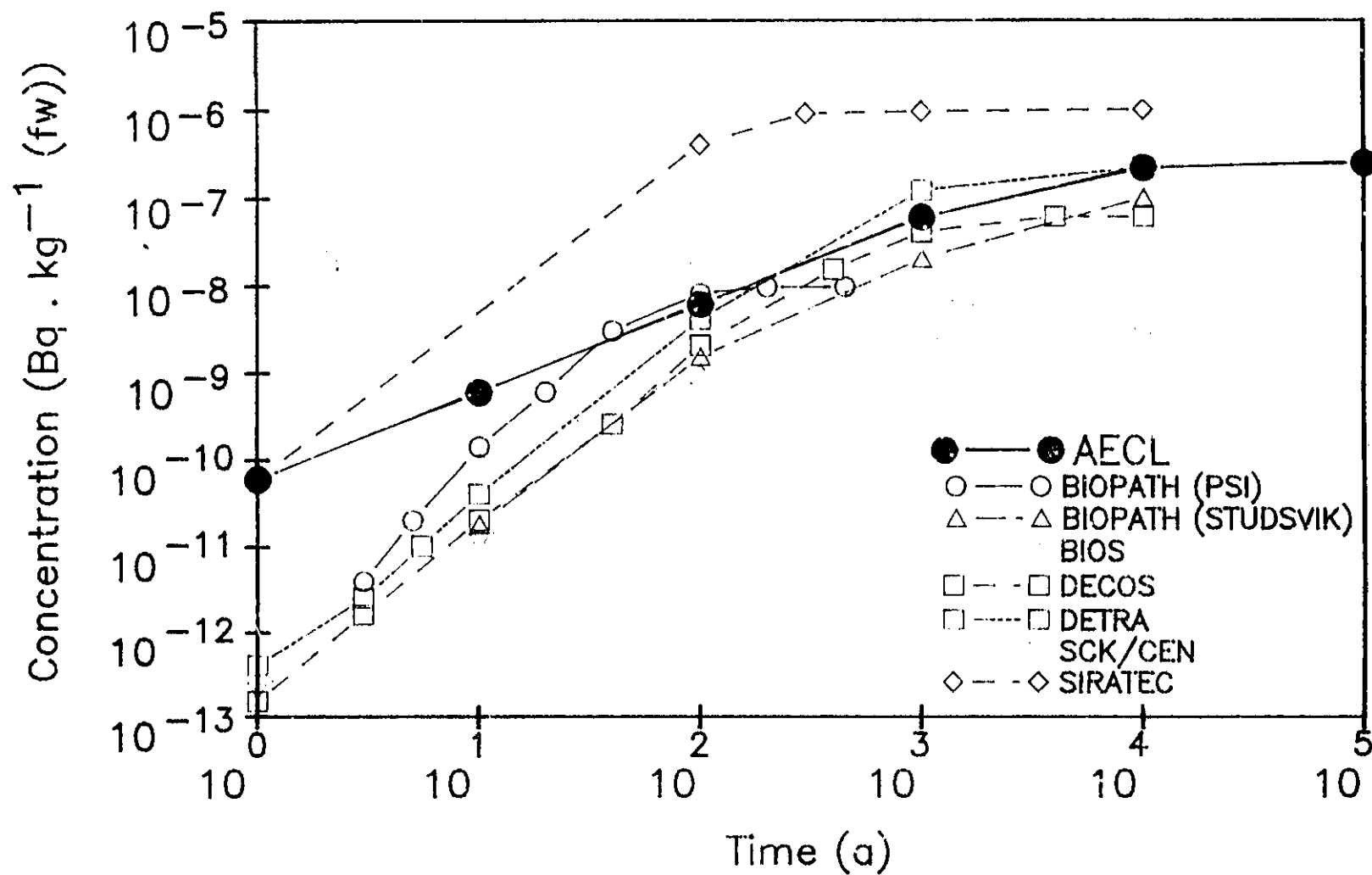
♦ BIOMASS



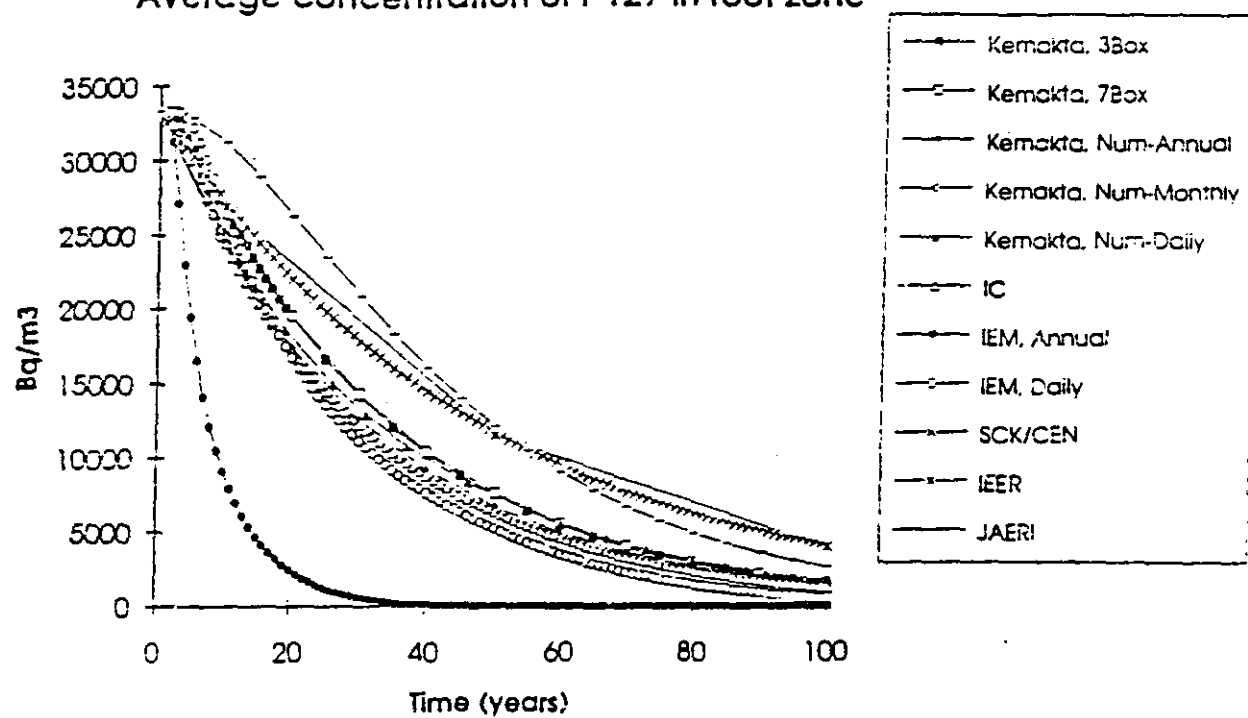
32

Np-237

Concentration in root vegetables

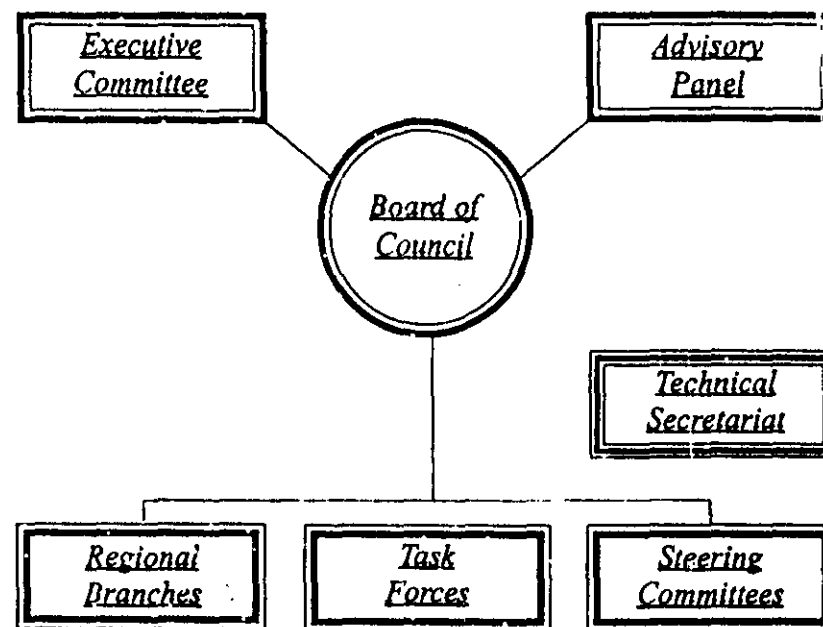


Average concentration of I-129 in root zone





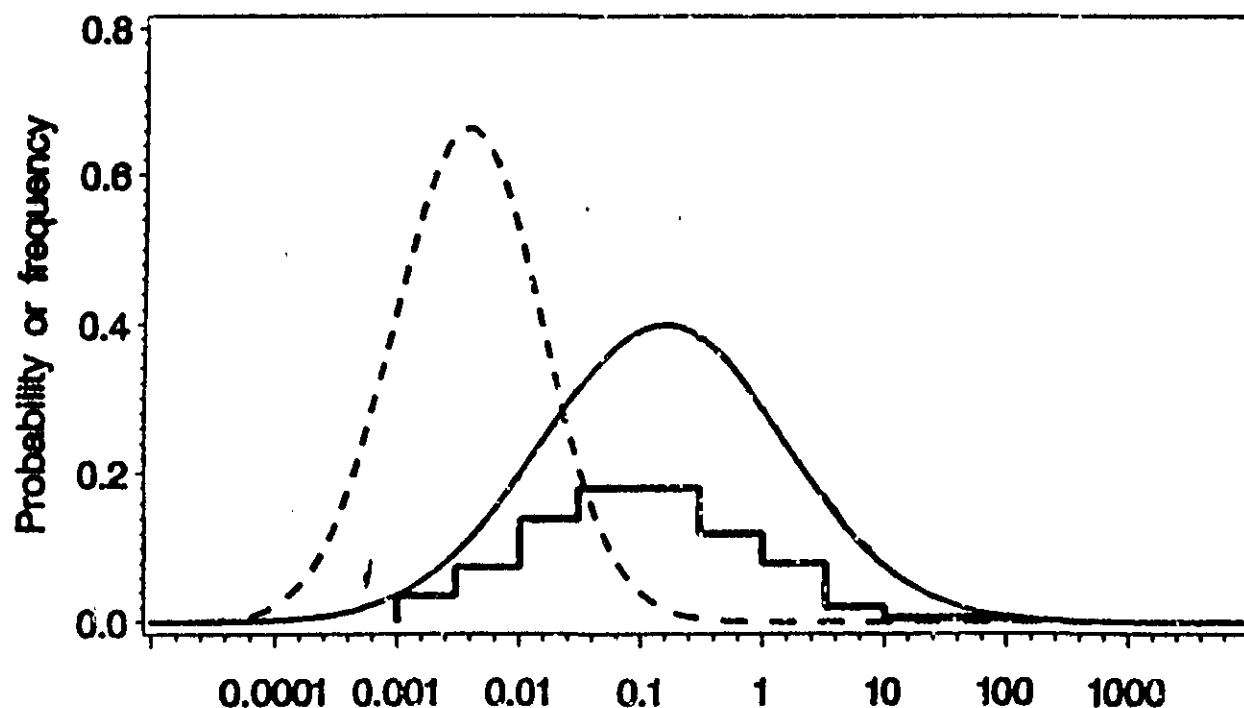
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Probability distributions of plant/soil concentration ratios (CR) for iodine (I), showing with a solid line the curve used in BIOTRAC, and with a dashed line the distribution of the data of the International Union of Radioecologists. The frequency histograms are of data we found in the literature.

Hilroy

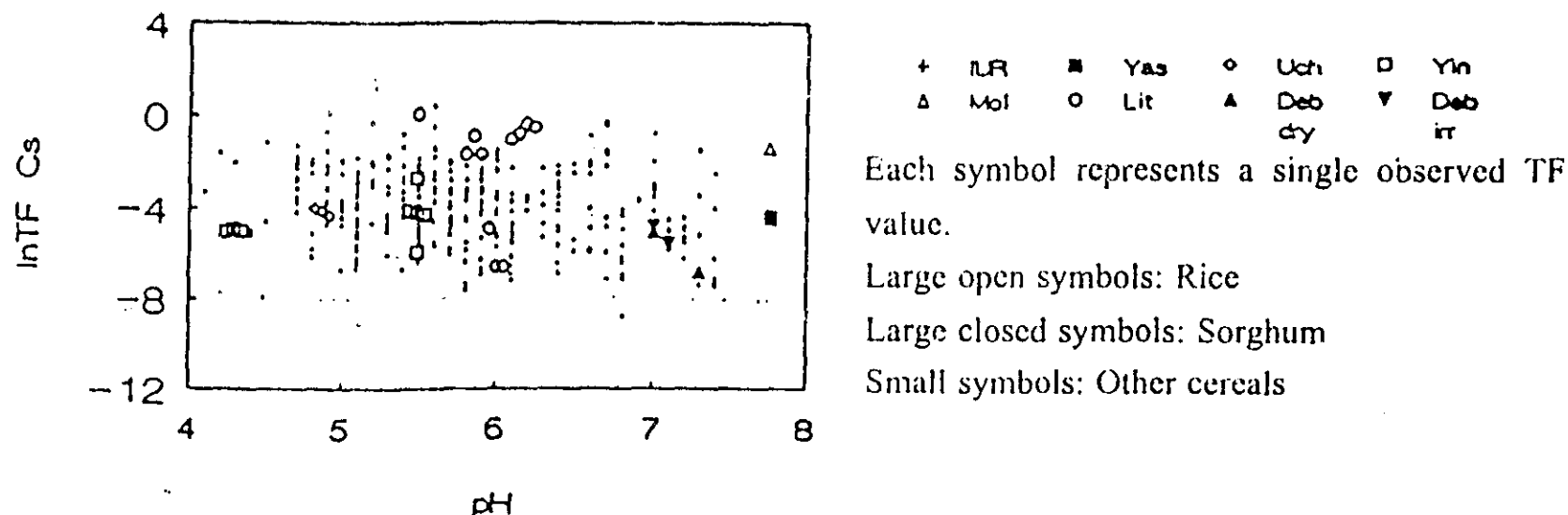


Fig 1. TF values of Cs-137 for cereals as function of pH.

EUR: Wheat, barley and rye, temperate zones of Europe and S. America.

Yas: T. Yassine, Syria, sorghum.

Uch: S. Uchida, Japan, rice.

Yin: Shu Ying Lai, China, rice.

Mol: A.S. Mollah, Bangladesh, rice.

Lit: Various, probably less reliable, data reported in older literature.

Dep: D.L. Dep, India, irrigated and non-irrigated sorghum.