CONSOREM

# Forum technologique du CONSOREM

## Abitibi Géosciences 2008

## L'indice de carbonatation: un outil pour l'exploration

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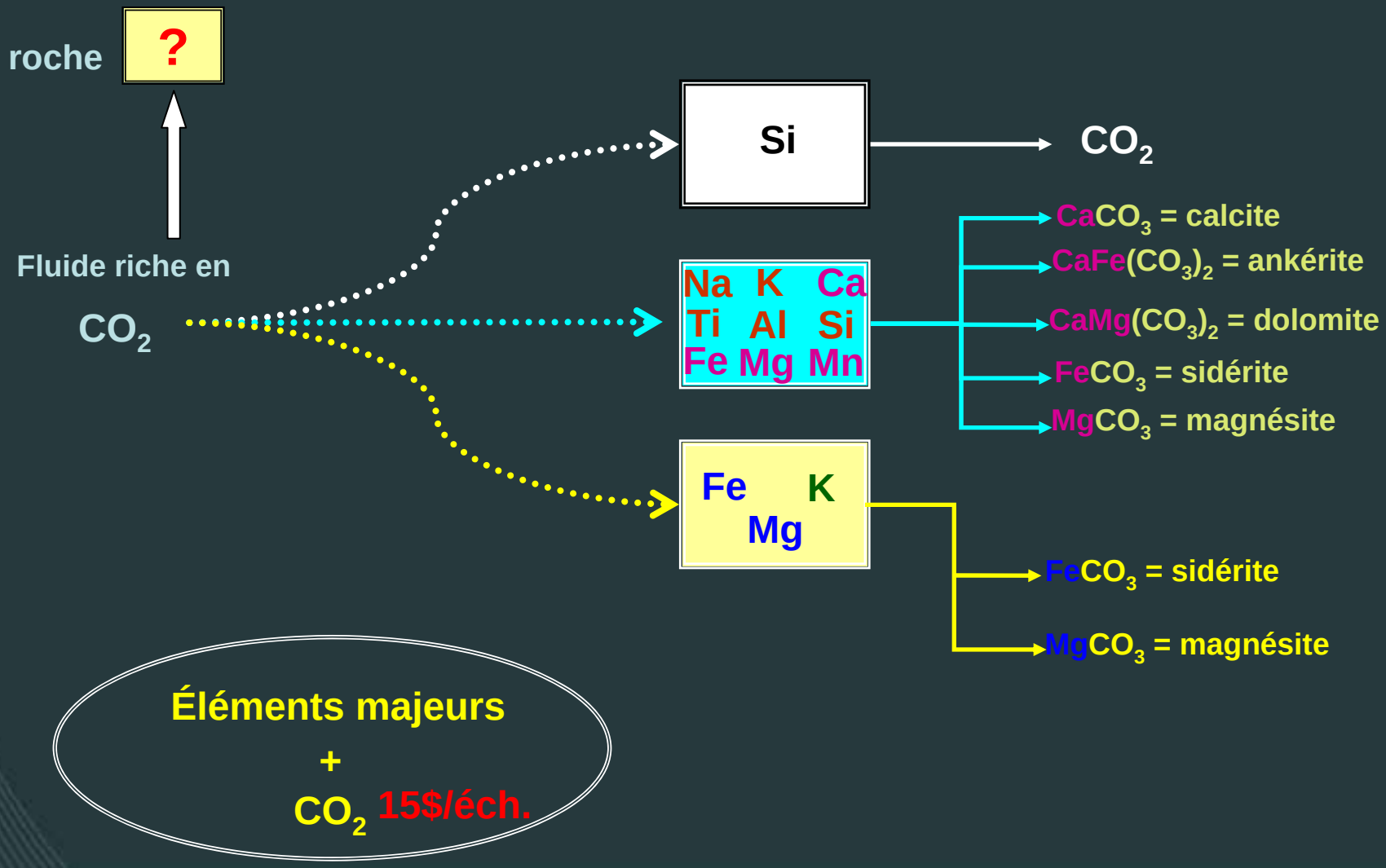
**CONSOREM**

# Introduction



# Principes de base

$CaCO_3$ = 1 mole de CaO + 1 mole de $CO_2$

$CaFe(CO_3)_2$ = 1 mole de CaO + 1 mole de FeO + 2 moles de $CO_2$

$CaMg(CO_3)_2$ = 1 mole de CaO + 1 mole de MgO + 2 moles de $CO_2$

CO2/CaO molaire = 1 ⟹ $CaCO_3$ (CaO + $CO_2$) = calcite

CO2/CaO molaire = 2 ⟹ $CaFe(CO_3)_2$ (CaO + FeO + 2CO2) = ankérite

# Indices de carbonatation

## Indice de saturation

- $CO_2$/CaO+FeO+MgO+MnO
- La composition des roches a très peu d'influence sur l'indice (attention toutefois aux roches riches en Py-As).

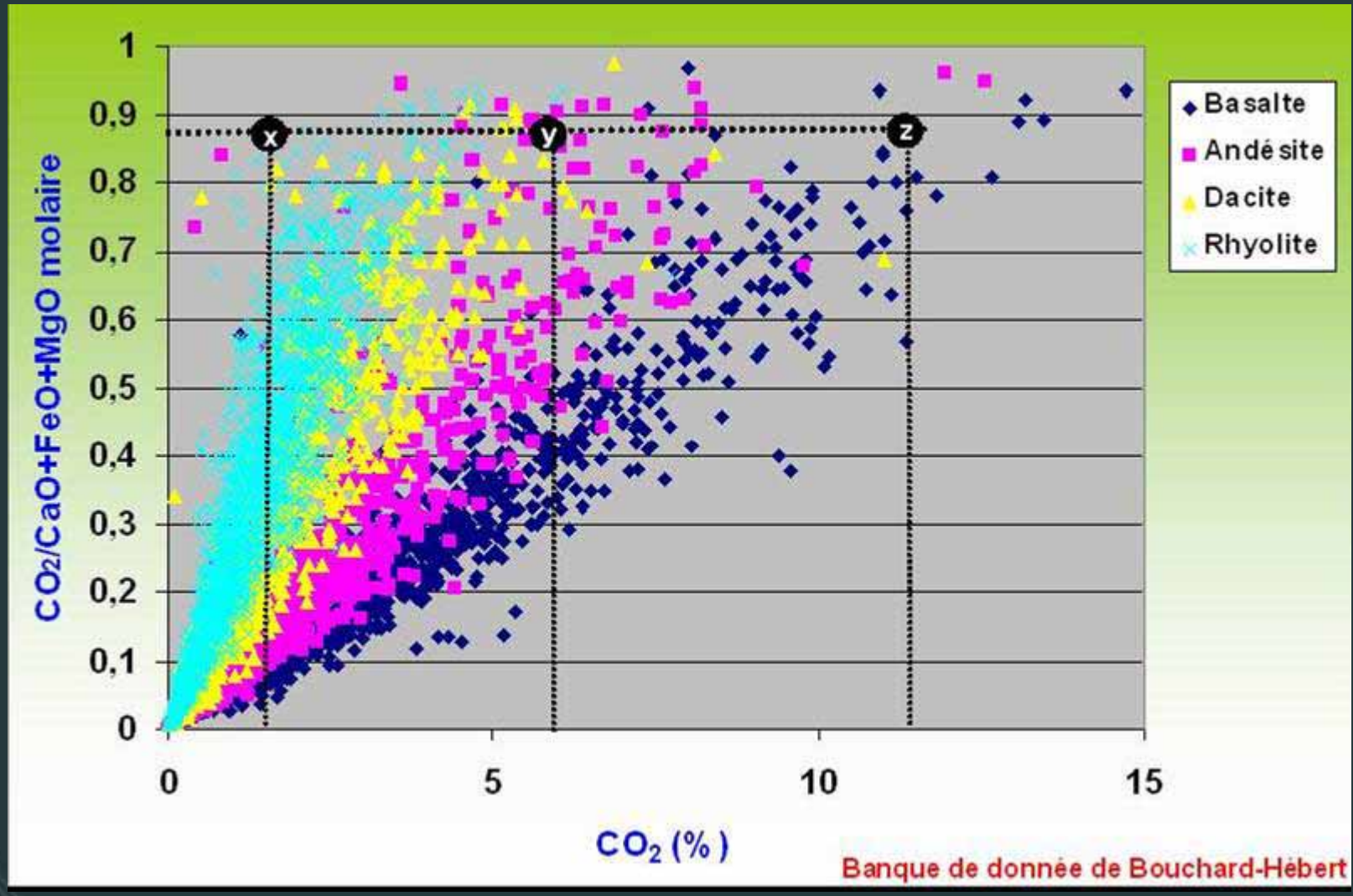
## Indice de discrimination

- $CO_2$/CaO
- Discriminer les différentes phases de la carbonatation.

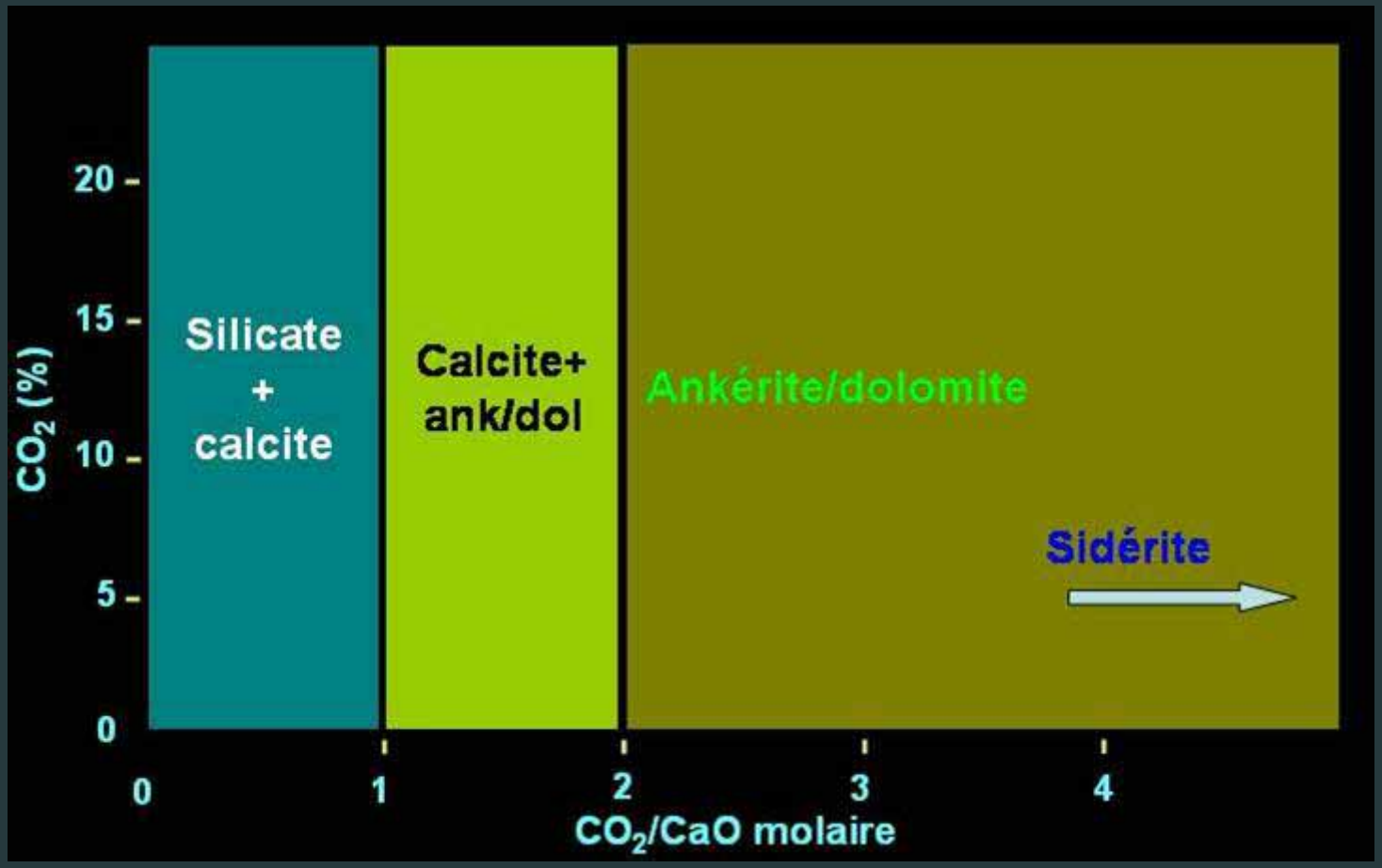
$$IS = \frac{(\%CO2 / 44.01)}{((\%MgO/40.3)+(\%CaO/56.08)+(\%MnO/70.94)+(\%Fe2O3 * (0.8998/71.85))}$$

$$ID = (\%CO_2 / 44.01) / (\%CaO / 56.08)$$

# La teneur en $CO_2$ ne reflète pas l'intensité de la carbonatation



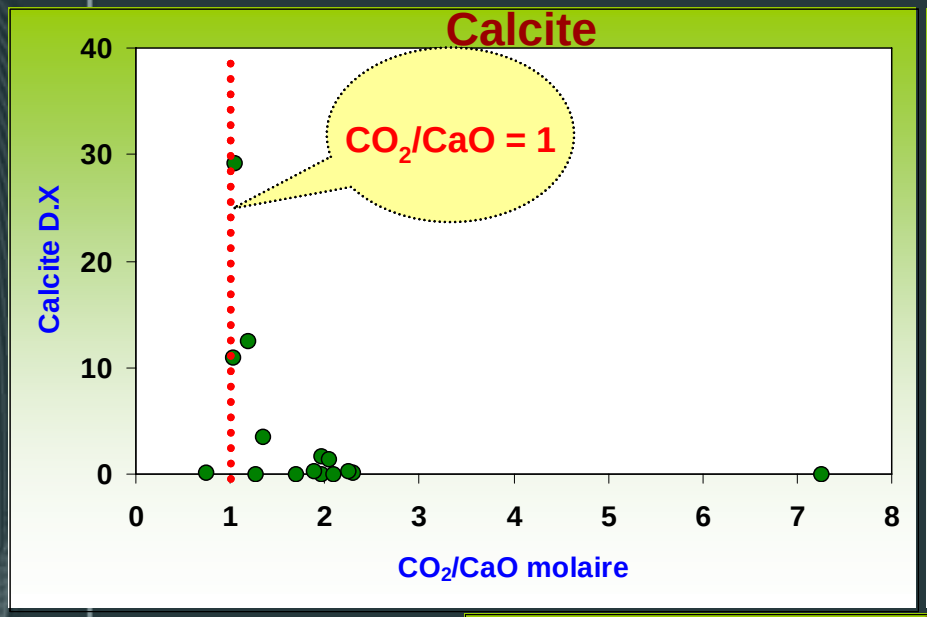
# $CO_2$/CaO molaire

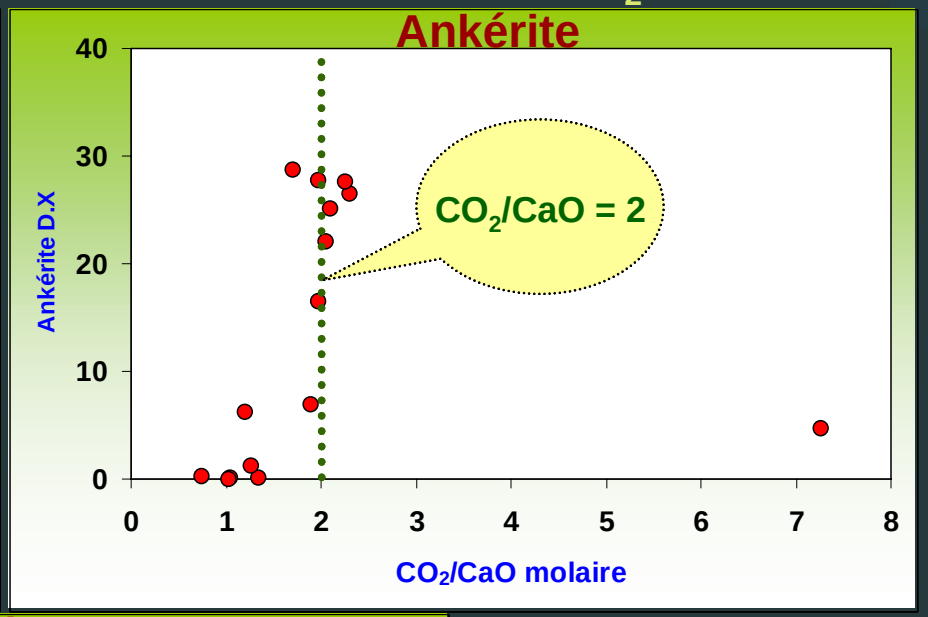


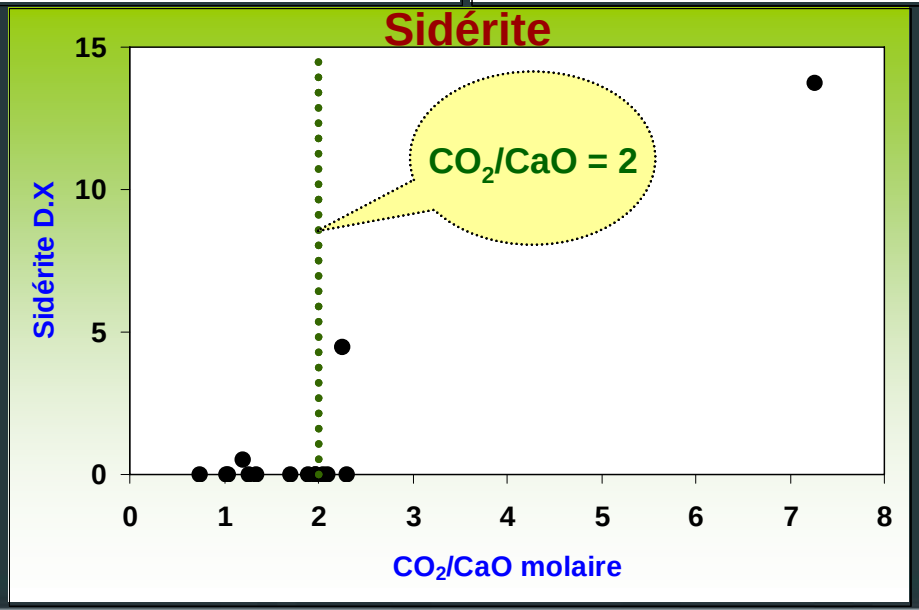

Modifié de Davies et al., 1982

# 1er test - Casa Berardi

## Diffraction X Phases carbonatées vs ratios molaires $CO_2$/CaO

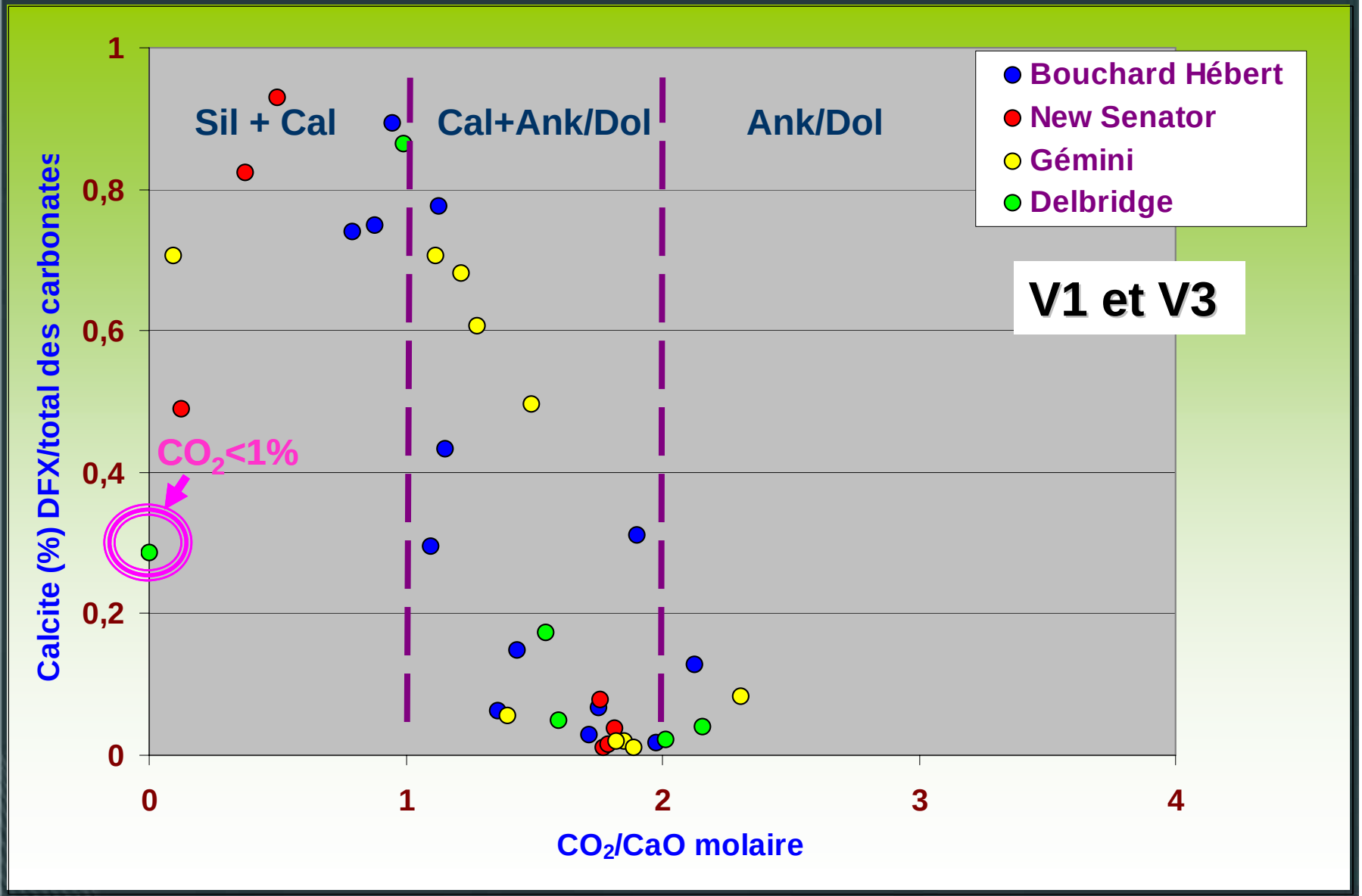


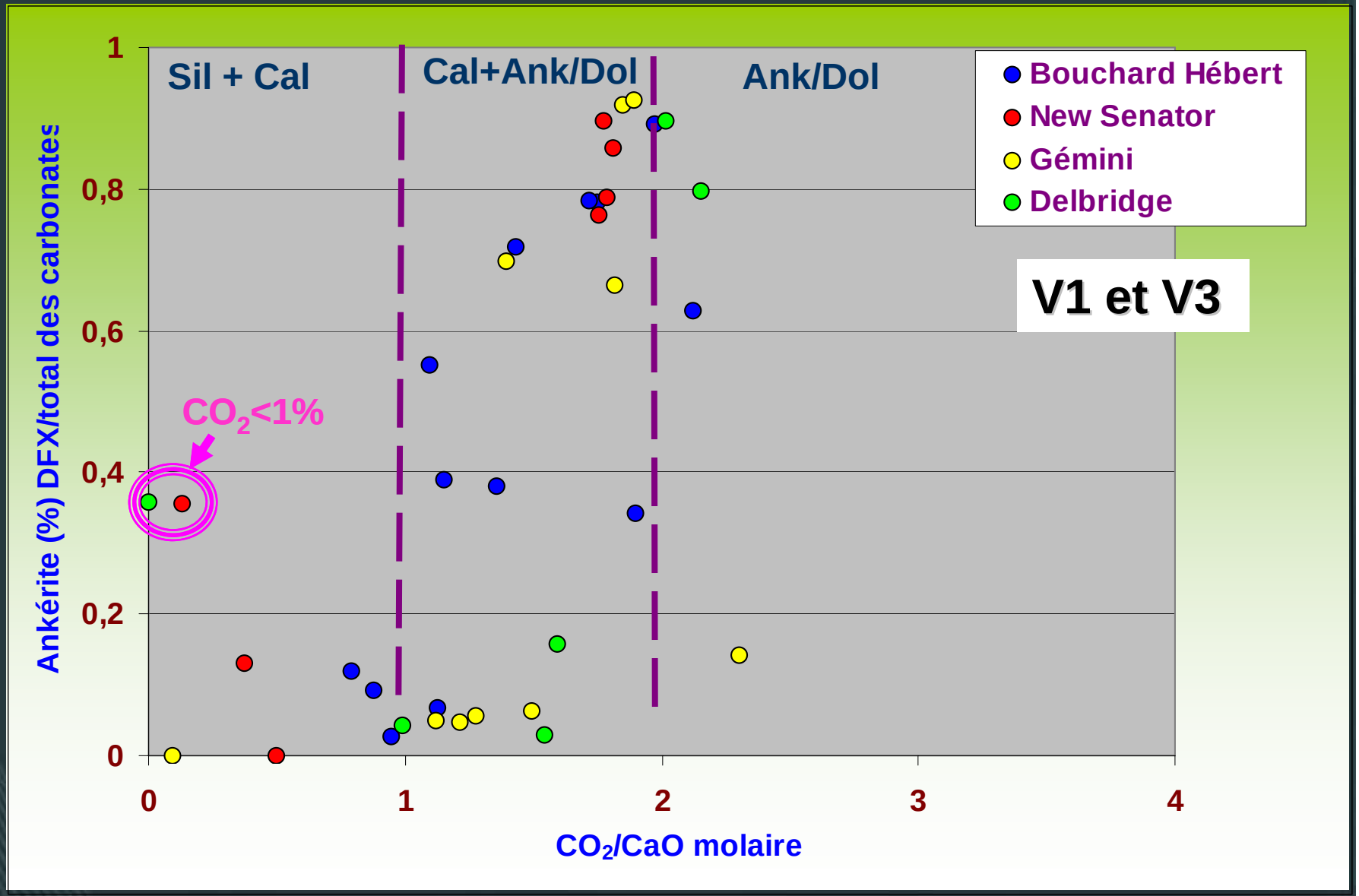
# 2e test – Autres contextes

## Abondance Calcite



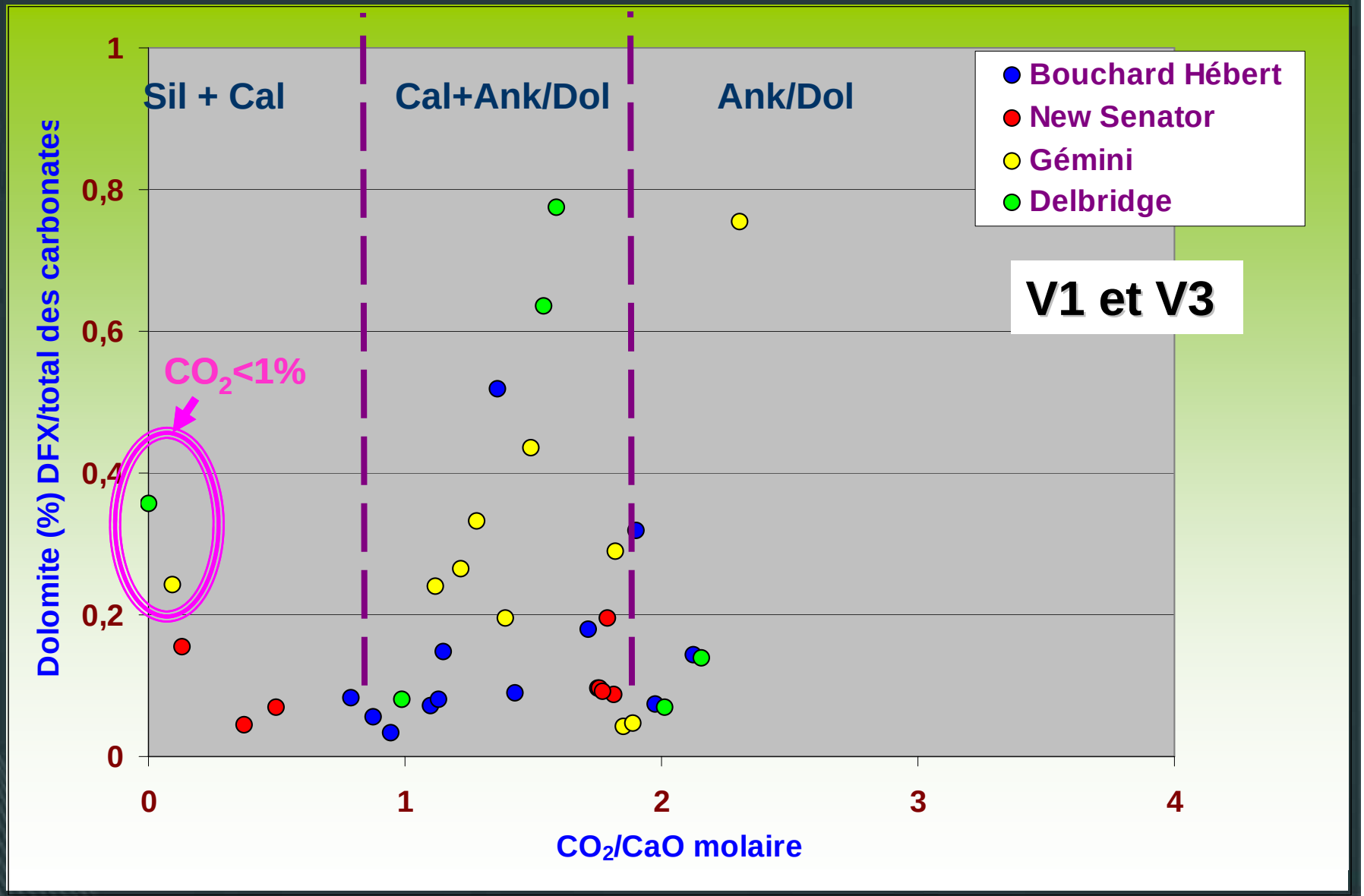
# 2e test – Autres contextes

## Abondance Ankérite

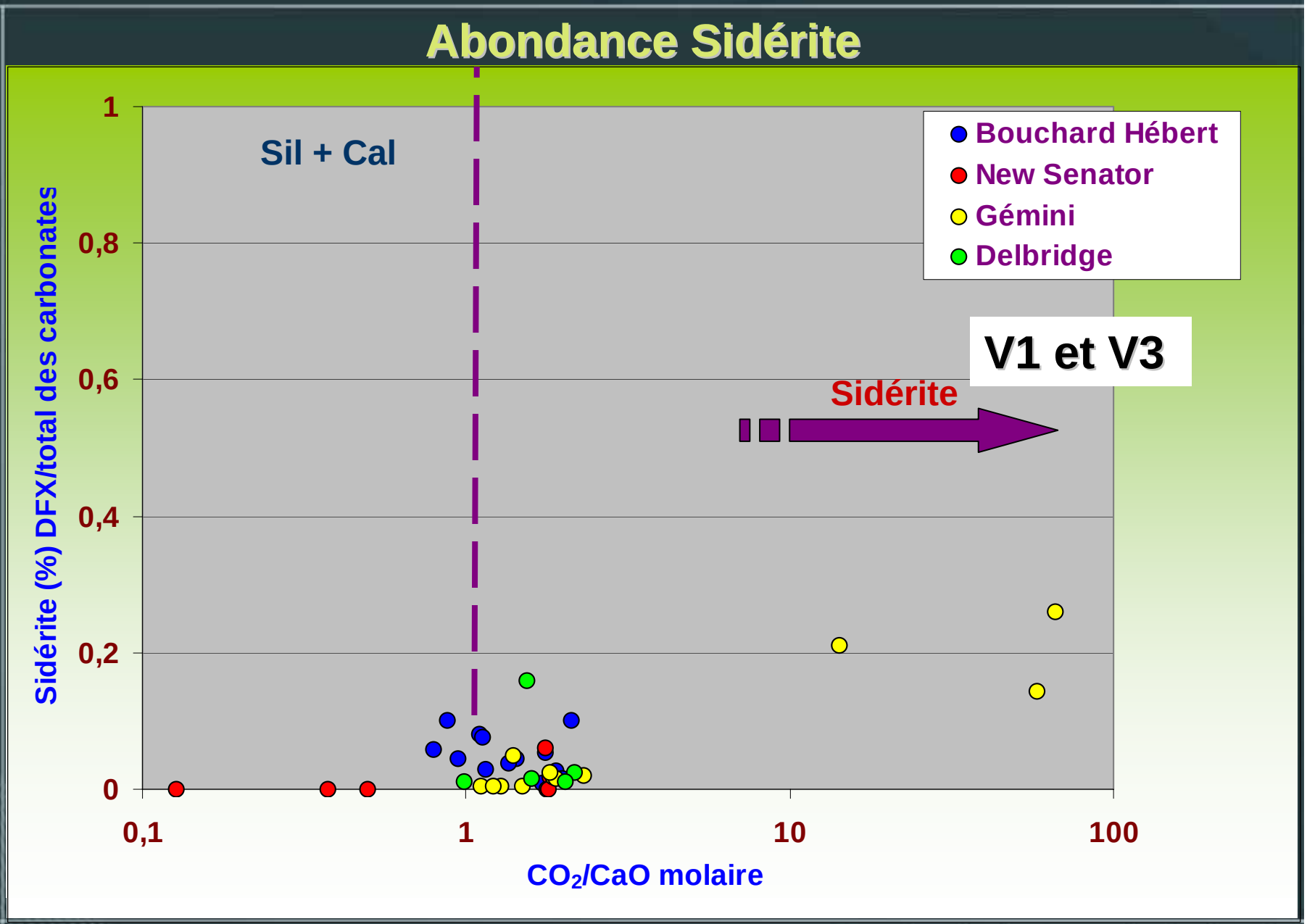


# 2e test – Autres contextes

## Abondance Dolomite

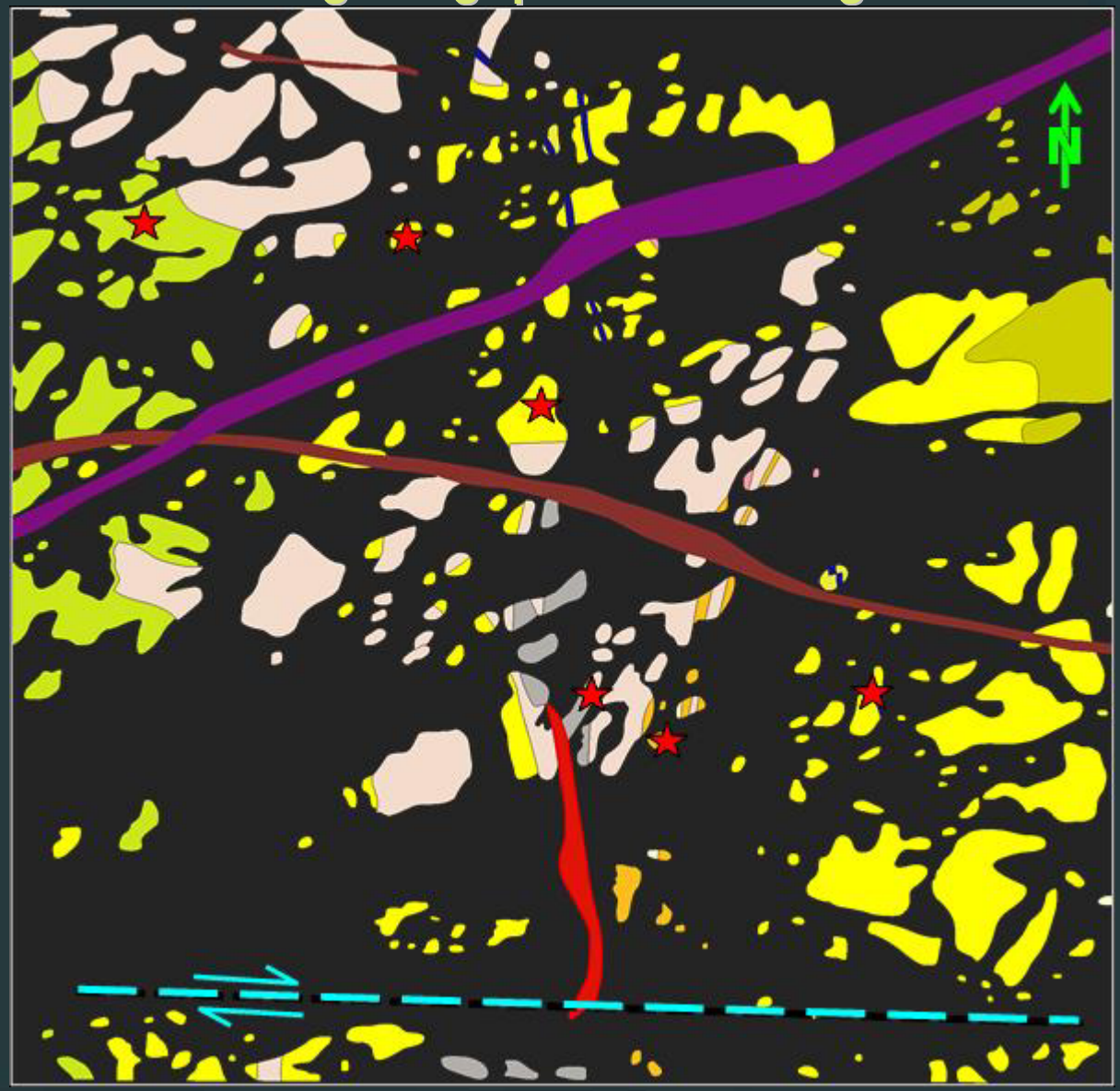


# 2e test – Autres contextes



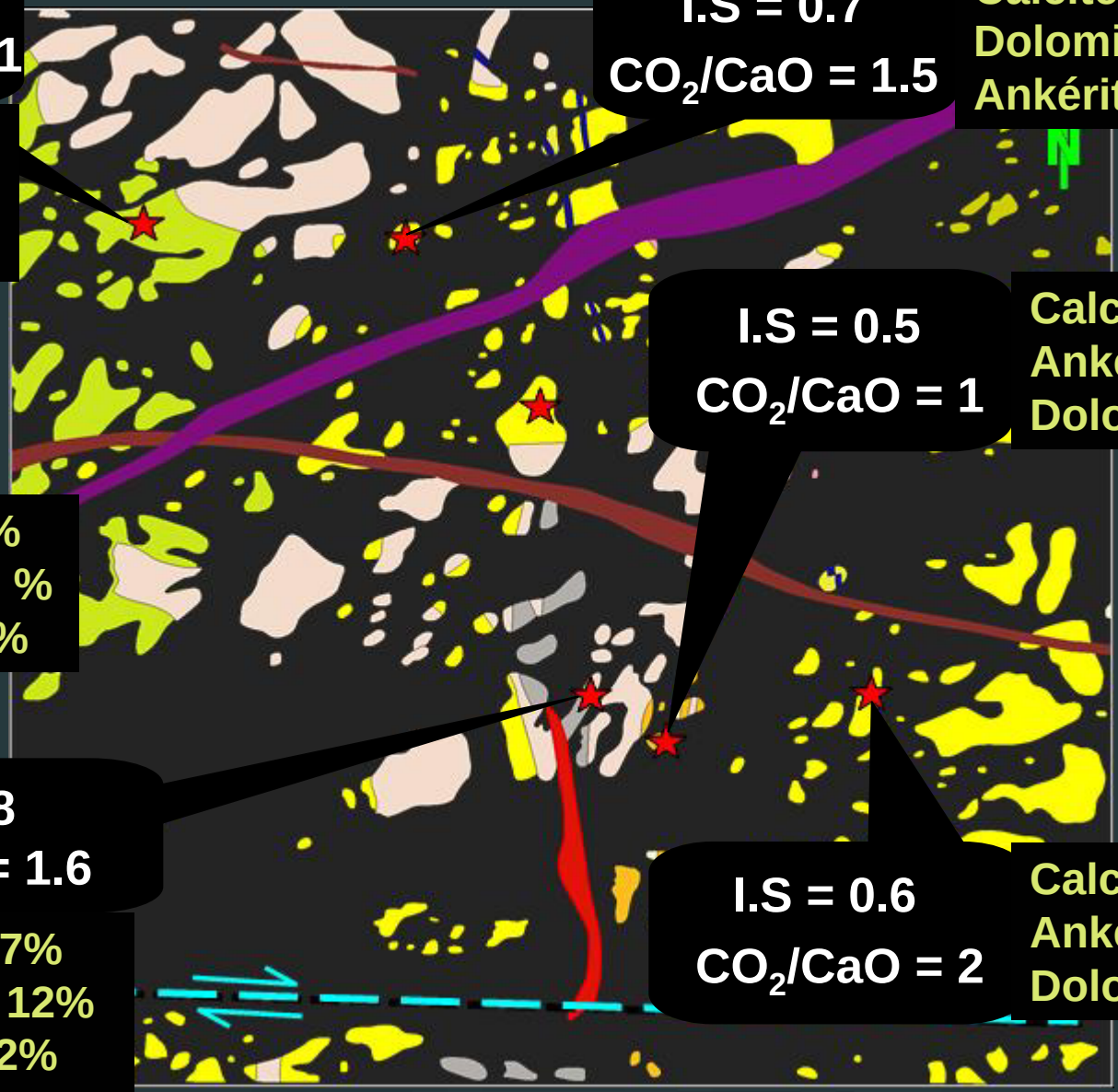
# Exemple d'application

## Carte géologique de Delbridge




*Boldy, 1968*

# Exemple d'application



I.S = 0
$CO_2/CaO = 0.1$
Calcite: 0.3%
Ankérite: 0.3%
Dolomite: 0.3%

I.S = 0.7
$CO_2/CaO = 1.5$
Calcite: 1.5%
Dolomite: 5%
Ankérite: 2%

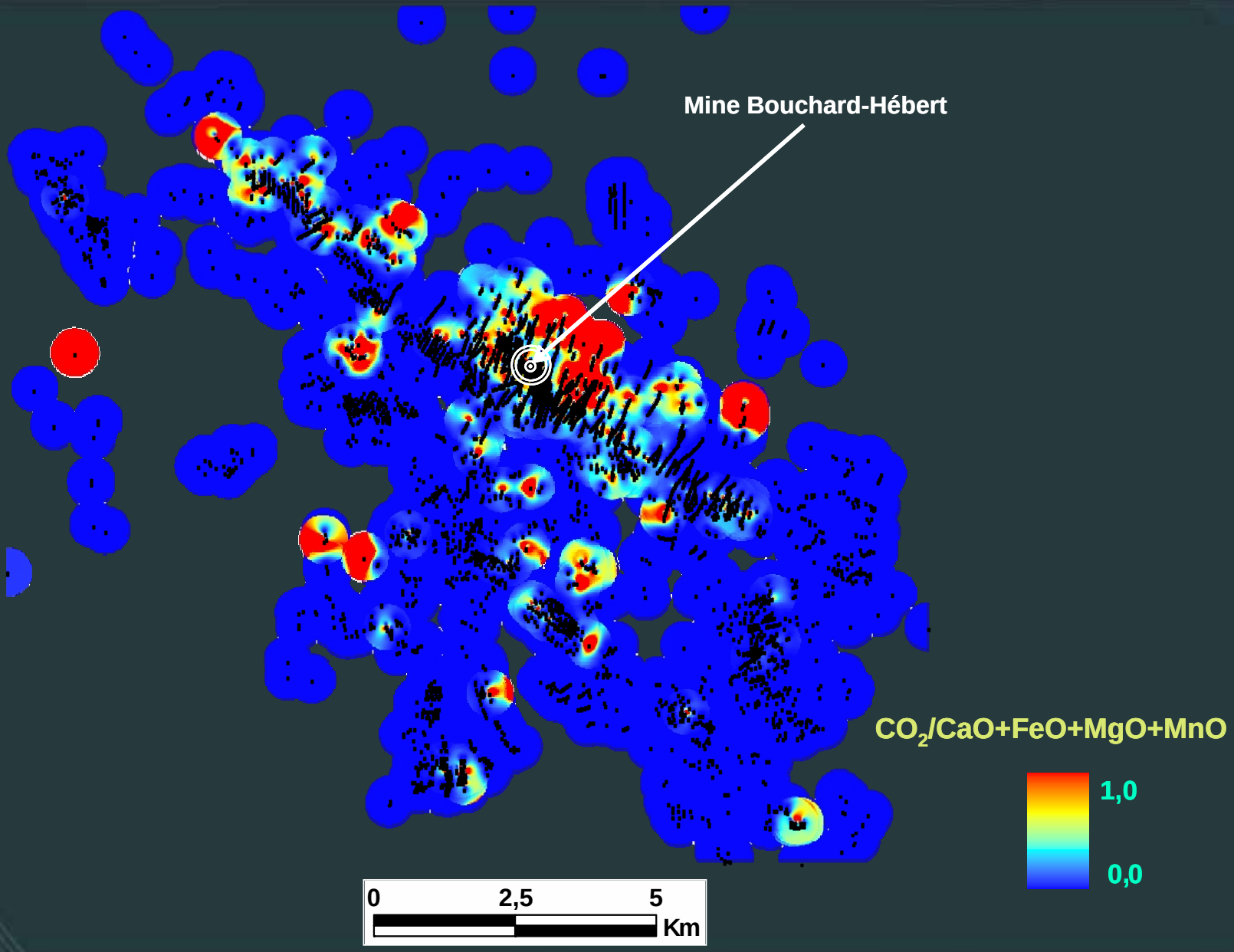
I.S = 0.5
$CO_2/CaO = 1$
Calcite: 20%
Ankérite: 1%
Dolomite: 2%

Calcite: 0.6%
Ankérite: 12 %
Dolomite: 2%

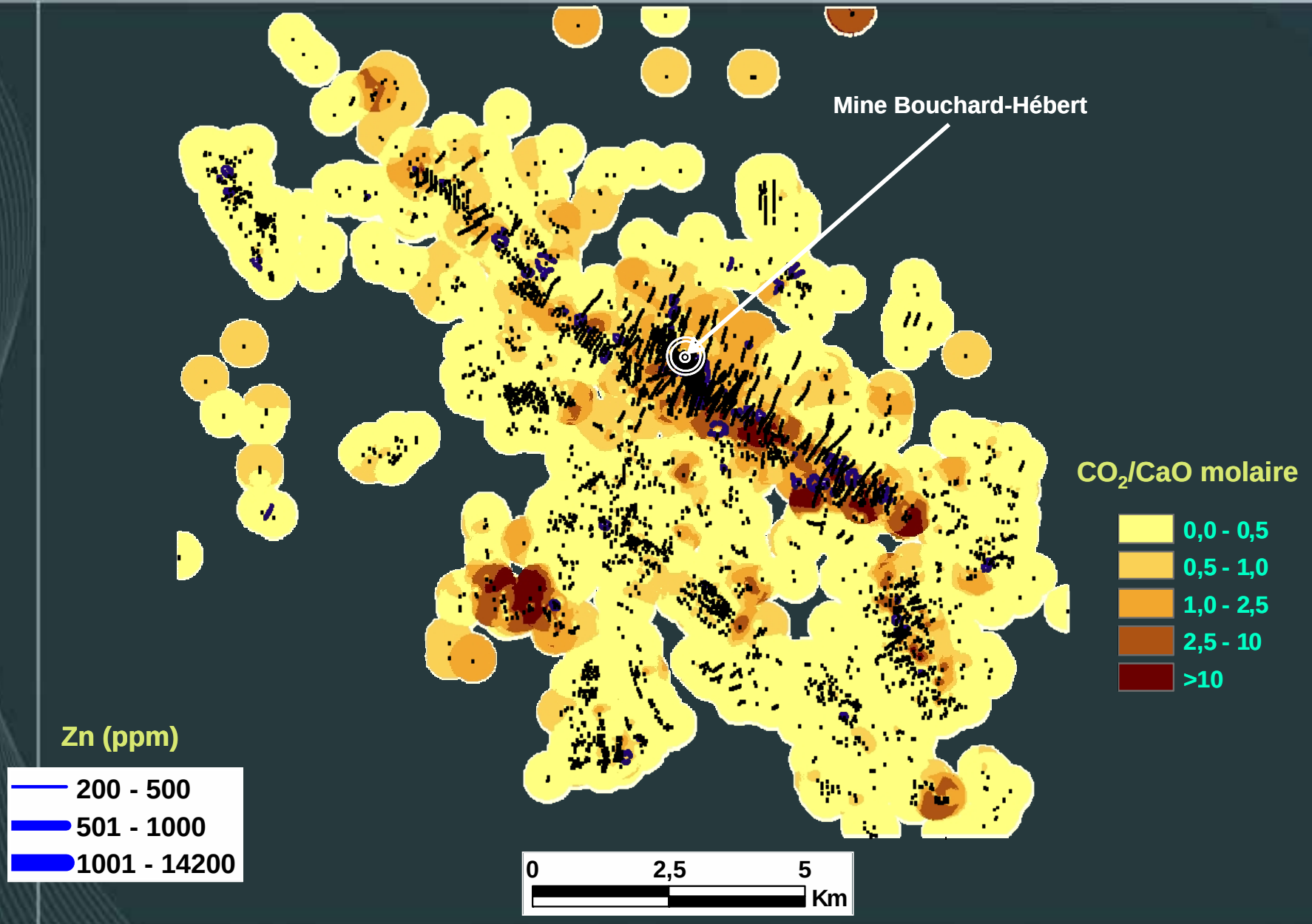
I.S = 0.8
$CO_2/CaO = 1.6$
Calcite: 0.7%
Dolomite: 12%
Ankérite: 2%
Sidérite: 0.2%

I.S = 0.6
$CO_2/CaO = 2$
Calcite: 0.7%
Ankérite: 28%
Dolomite: 2%

# Indice de saturation

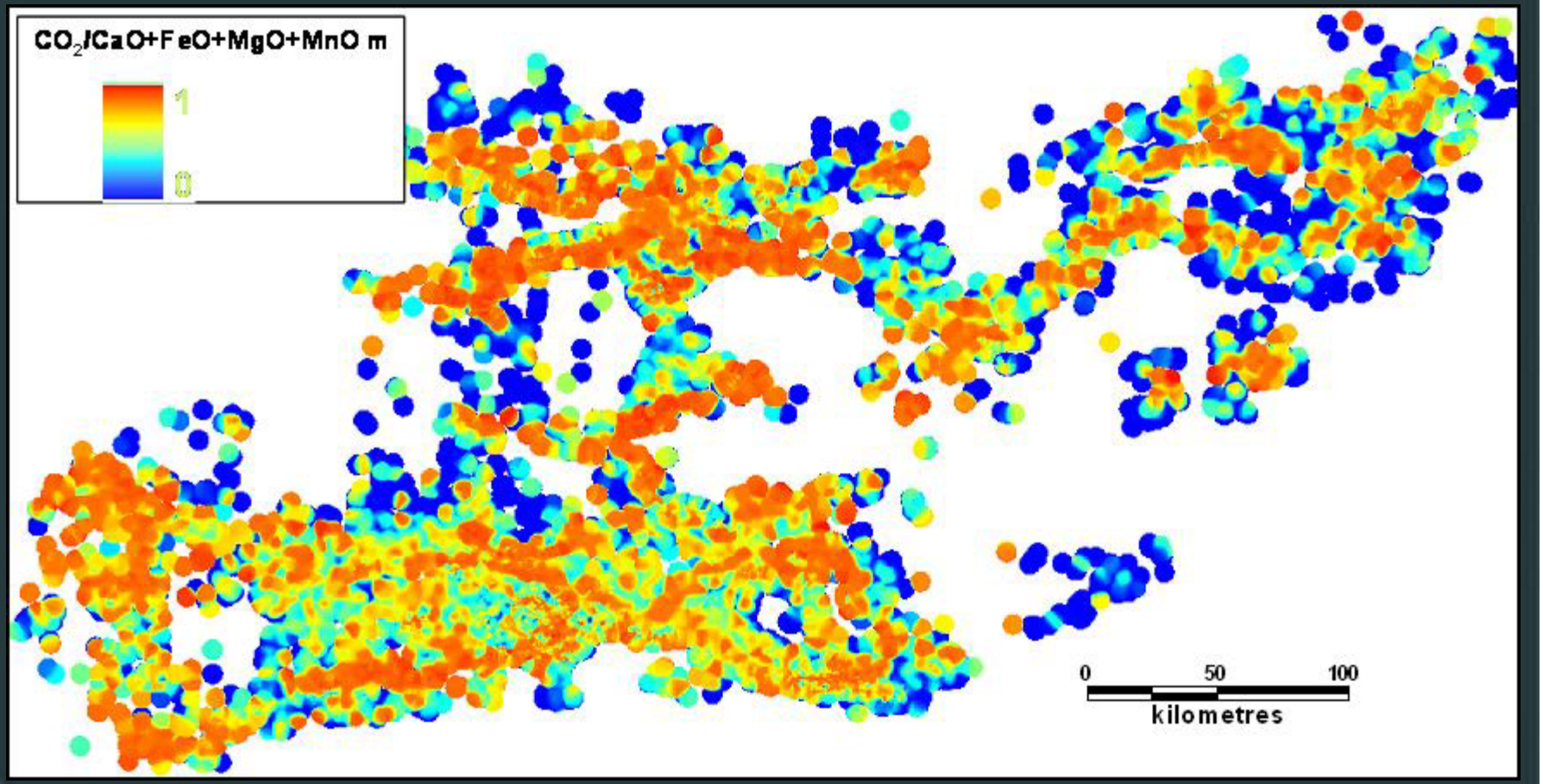


# Indice de discrimination



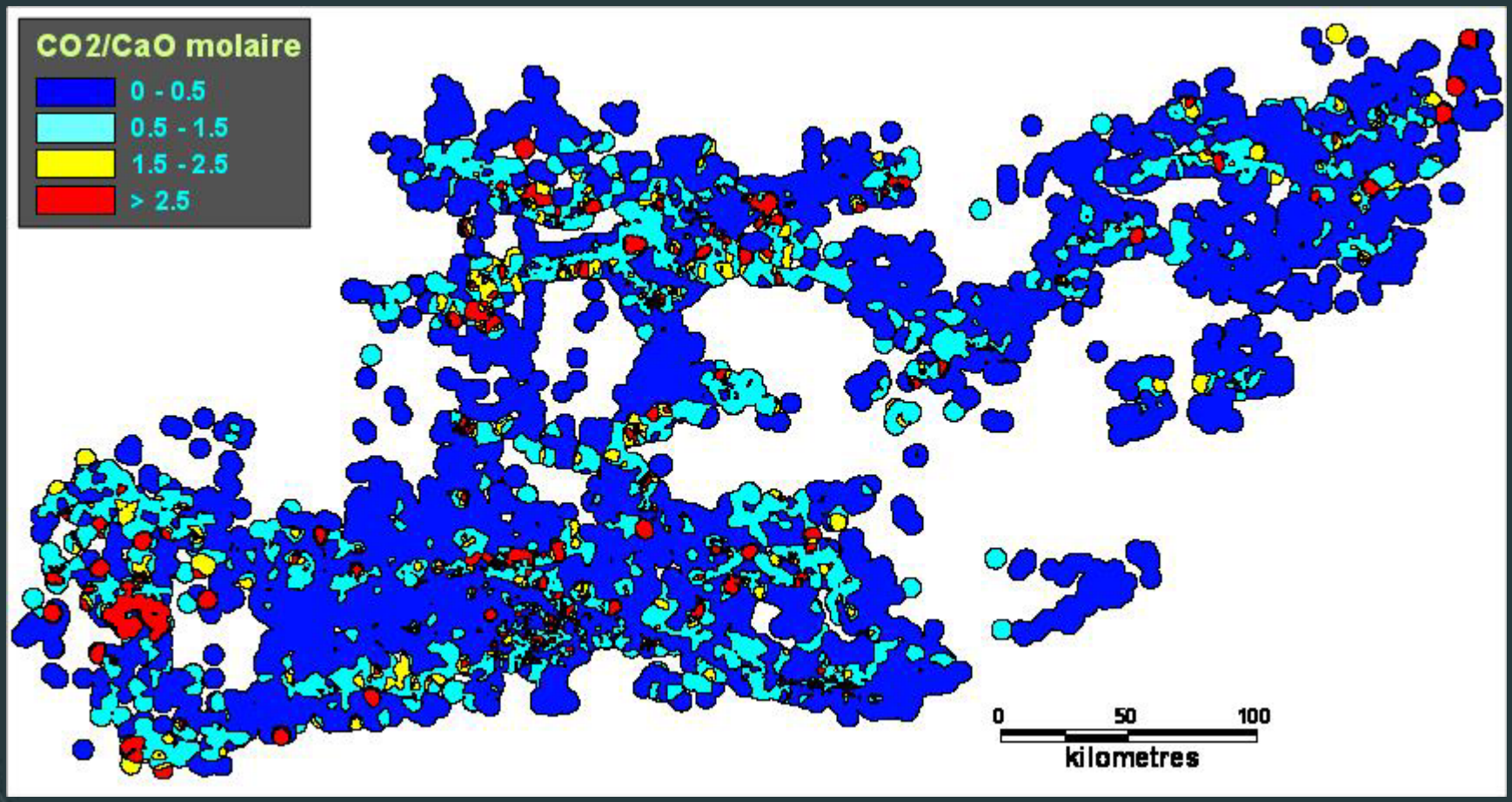
# Échelle régionale : Abitibi

***Indice de saturation***

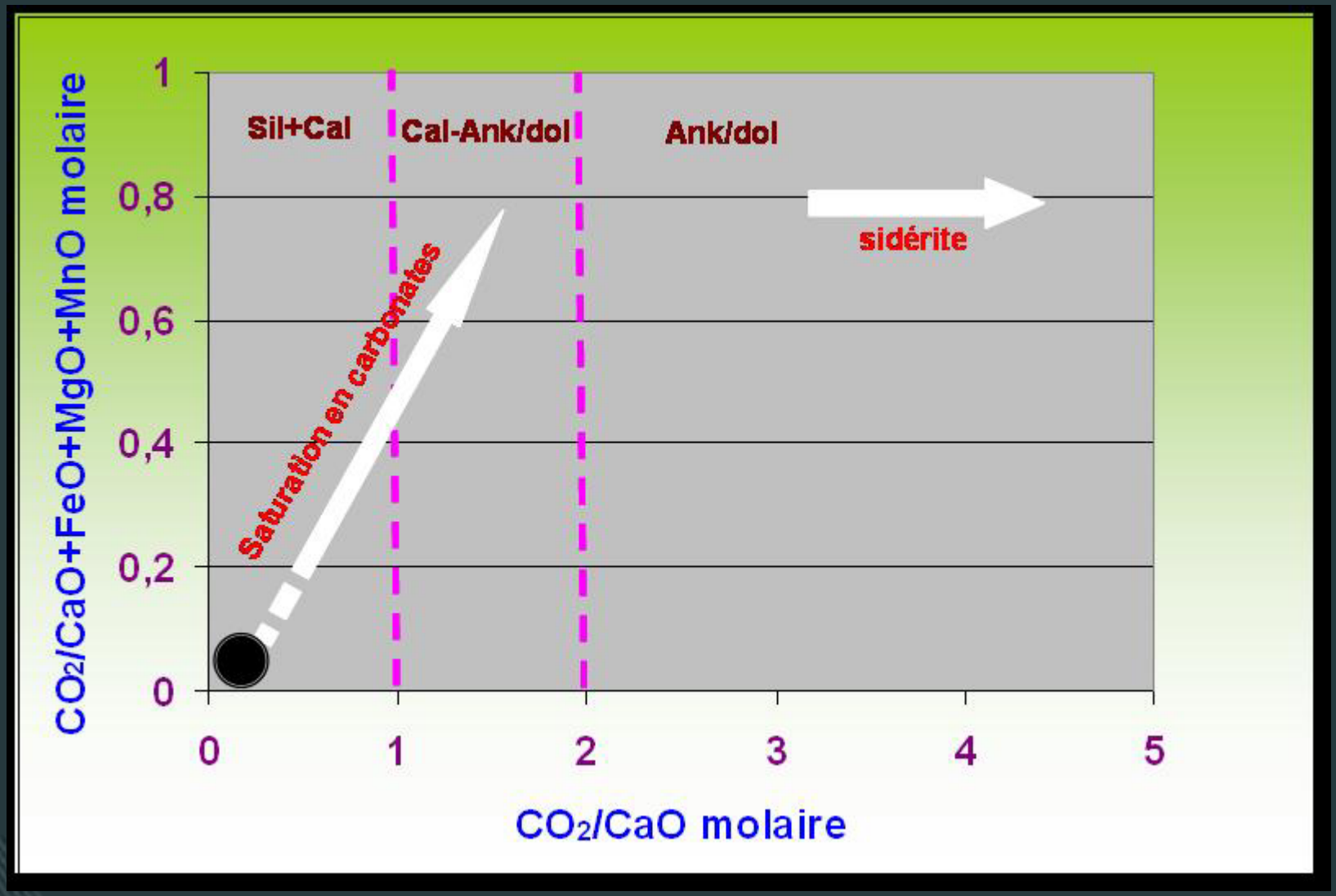


# Échelle régionale : Abitibi

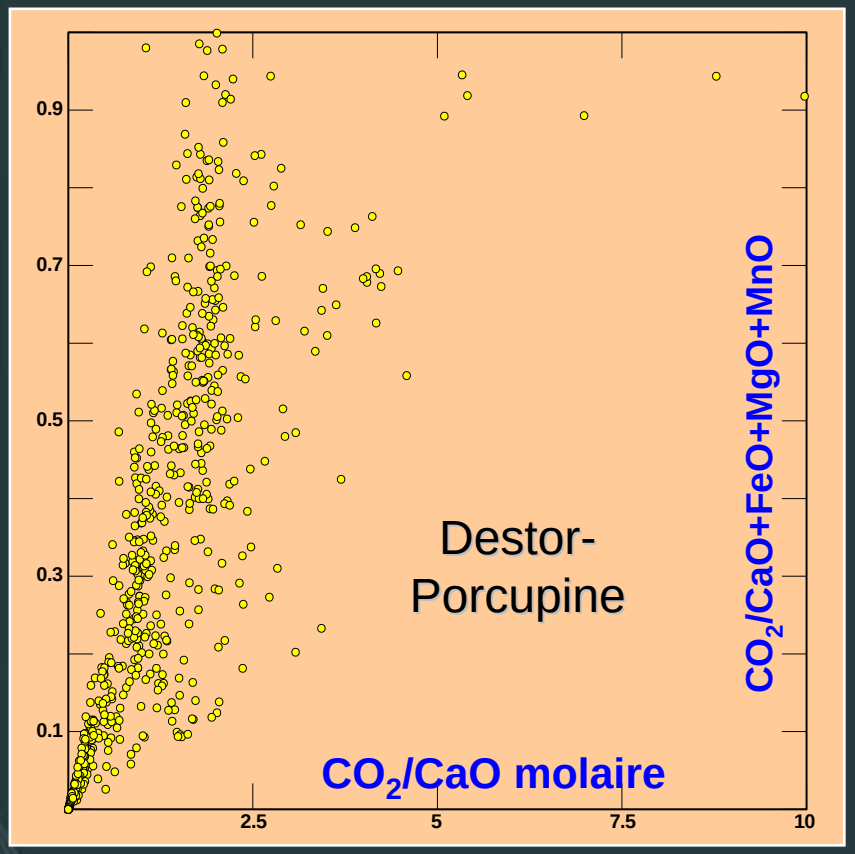
***Indice de discrimination***

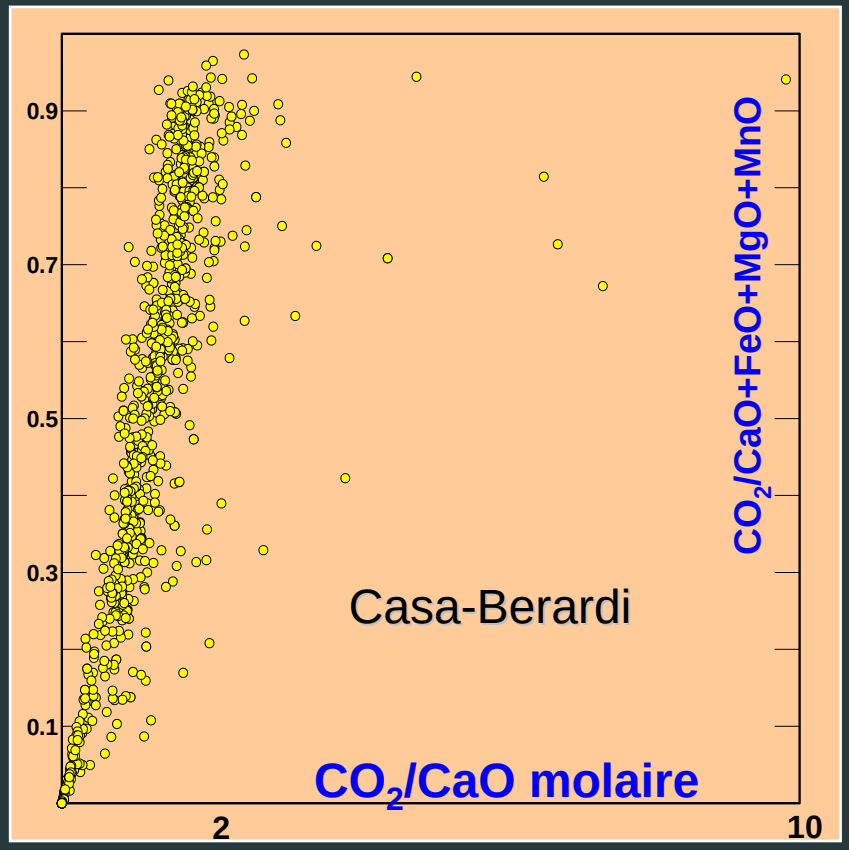


# Diagramme de carbonatation

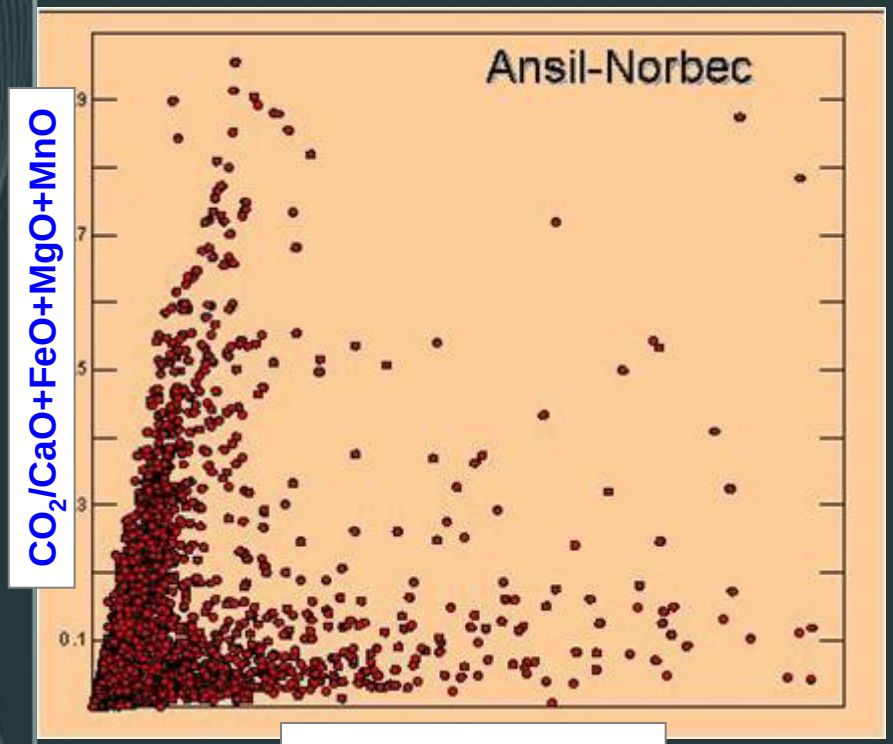


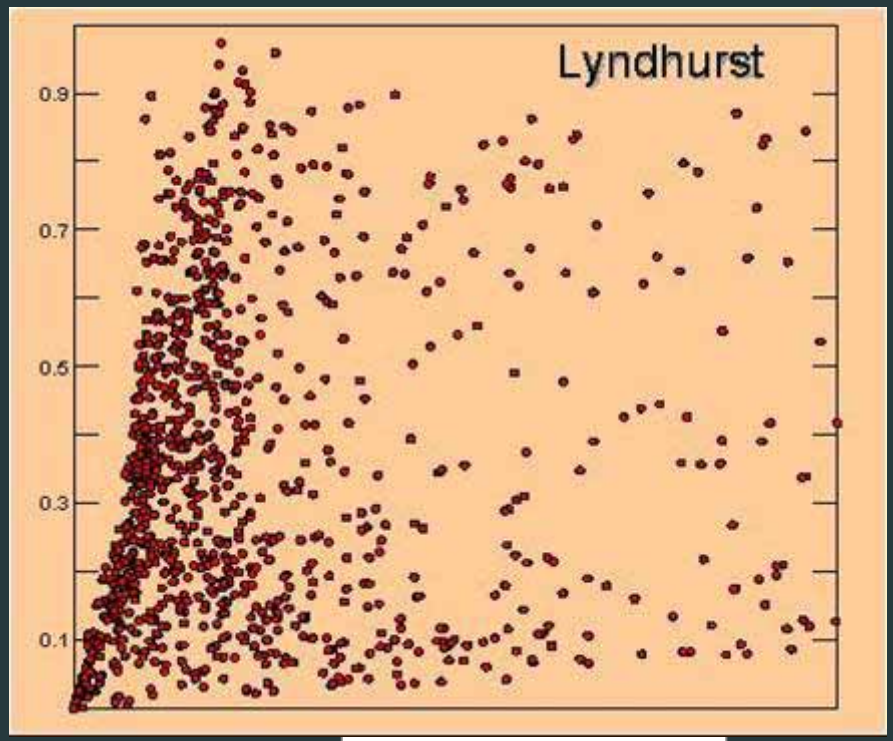
# Exemples pour contextes Or orogénique



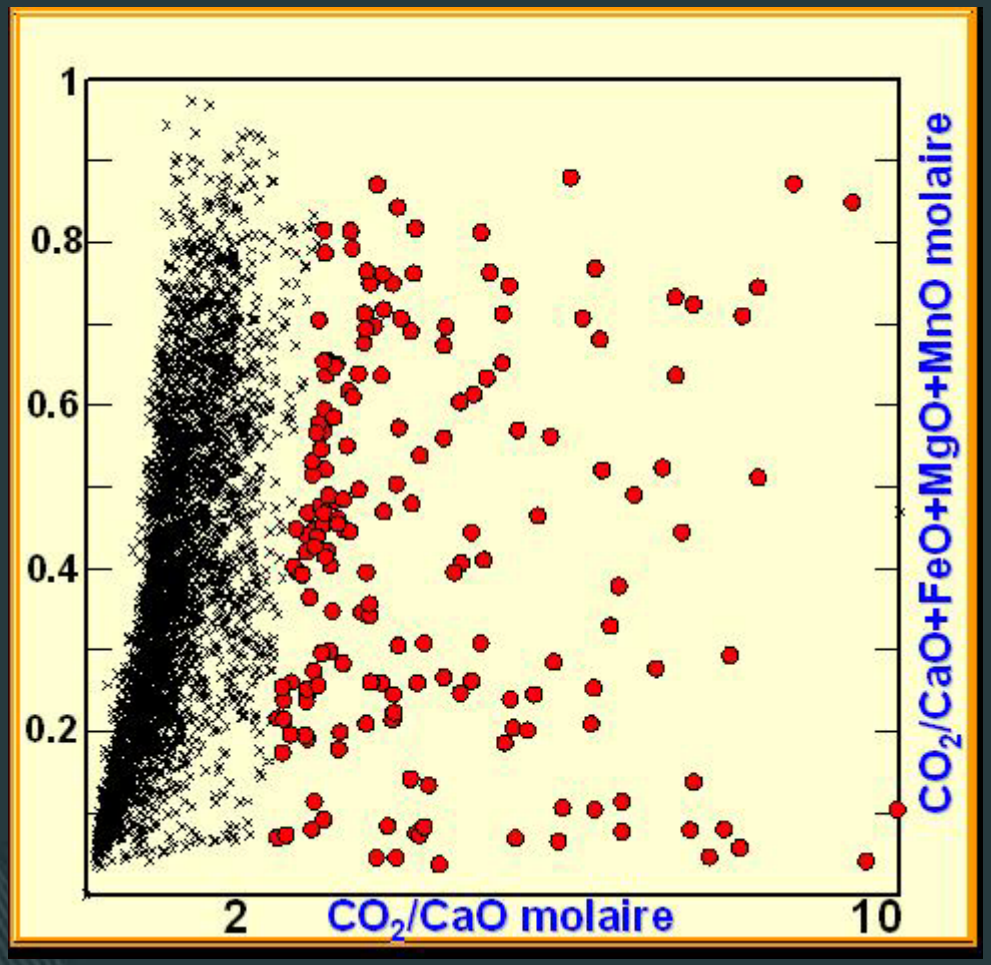



# Exemples pour contextes VMS



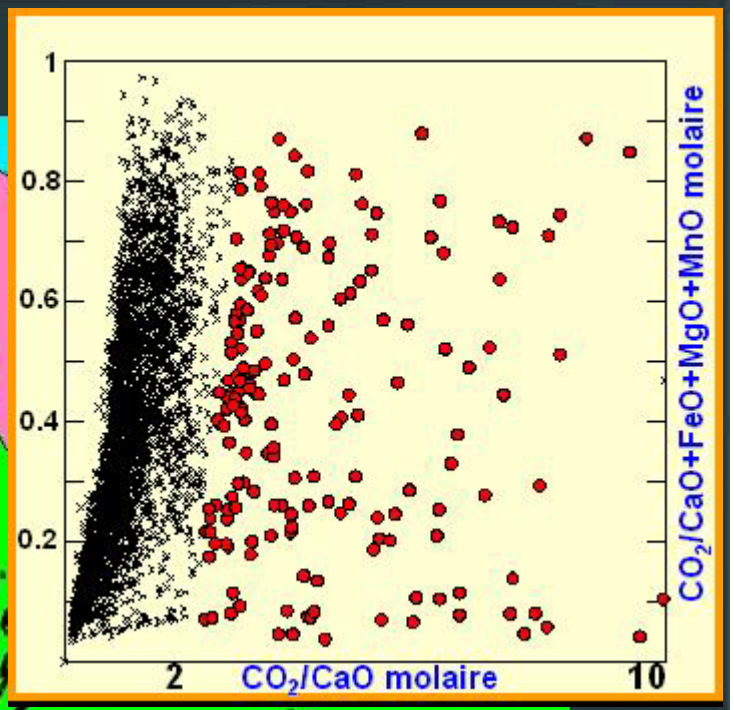



# Bouchard-Hébert

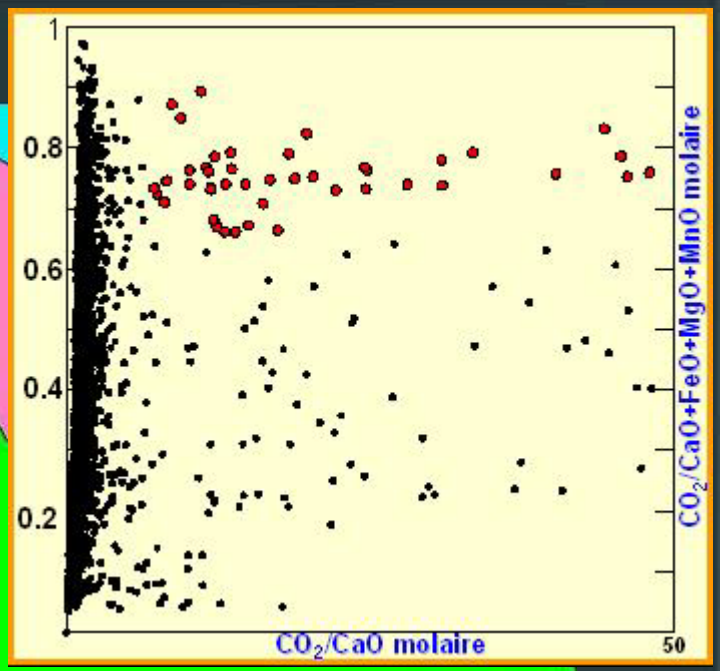



- Échantillons provenant du halo d'altération

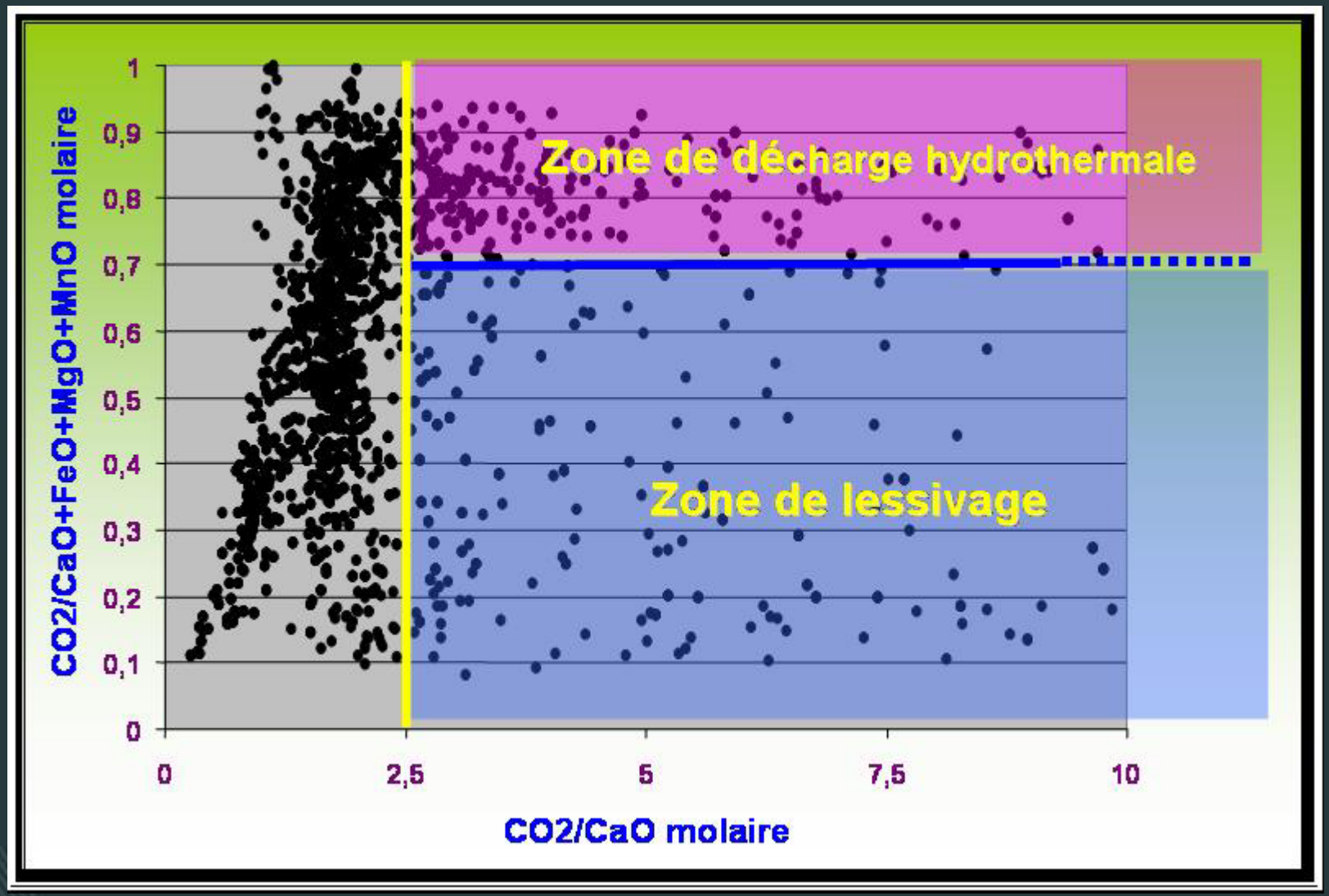
# BOUCHARD HÉBERT



# BOUCHARD HÉBERT



## Diagramme de carbonatation et zones d'altérations proximales



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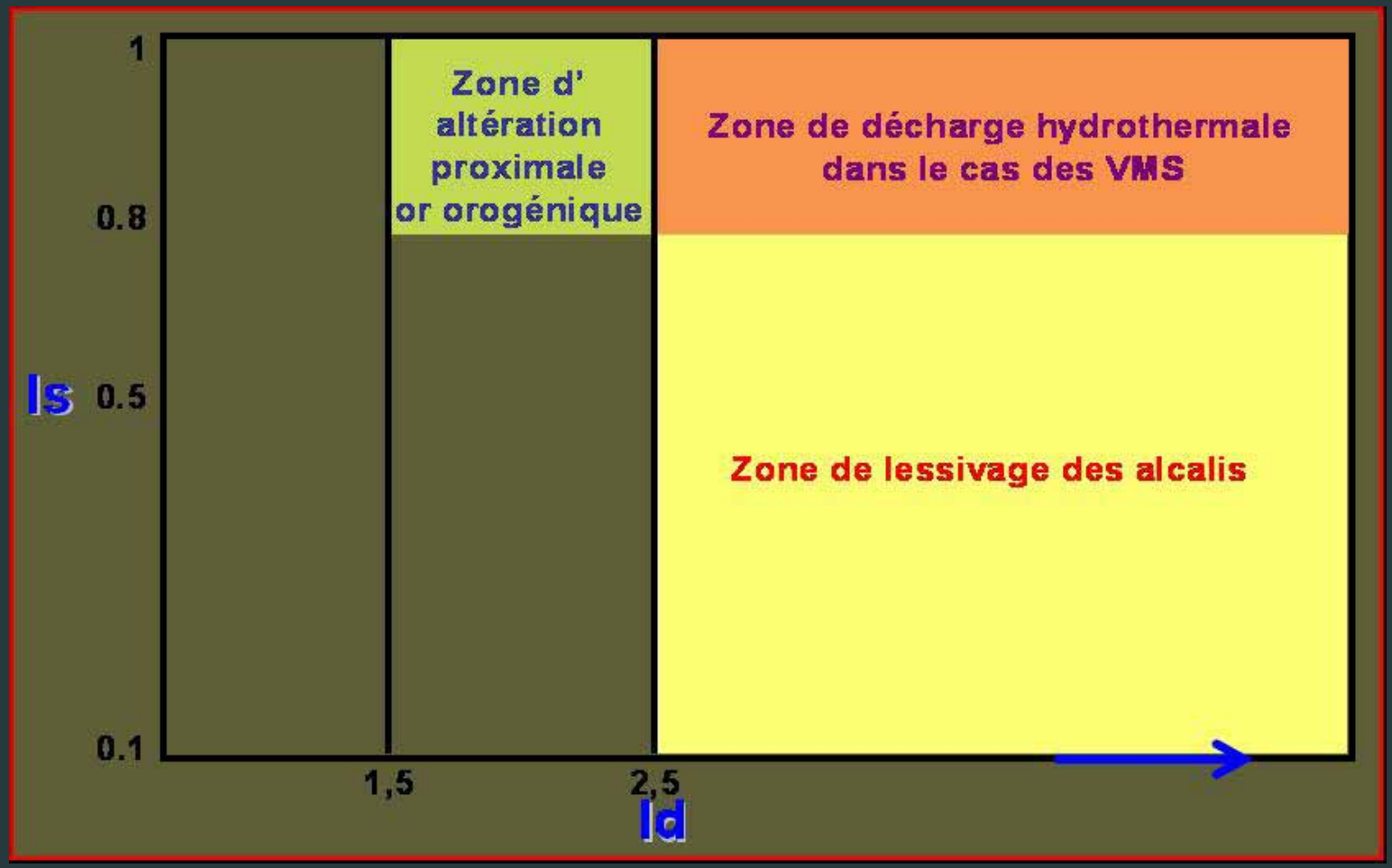

# Limitations de la méthode

- Estimation du CO2
- Pas de calcul lorsque %CO2 < 1
- Donne une bonne estimation du contenu total de carbonates pas l'histoire de la carbonatation

- Attention
  - Présence de sulfures dans la roche
  - Présence de veines de carbonates dans la roche

# Conclusions

**Indice de discrimination permet de déterminer les espèces de carbonates à partir d'une analyse lithogéochimique**

**Diagramme de carbonatation est utile pour le ciblage dans les environnements volcanogènes et Au-orogénique.**