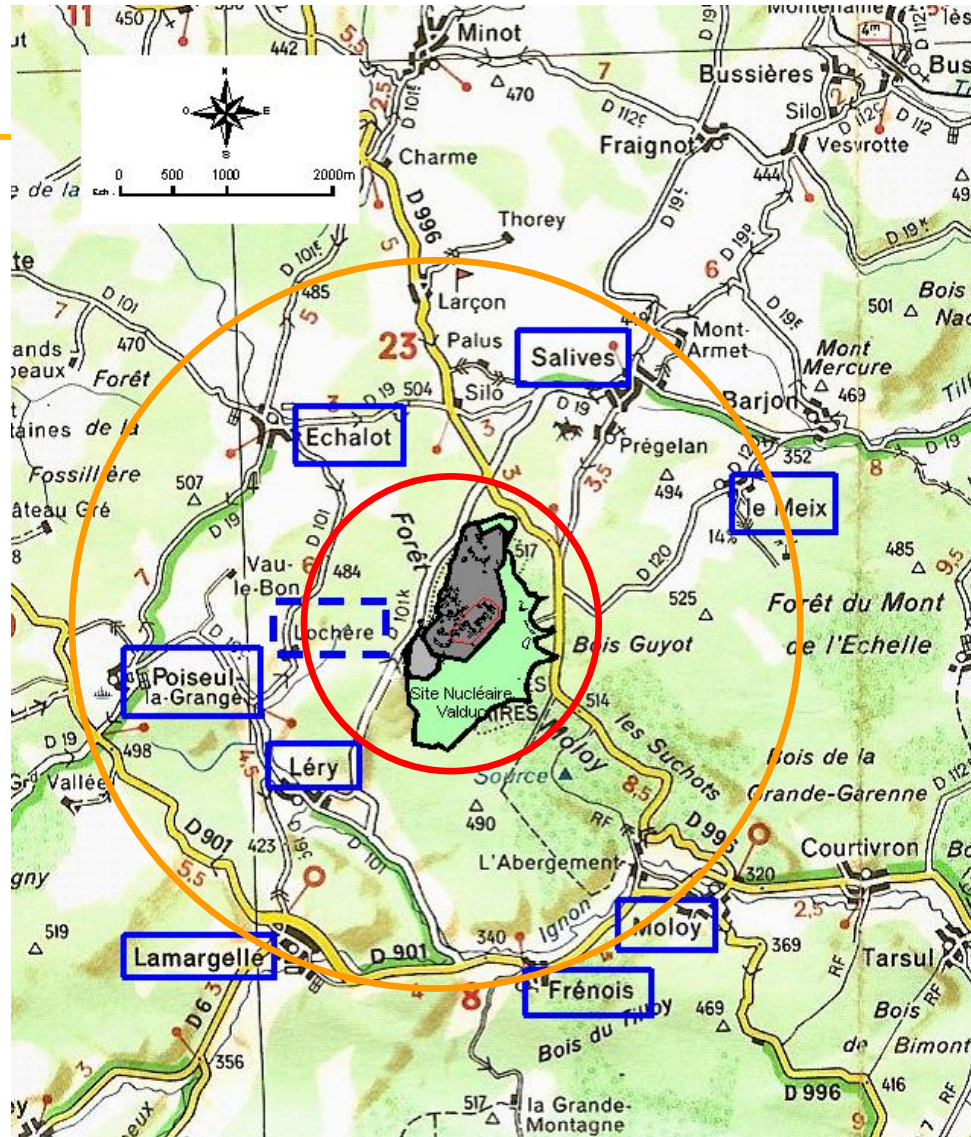


Contribution of CEA-Valduc centre on knowledge about atmospheric tritiated water transfers in the different compartments of the environment from survey data.

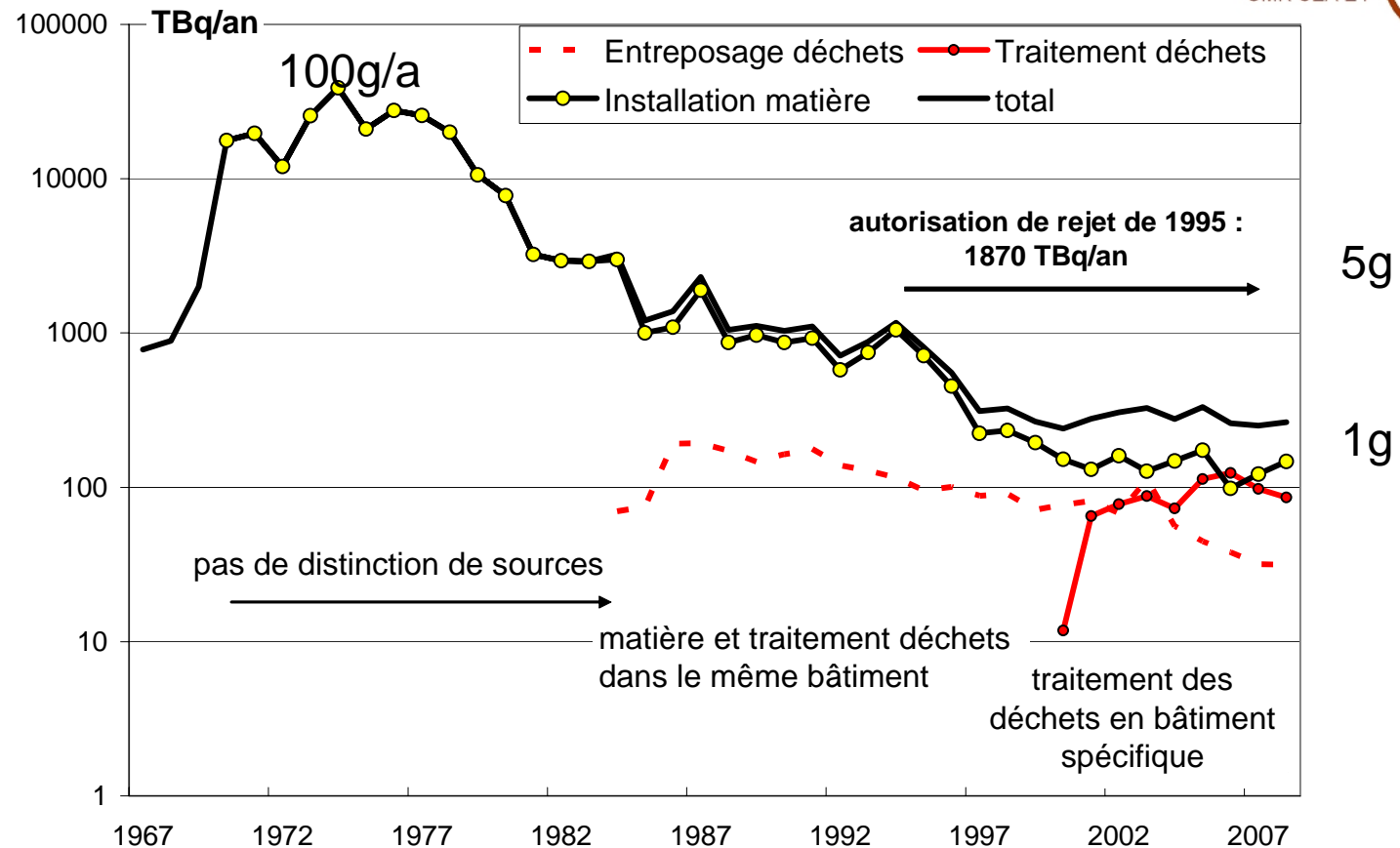
CEA France



Atmospheric Release : Tritium



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UMR CEA E4



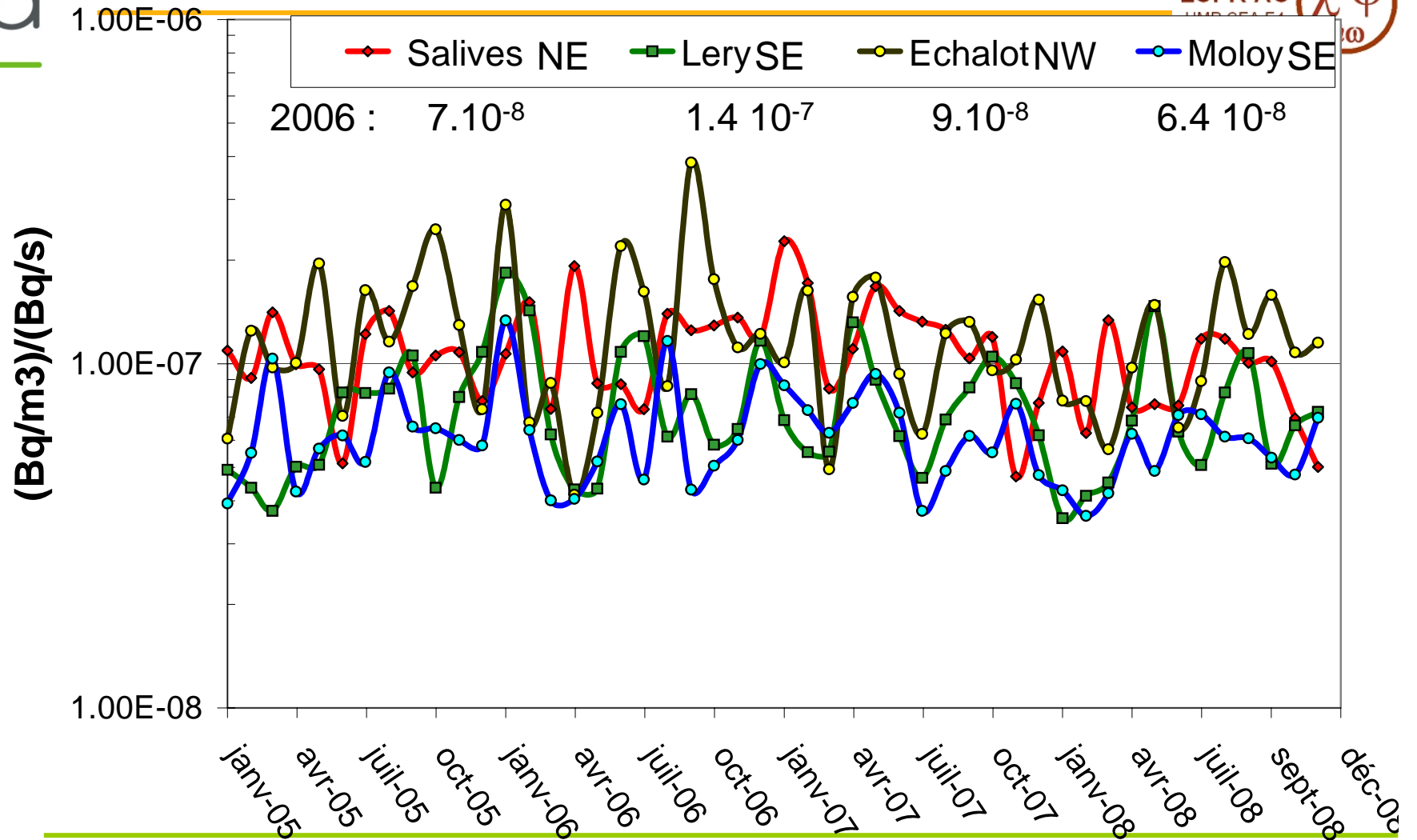
Constant annual Release for 10 y : about 1 gramme (358TBq)



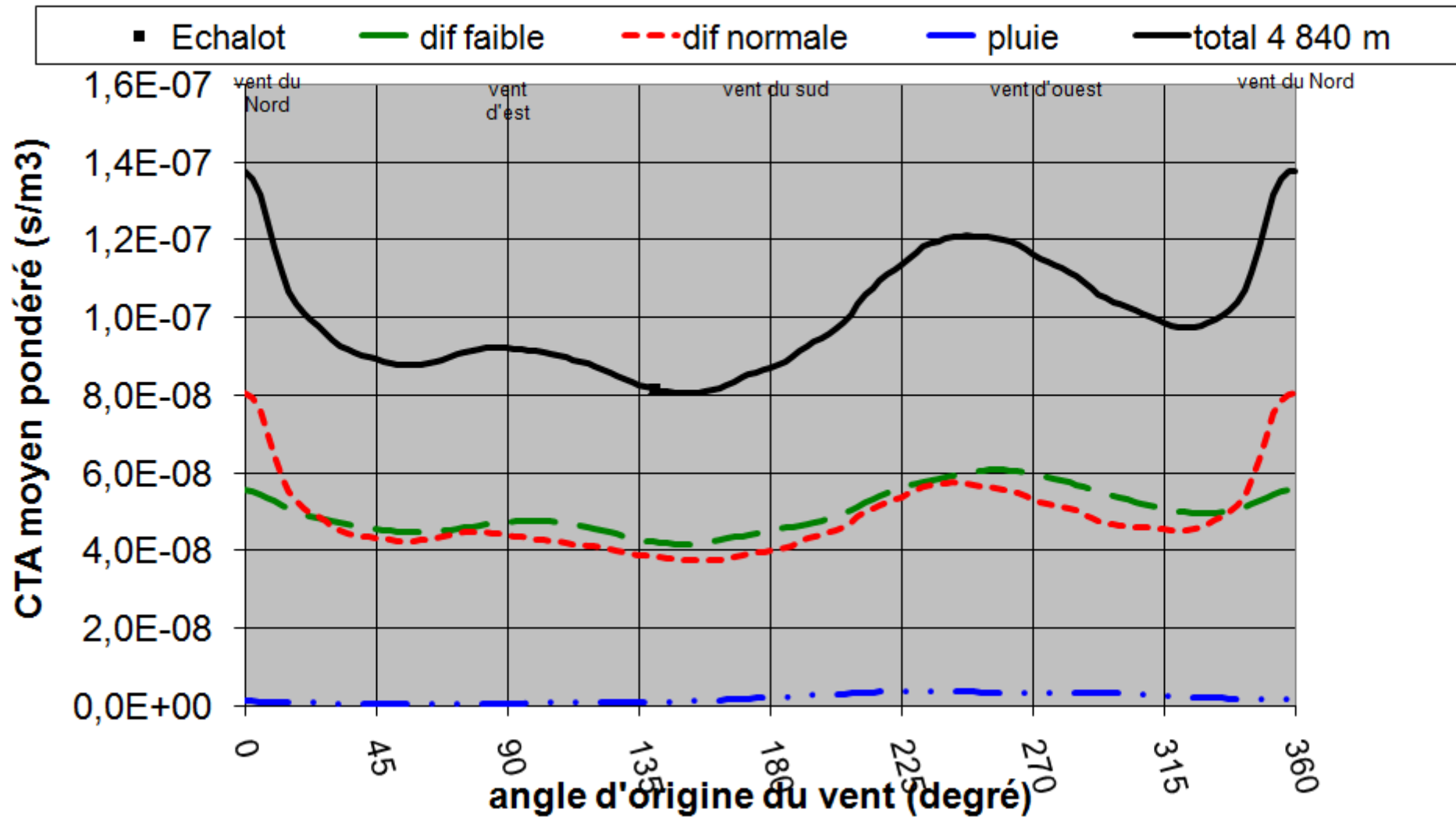
atmospheric Transfers

Measures and assessments

atmospheric Transfer measures and assessment

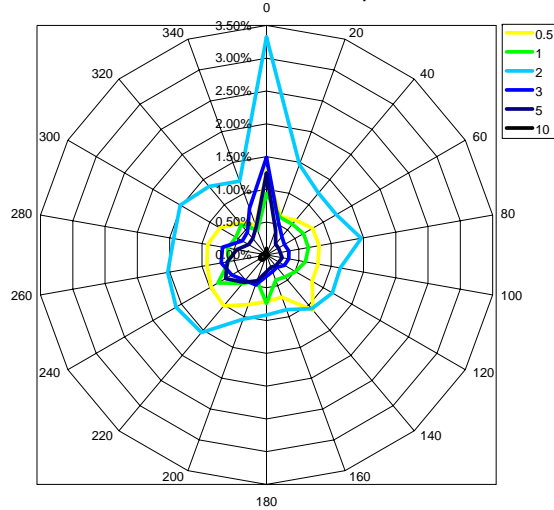


Coefficients de Transfert, en fonction de l'origine des vents, à la distance de Echalot pour Il 137 , hauteur de rejet de 50 m



Environment meteo

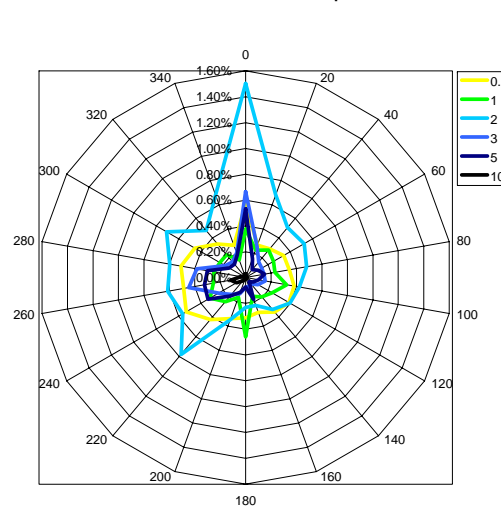
Rose des vents en diffusion normale sans pluie d'avril 05 à mars 08



Dry conditions

Unstable

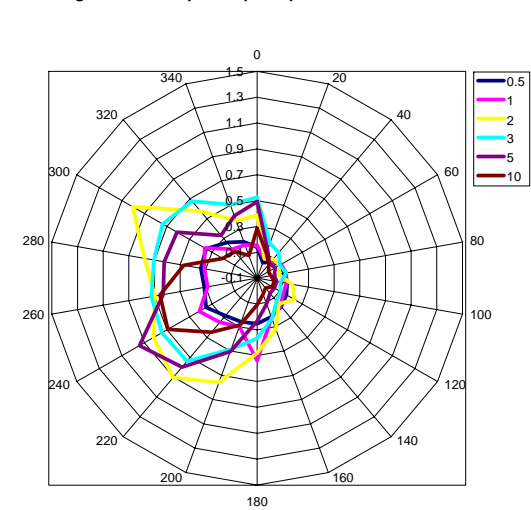
Rose des vents en Diffusion Faible sans pluie d'avril 05 à mars 08



Dry conditions

stable

Origine des vents par temps de pluie de mars 2005 à mars 2008

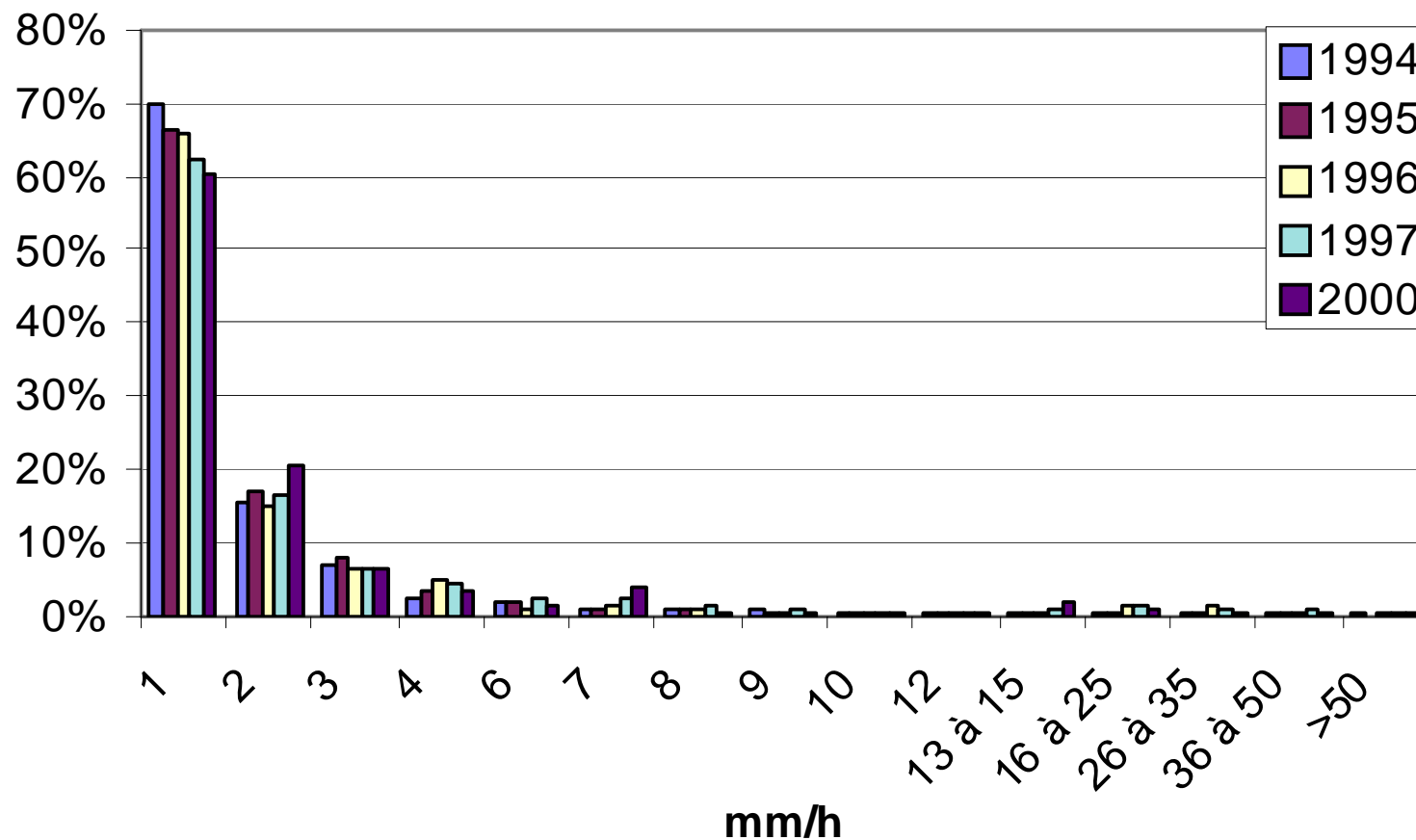


rainy

All stabilities

Rain intensity distribution

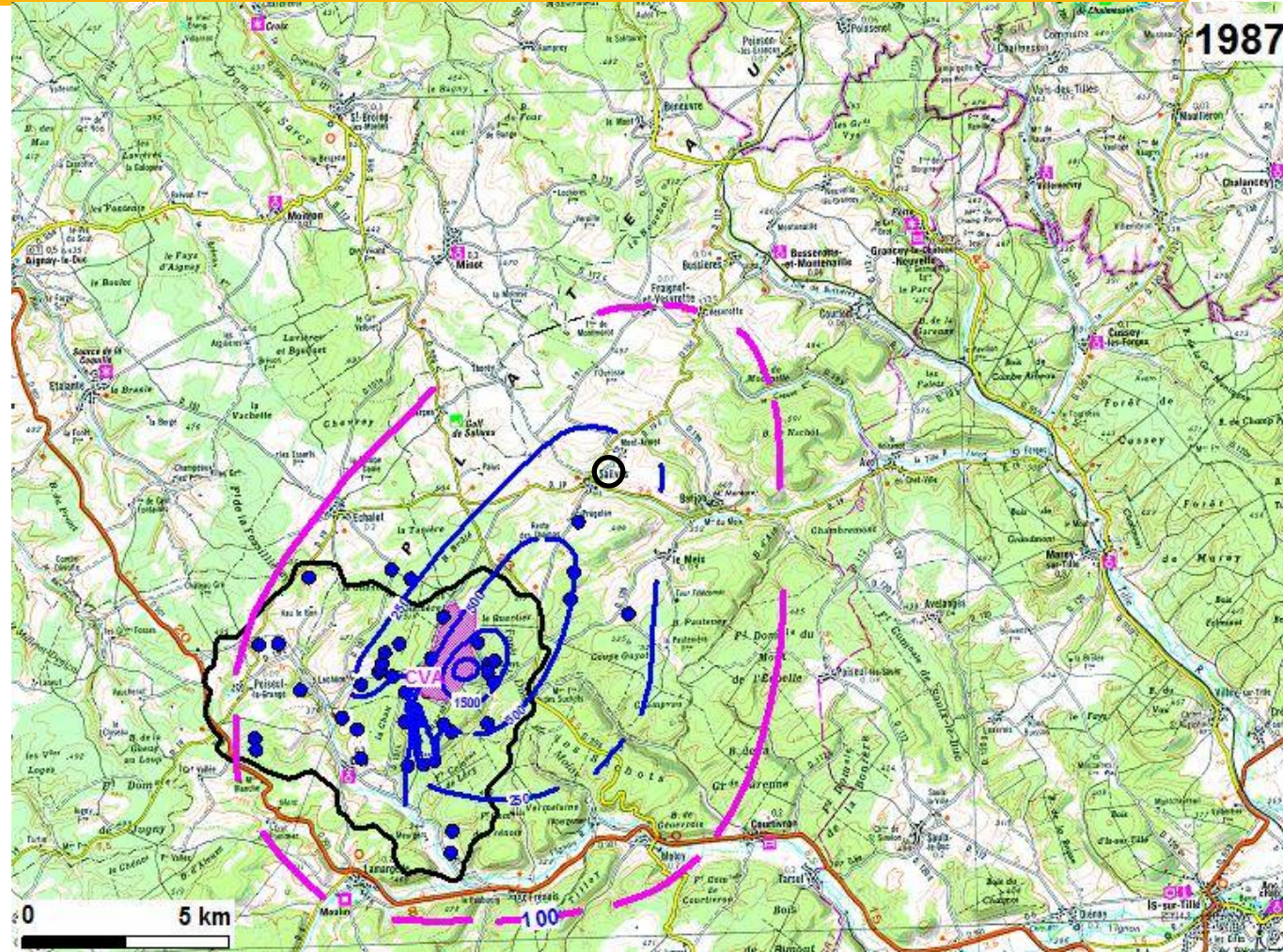
Répartition des intensités de pluies (% annuel)



Concentrations in tritium of the upper water table 1987



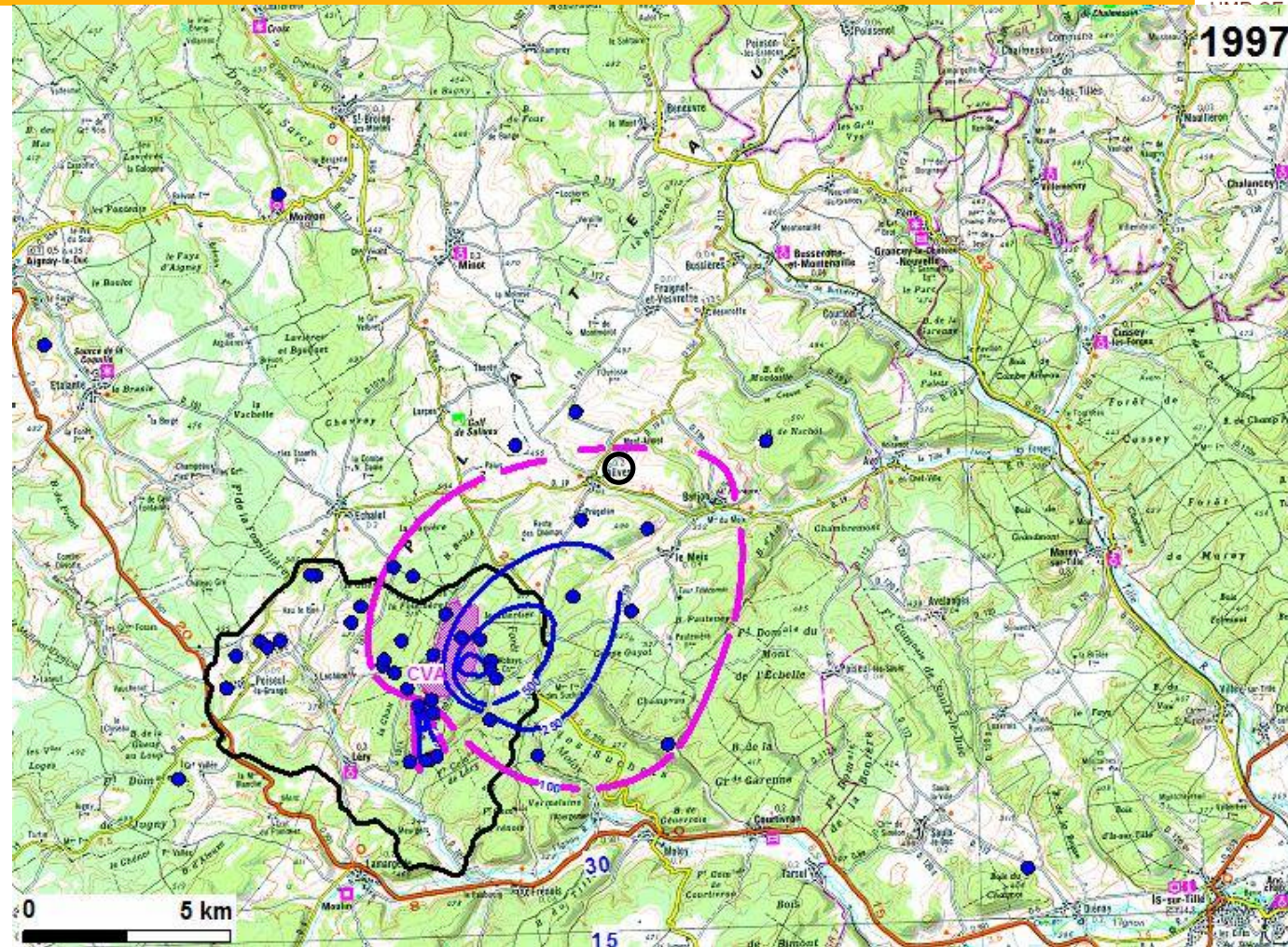
LCPR-AC
E4



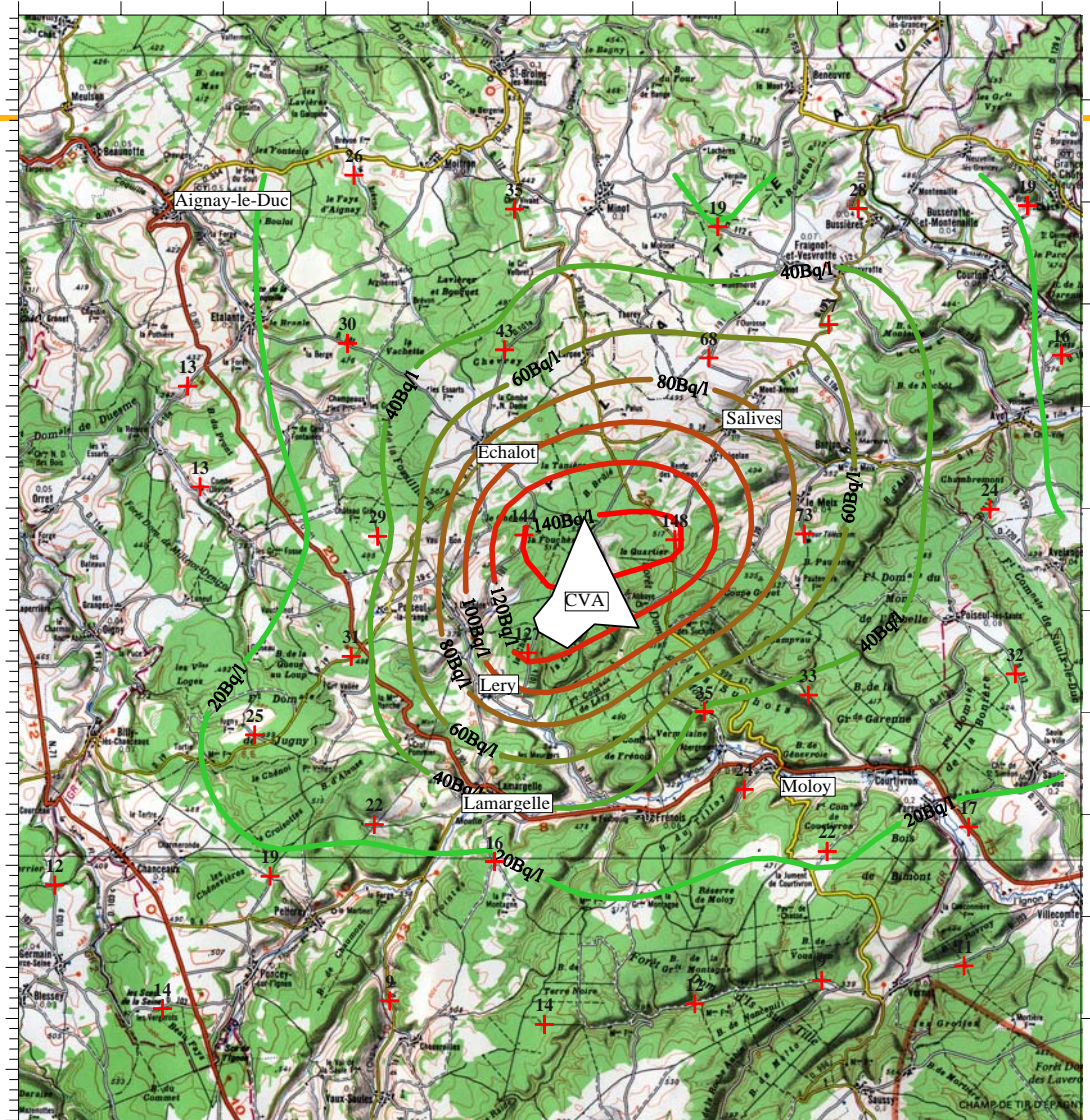
Concentrations in tritium of the upper water table 1997



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E4



OBT in oak leaves 1998



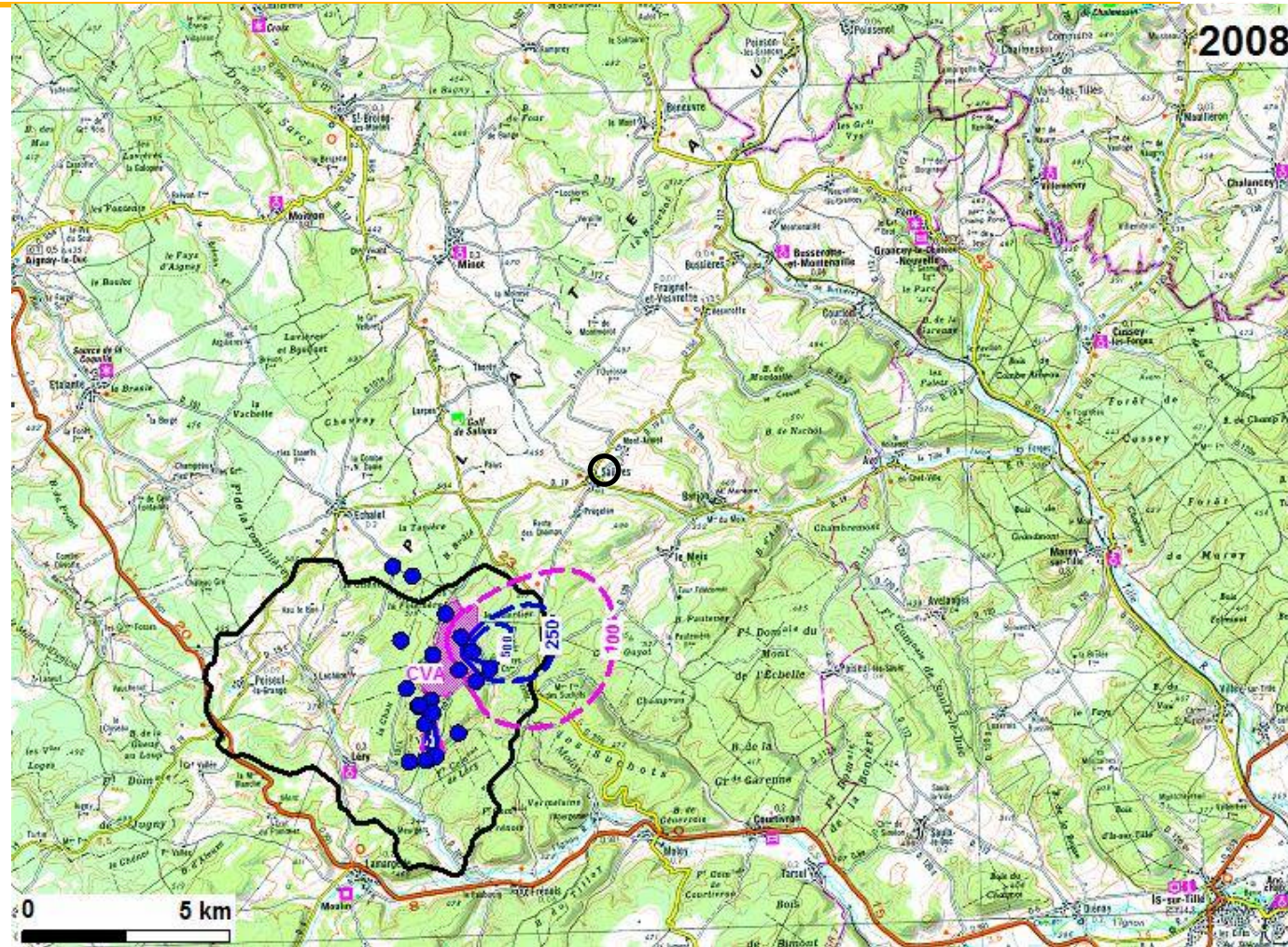
SFRP Paris

4 km

11

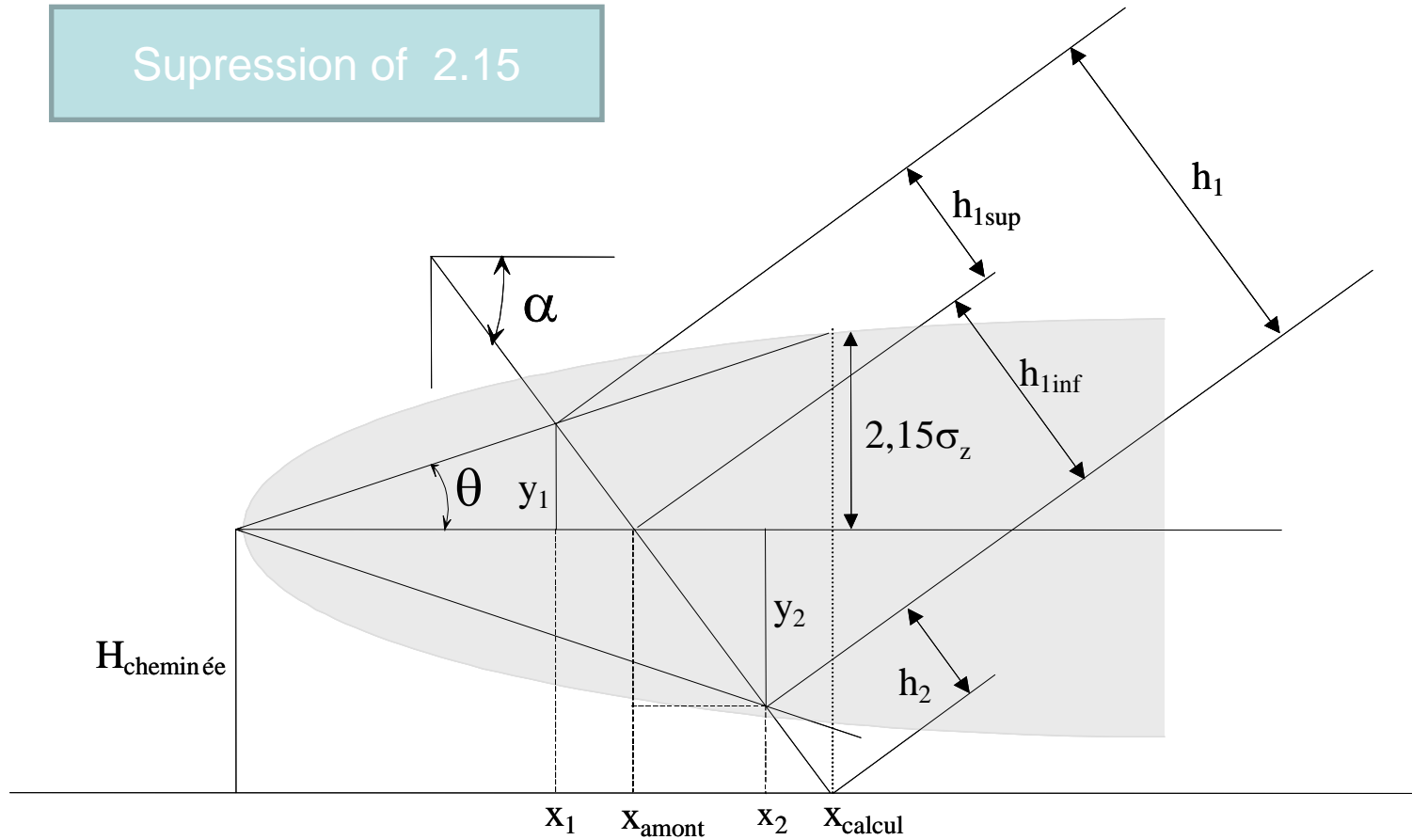
Isoconcentrations en tritium (OBT) en Bq/l

Concentrations in tritium of the upper water table 2008



Geometry for Chamberlain model

Supression of 2.15



To find the observed value



- need to increase the activity of rain
- The way was to reduce 2.15 sigma to 1 sigma
- We probably under-estimate the root pathway

When rain deposition small, vapor deposition can be seen



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Station on site	South	North-East	Nord-West
HTO air vapor w (Bq/l) ¹	142	243	236
HTO rain (Bq/l) ¹	36	238	100
HTO soil (Bq/l) ²	69	231	132

Average of monthly measurements in 1999-2000 1 : continuous , 2: points

Calculation

- 700 L / year of rain

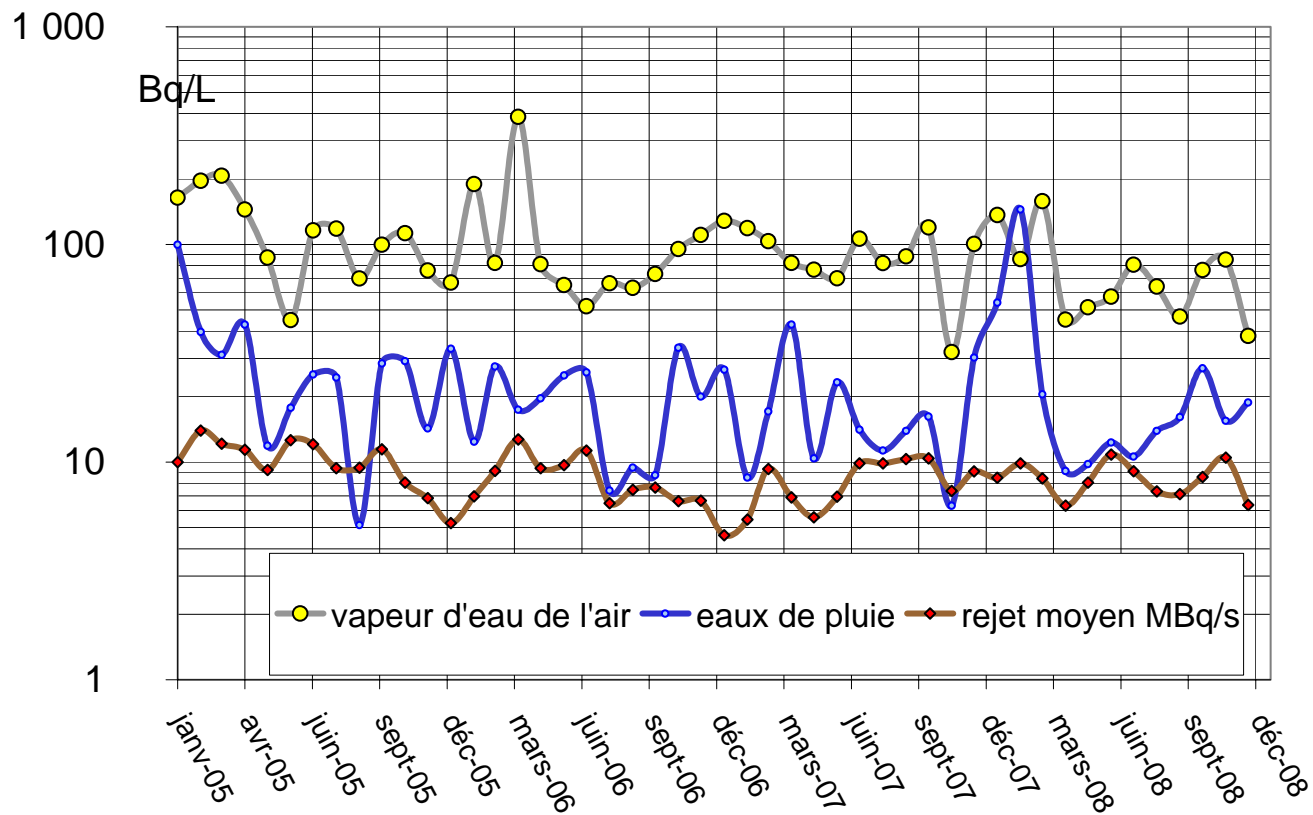
HTO soil (Bq/l) ²	69	231	132
HTO soil (Bq/l) $0.3 A_{\text{vap}} + 0.7 A_{\text{rain}}$	68	239	140

300 L.y⁻¹ of dry vapor / 8 g.m⁻³ . => **1.2 10⁻³ m.s⁻¹**

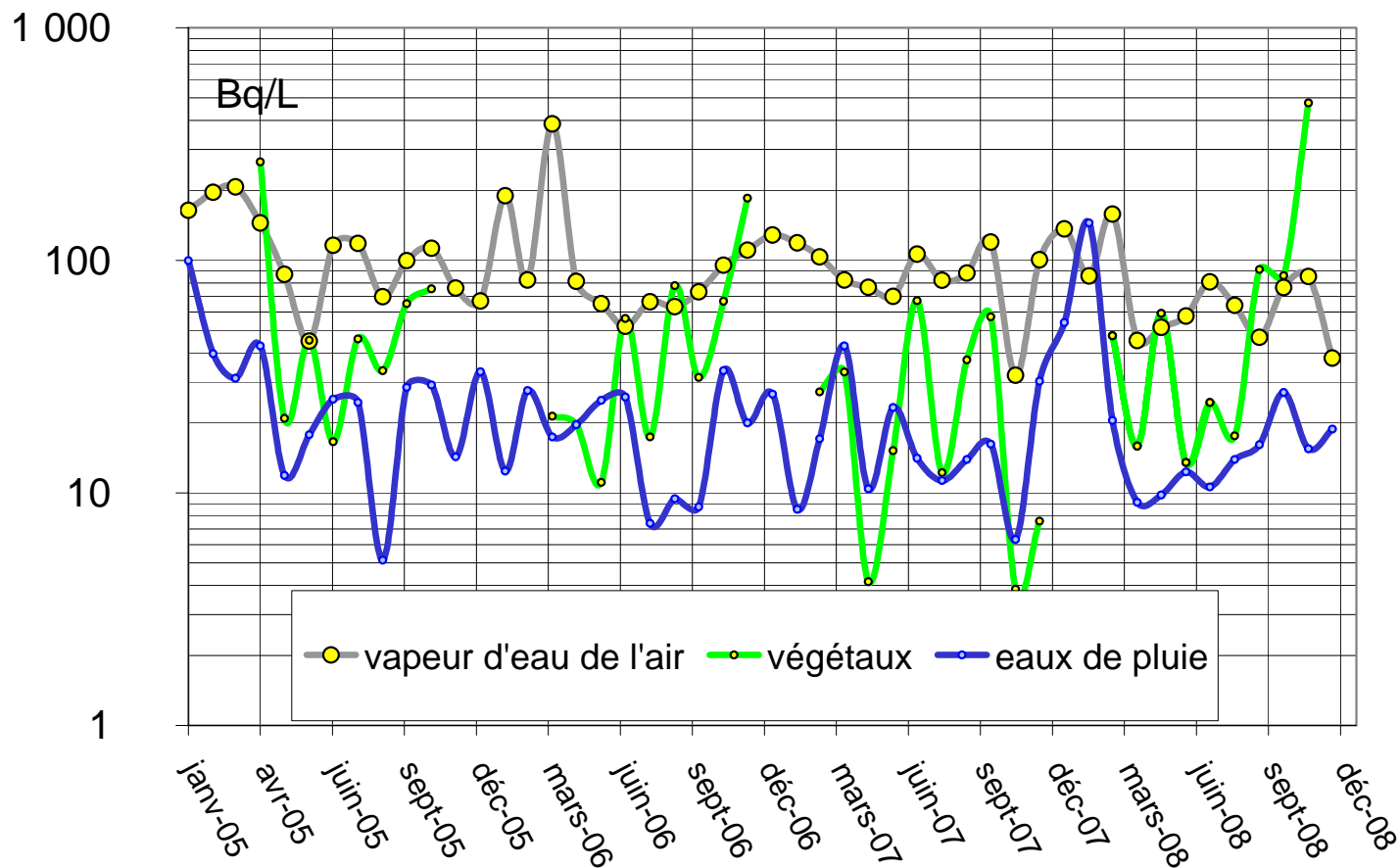
Free waters

Data of environmental survey

rains less tritiated than air water vapor



Grass between air vapor and rain water



Tritium absorption by lettuces exposed to a tritiated atmosphere

C. Boyer PhD

Contexte de l'étude

Transfert du tritium de l'environnement aux plantes

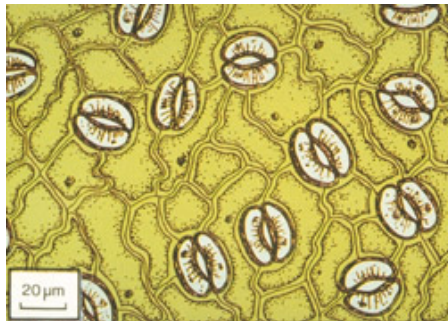
cea

LCPR-AC
UMR CEA E4

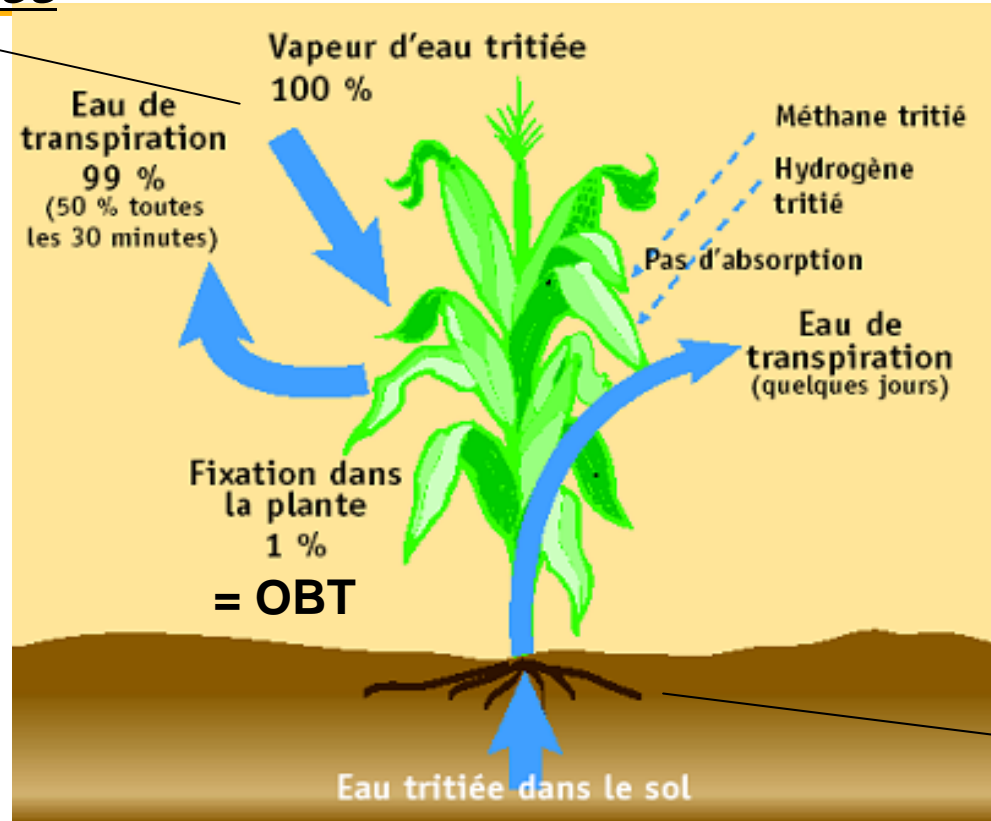


Absorption
foliaire

Rôle des stomates
(diffusion)



Phénomènes
diurnes/nocturnes



Perte de HTO

Transpiration

Absorption
racinaire

Source : « Le tritium et l'environnement », SFRP 2002.

Experimental Protocole

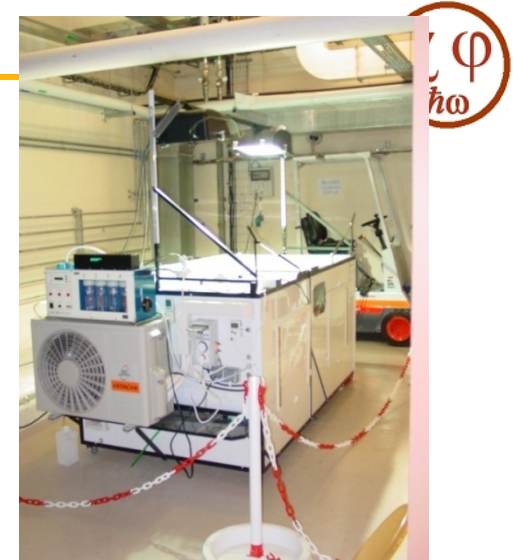


Cinetic Experiences (short term : 24 h), in controled conditions :

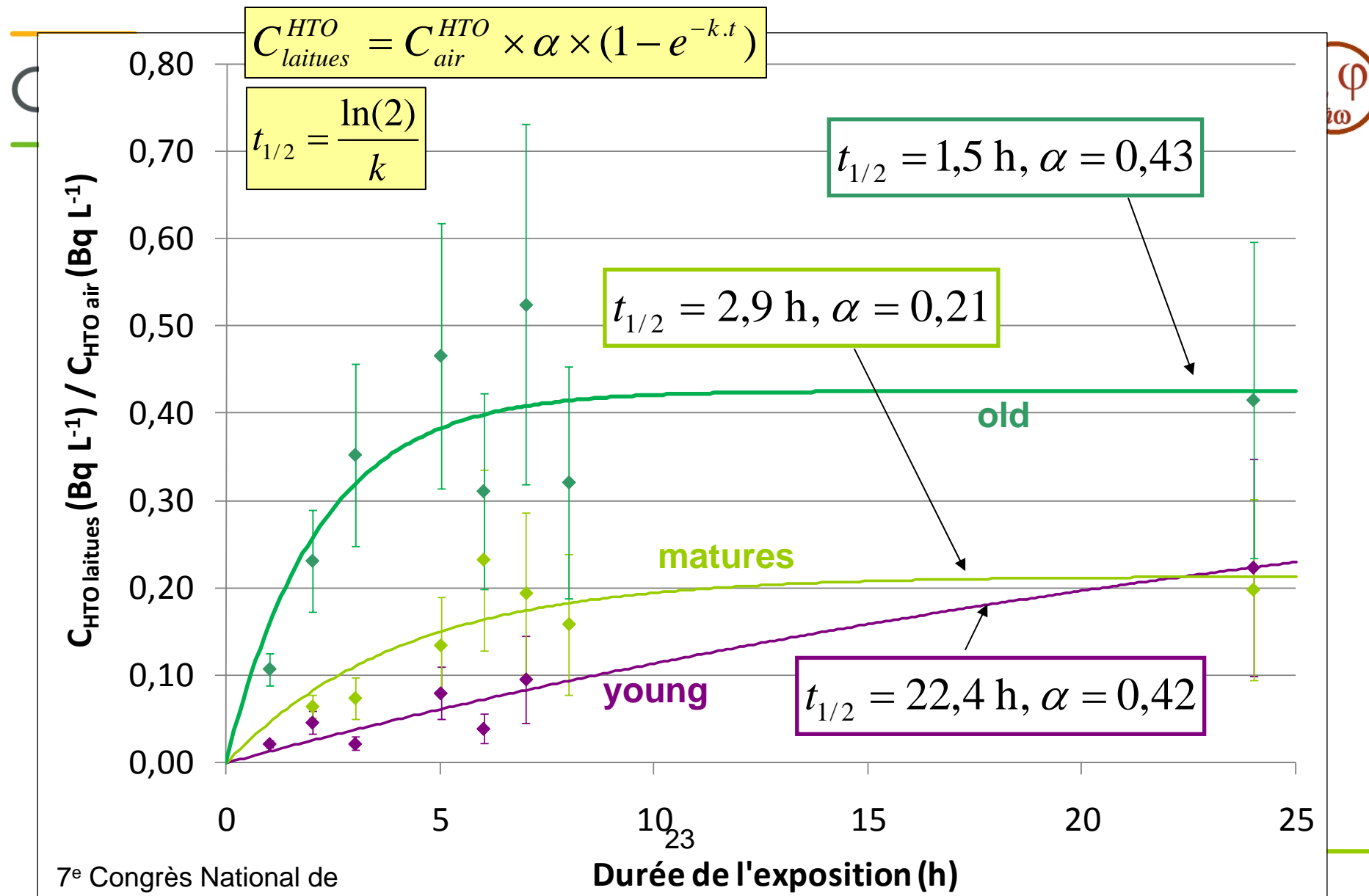
- *2 parameters tested :*
 - stage of development of the vegetal
 - light or darkness

- *Conditions of exposure in climatic box:*
 - temperature of room ~ 23°C
 - light ~ ¼ of the maximal outside light
 - hygrometry ~ [60 – 75%]
 - tritium in air (HTO) ~ [60 – 190 Bq m⁻³]

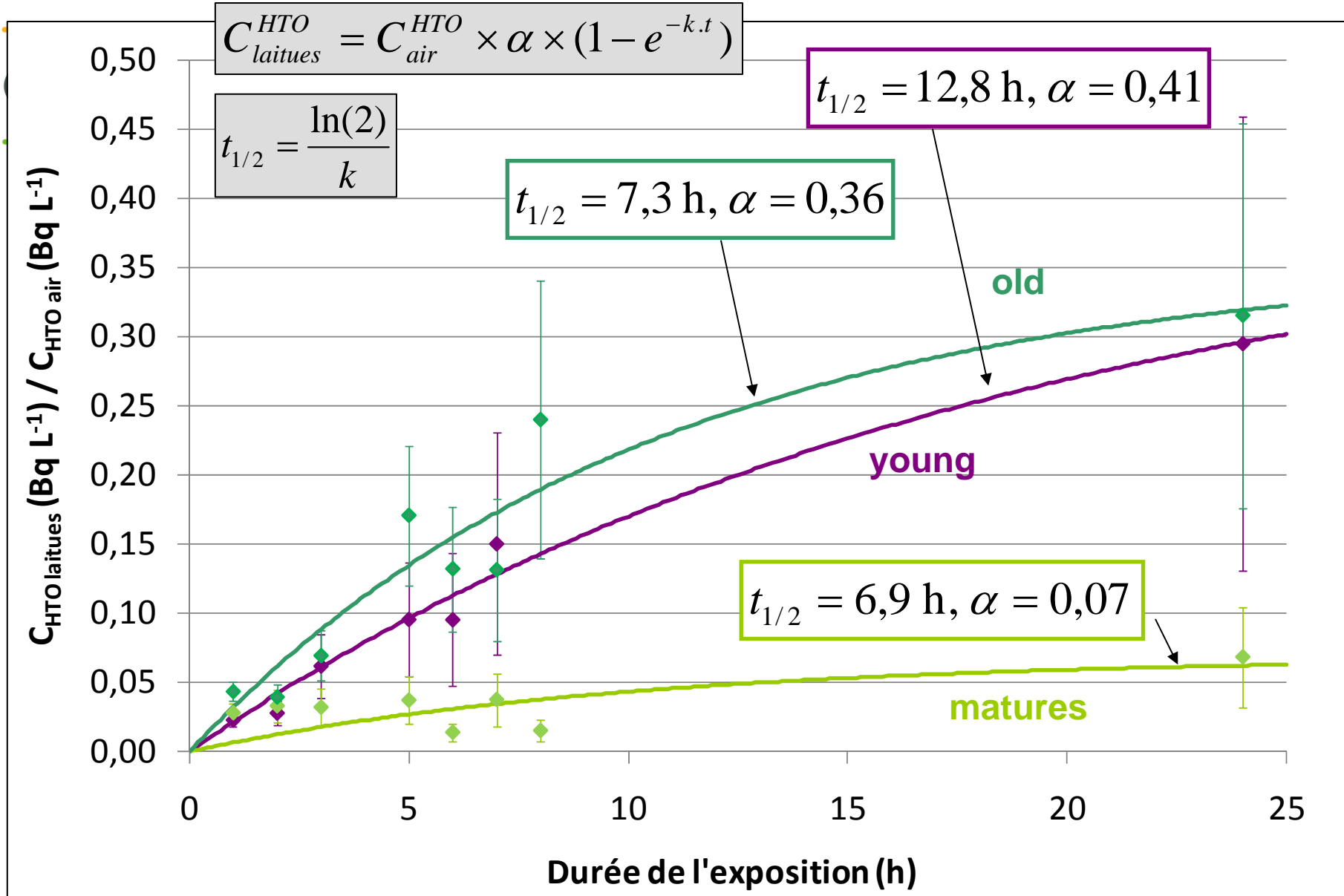
- *Sampling at 1h, 2h, 3h, 5h, 6h, 7h, 8h et 24h of exposure*



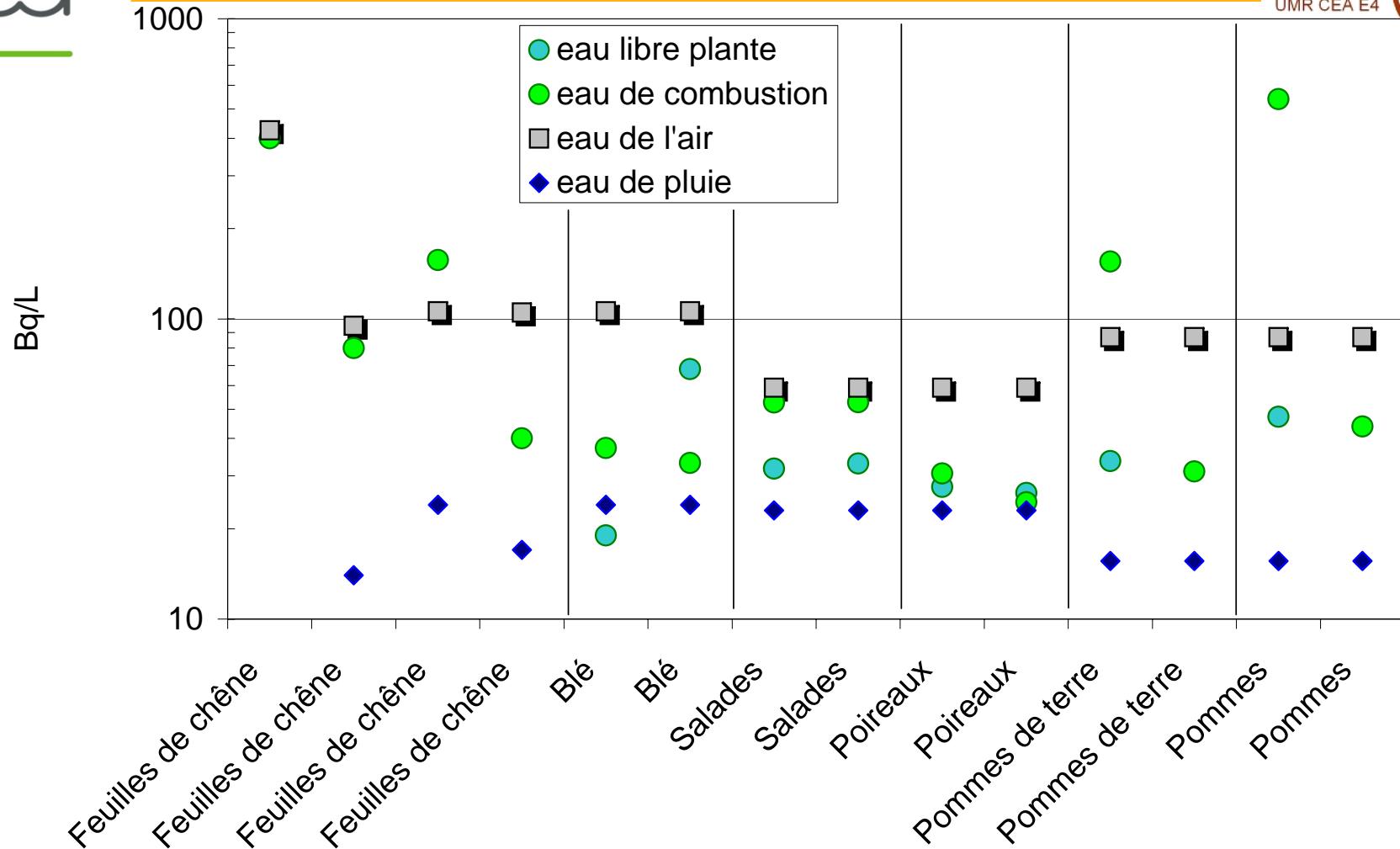
Measures in Free water : light



Measures in free water: darkness



Water concentrations in air, rain, and vegetables : free and combustion



Conclusions



- $Hr.A_{air} + (1-Hr).A_{soil}$
or
 $0.4 A_{air} + 0.6 A_{soil} ?$
- Effect of cuticles and efficiency of stomates
Particularly during the night
- Contribution of rain for soil and for OBT in leaves



thanks



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laurent.vichot@cea.fr