

# LES ASCENDANCES DES ORAGES VUES PAR C2OMODO AU-DESSUS DU CRA

Sous la direction de Jean-Pierre Chaboureau et Jérémy Richard



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# Introduction

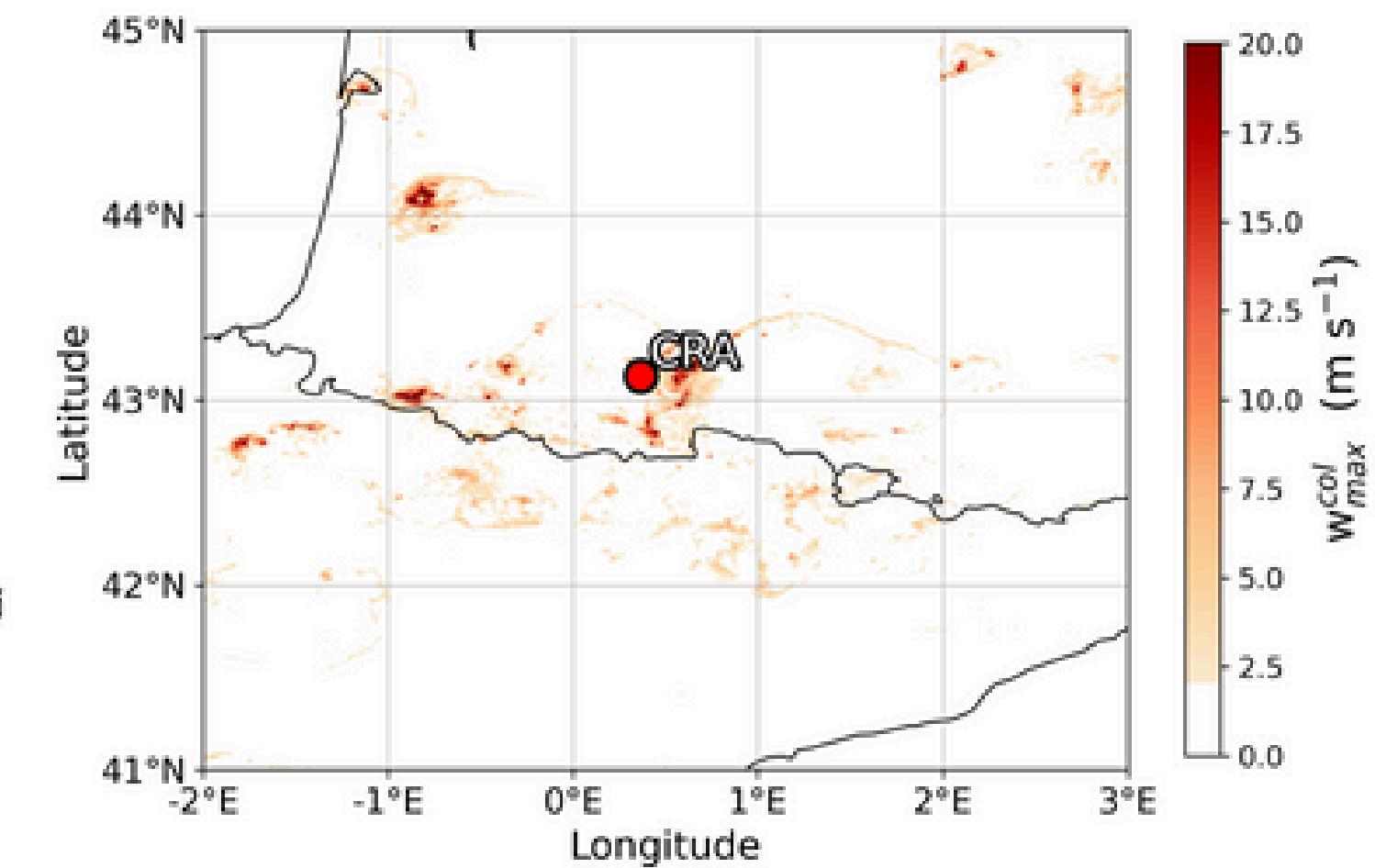
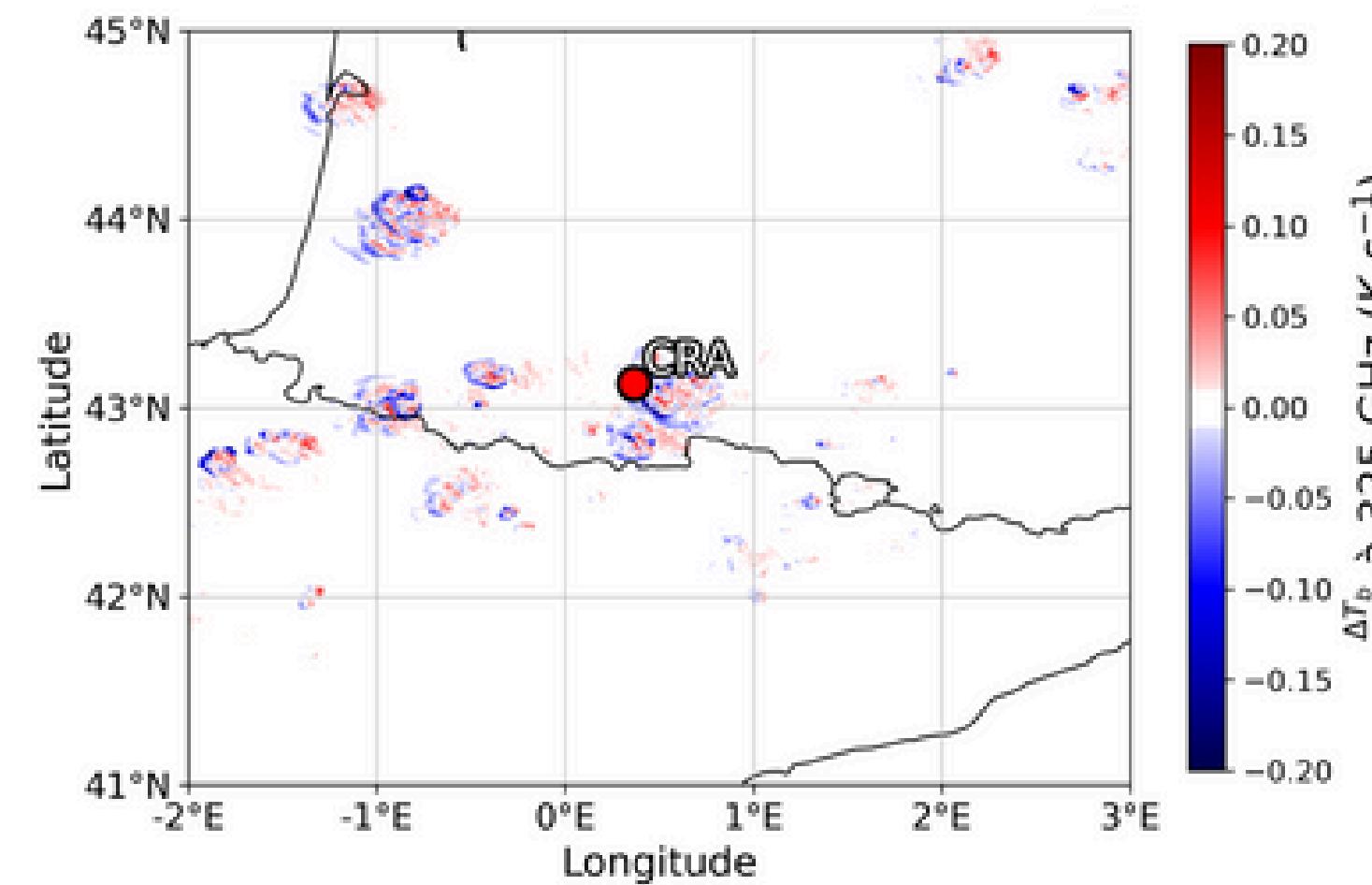
Mesurer la vitesse verticale

## Mission C2OMODO

- Tandem de satellites.
- Fréquence : 325 GHz (Auguste et Chaboureau 2022).

## Objectifs

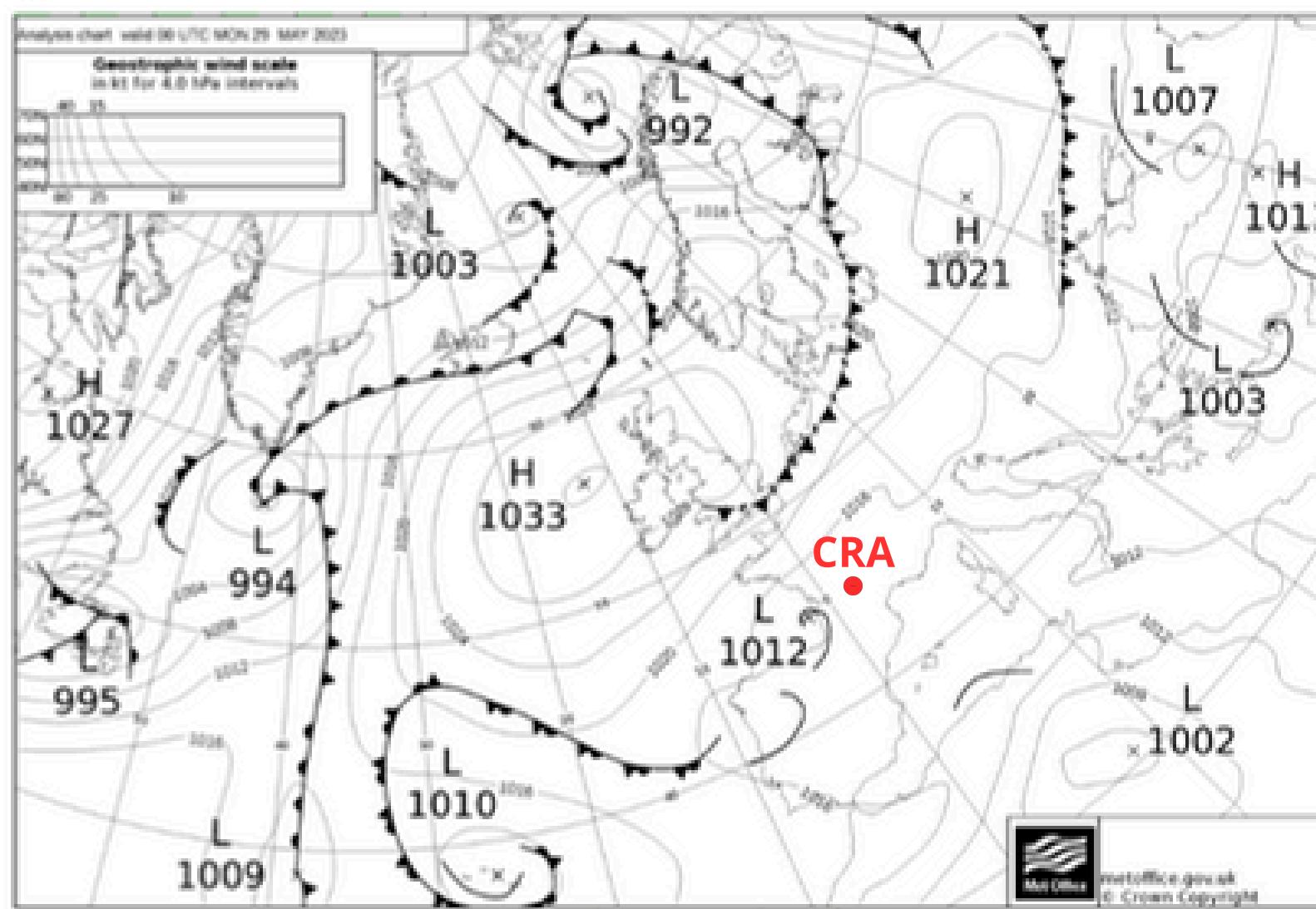
- Explorer les relations entre la taille de la cellule,  $w_{max}$  et  $T_{b,min}$ .  
→ Intérêt pour la mission.



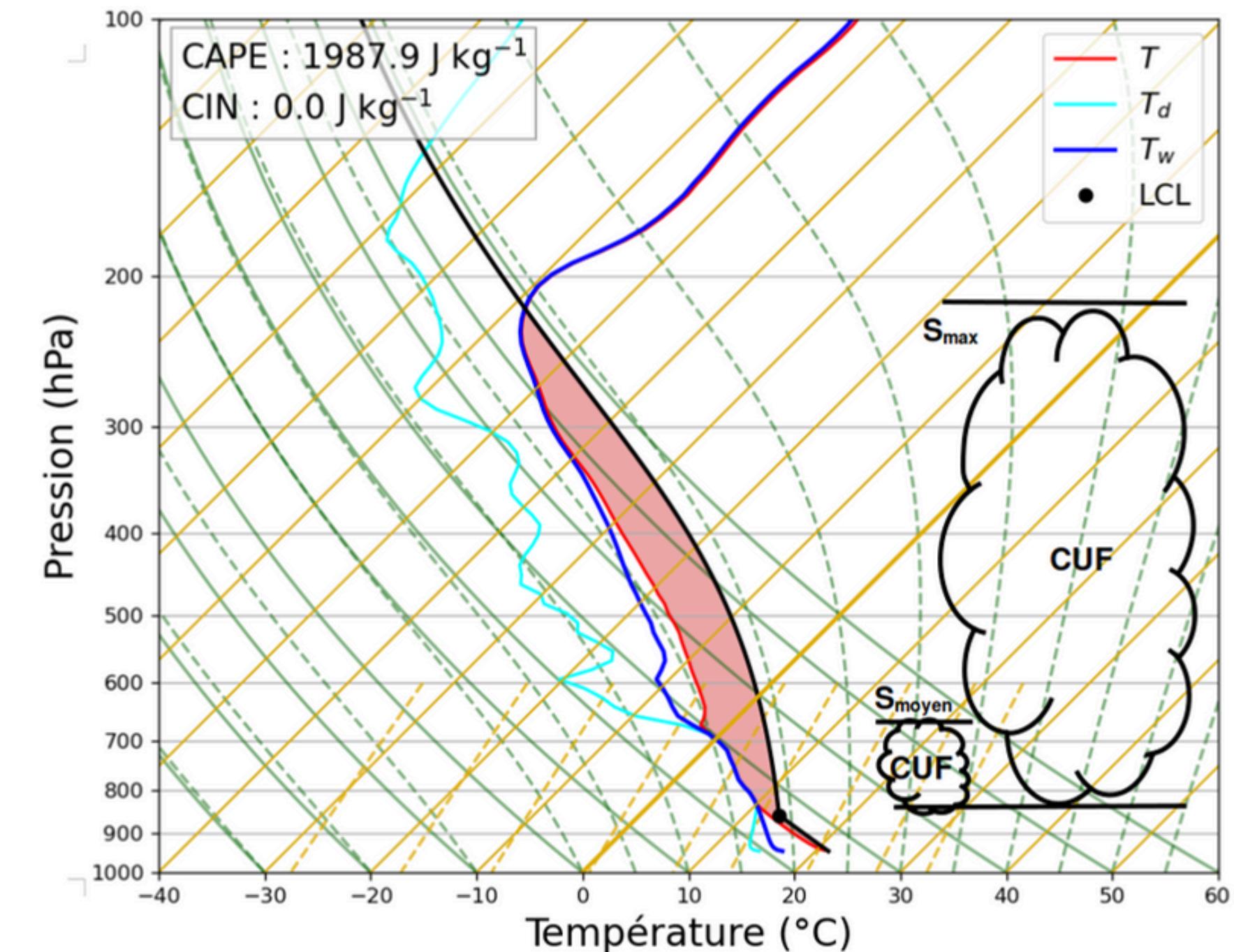
# Situation météorologique : 29 mai 2023



- Présence d'un marais barométrique.



Émagramme à 13:15 UTC au-dessus du CRA (à partir de la simulation Meso-NH)



- Basses couches atmosphériques très instables.

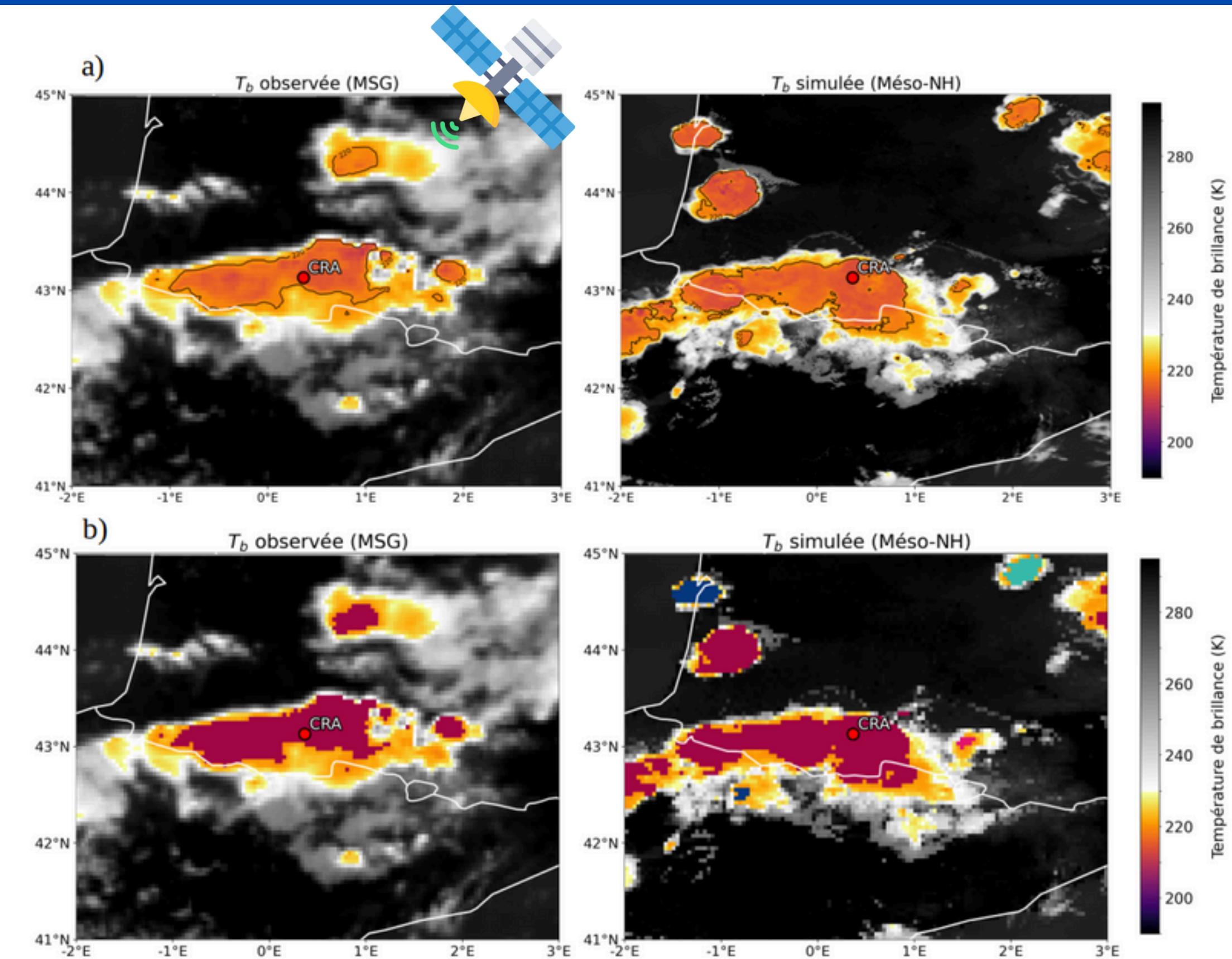
# Méthodologie

## Données à disposition

- Simulation Méso-NH : domaine de 512 km de côté, résolution horizontale de 1 km, de 13:00 à 22:00 UTC.
- Profiteur de vent VHF du CRA.
- Images MSG 10.8  $\mu\text{m}$ .

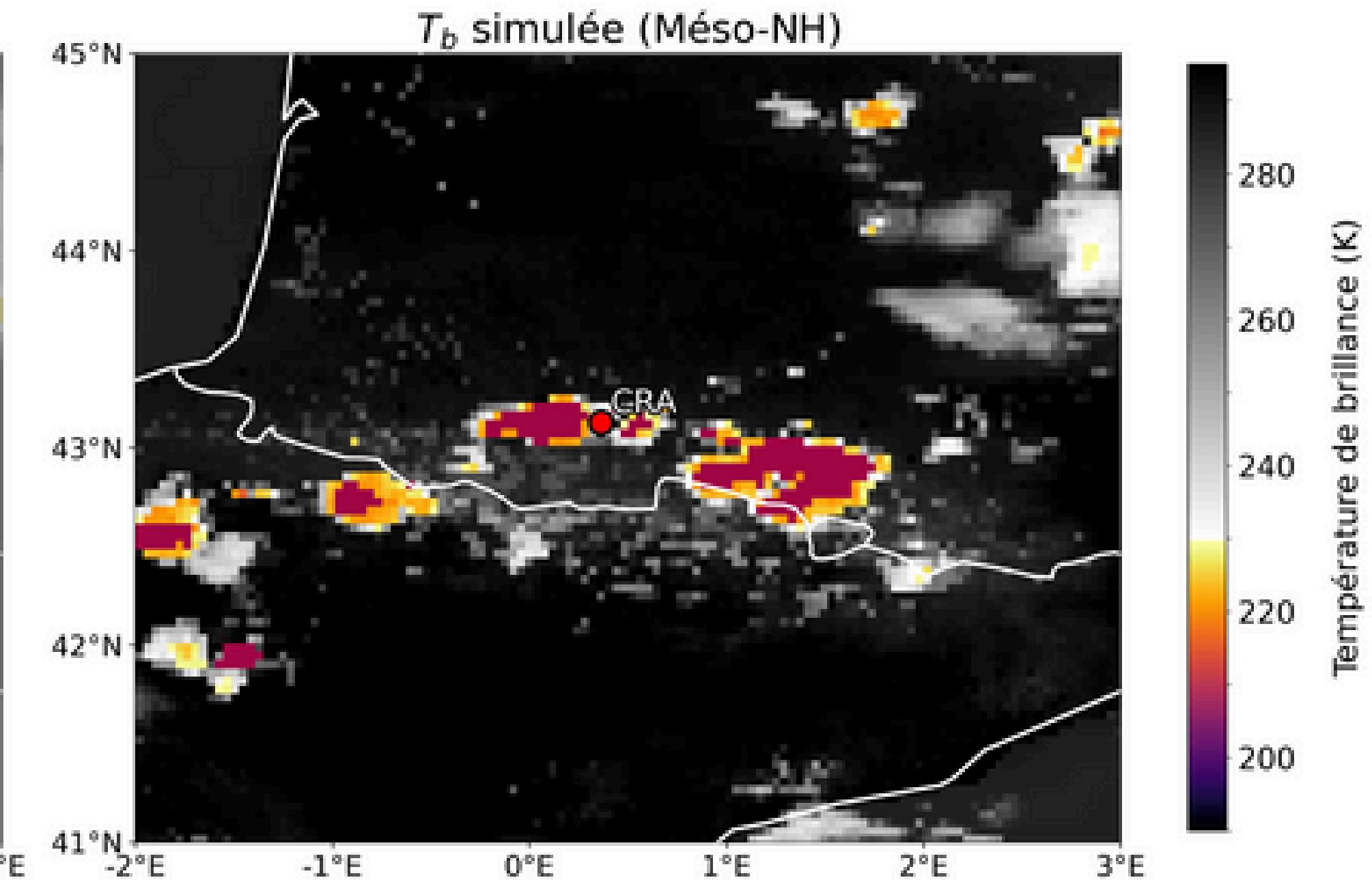
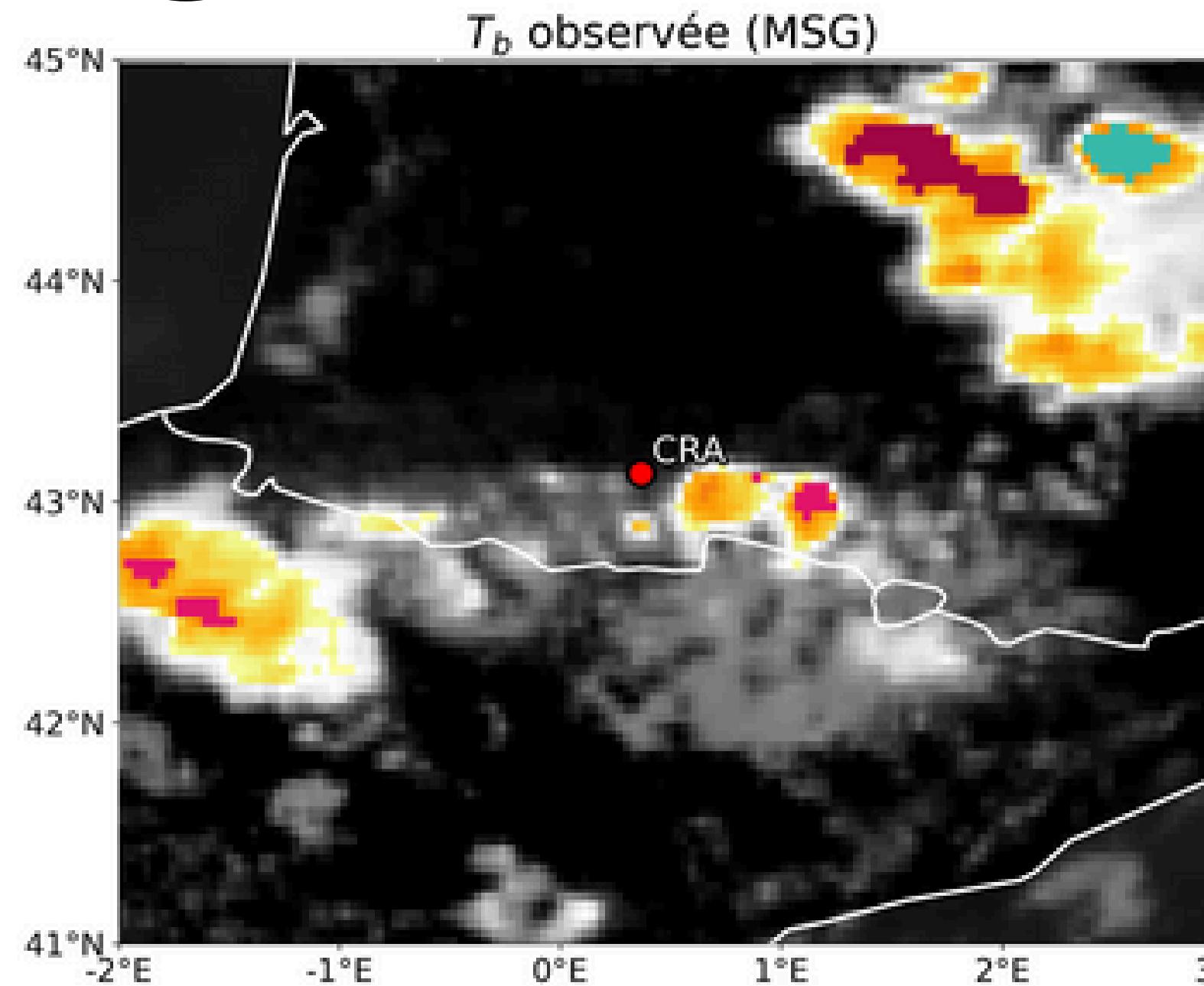
## Algorithme de suivi (Maury et al. 2022)

1. Identification des cellules, critère  $T_b < 220 \text{ K}$ .
2. Suivi temporel : intersection des régions convectives identifiées entre les pas de temps.



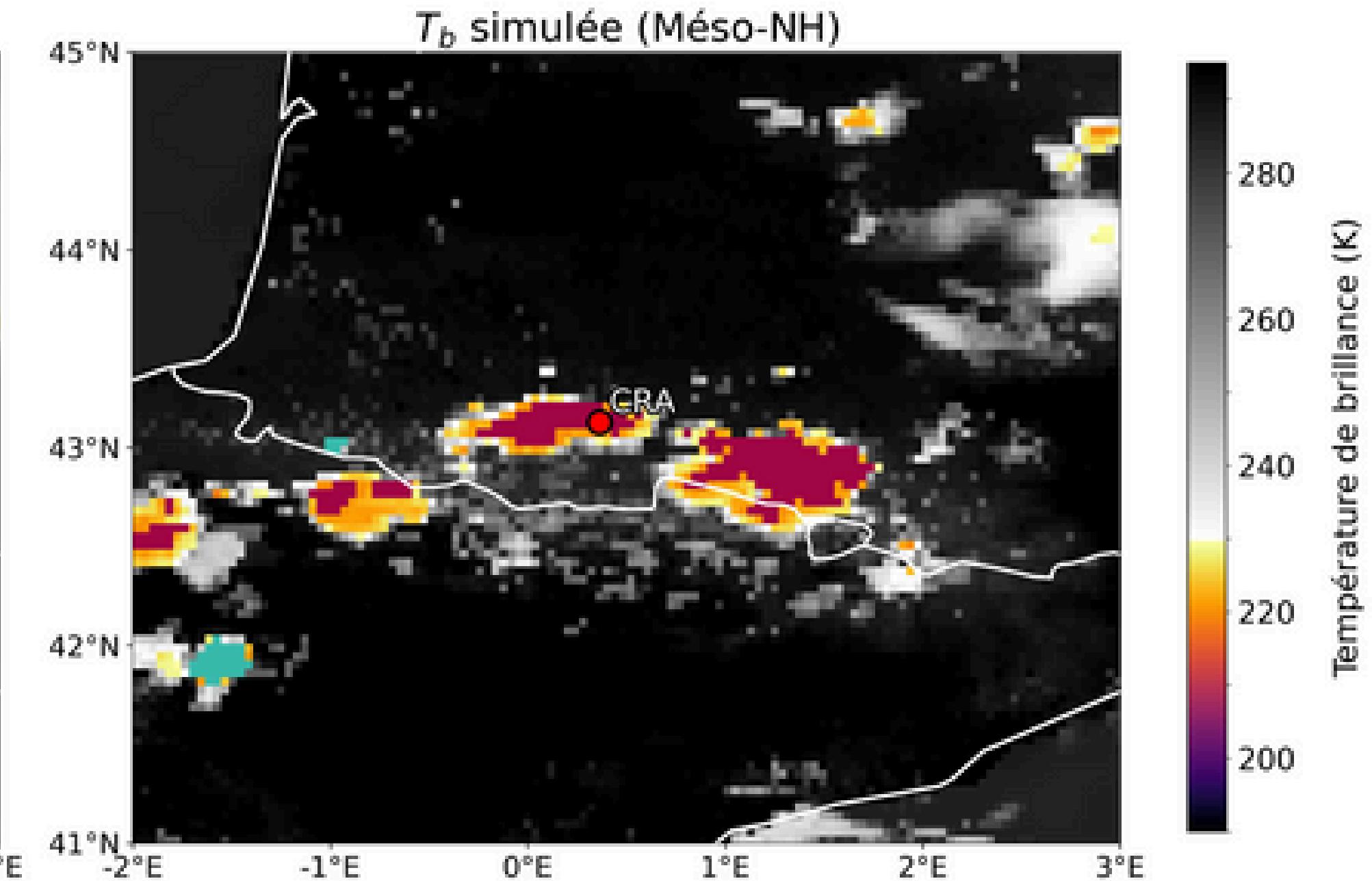
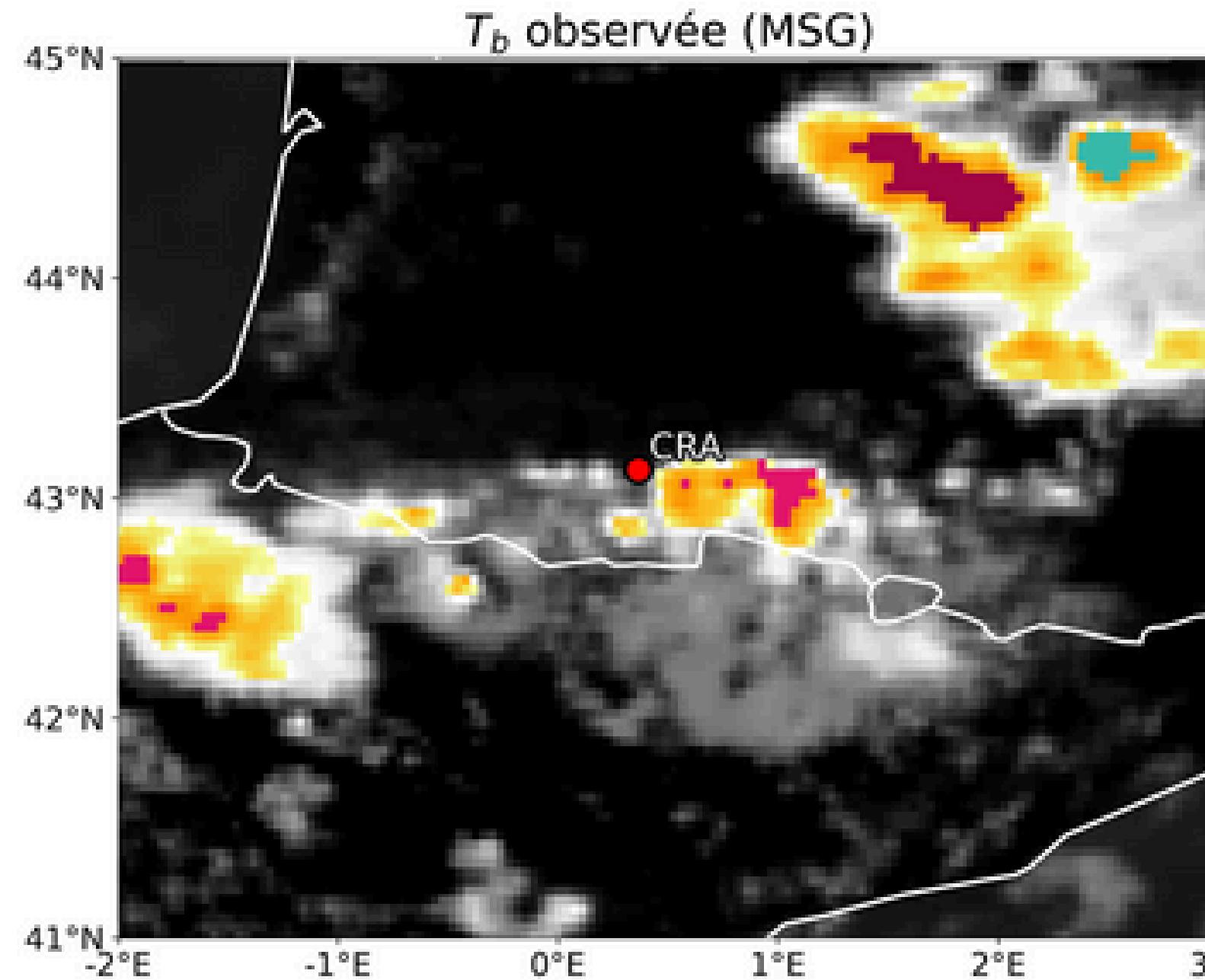
# Méthodologie

14:00



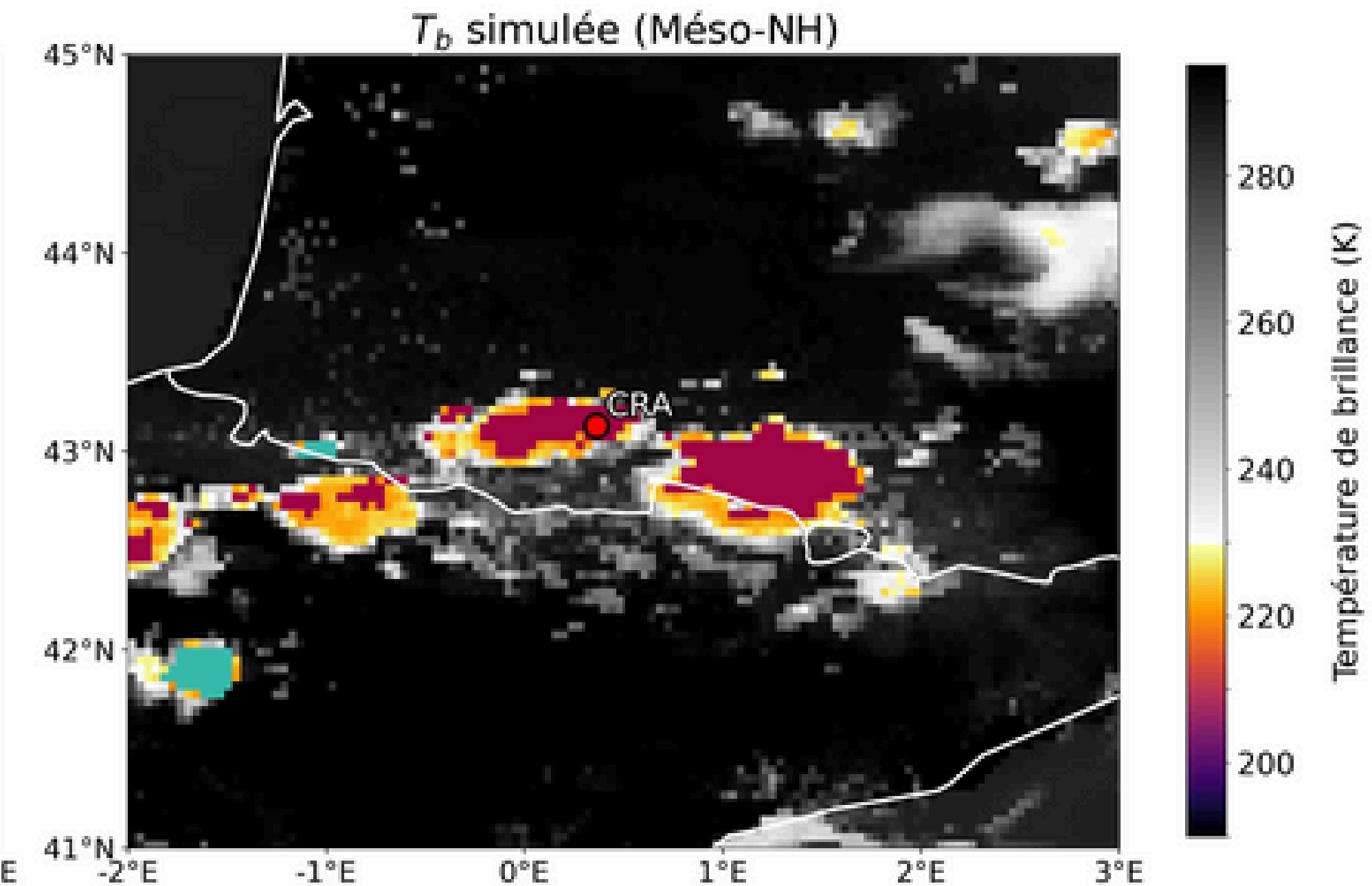
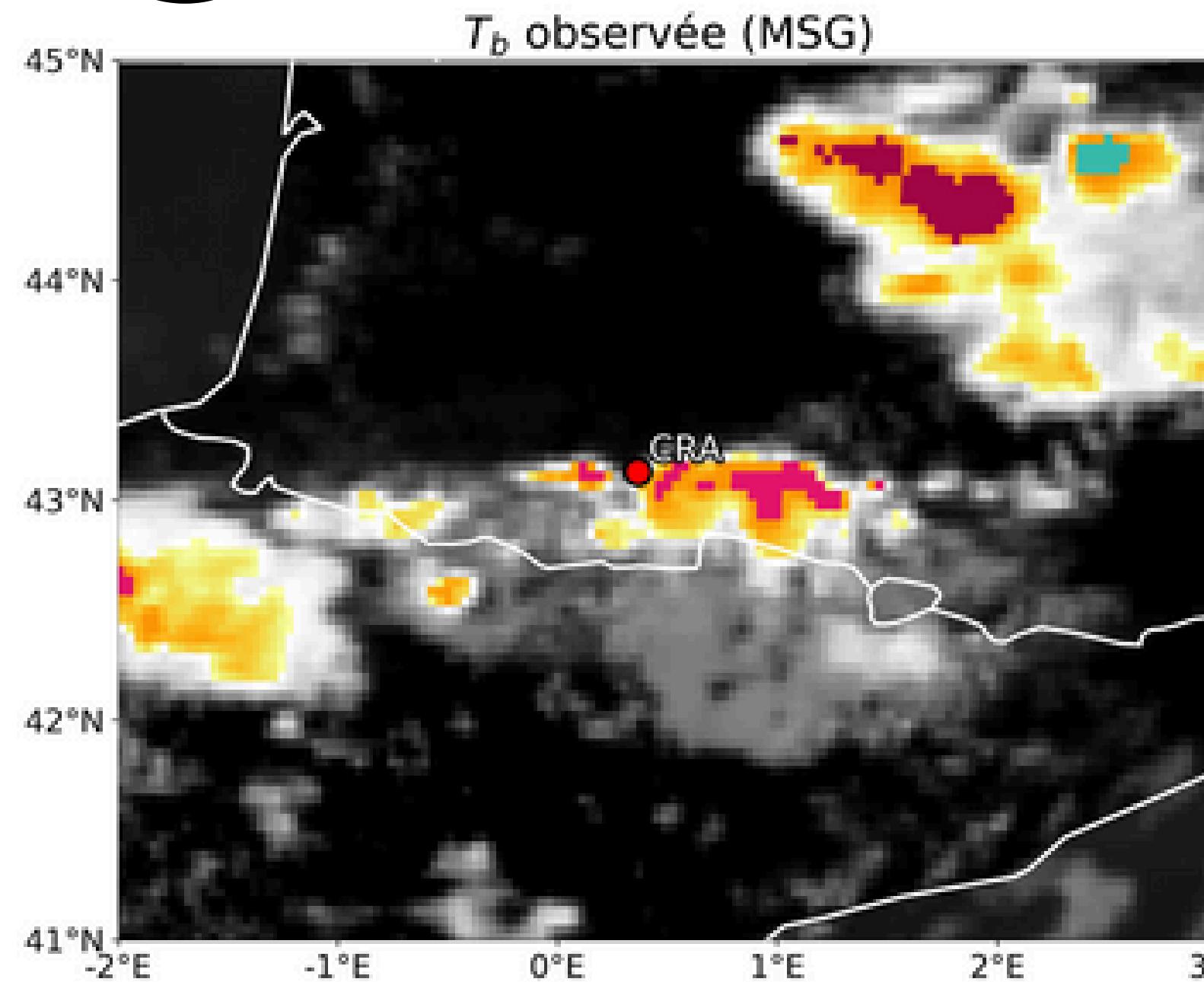
# Méthodologie

14:15



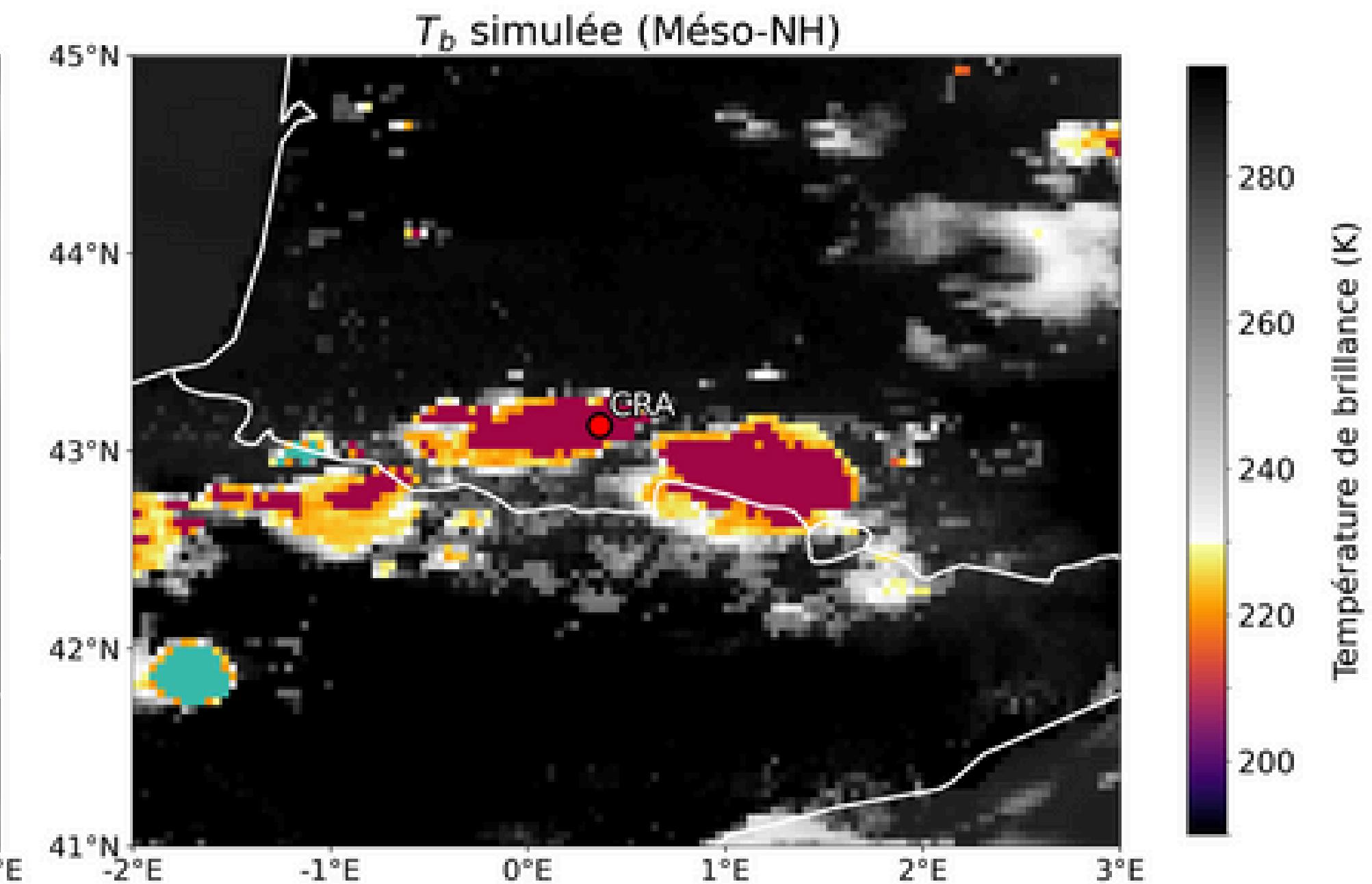
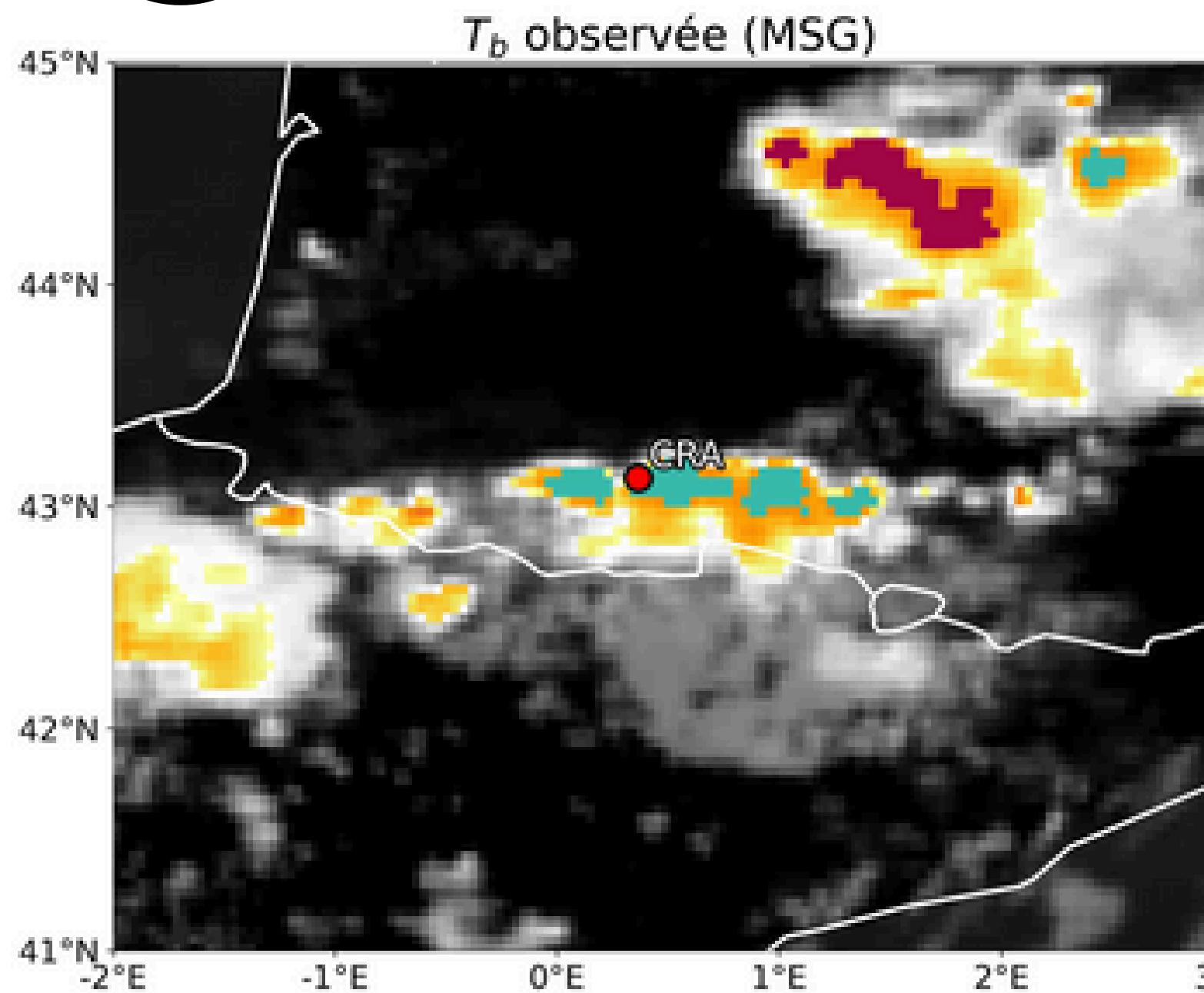
# Méthodologie

14:30



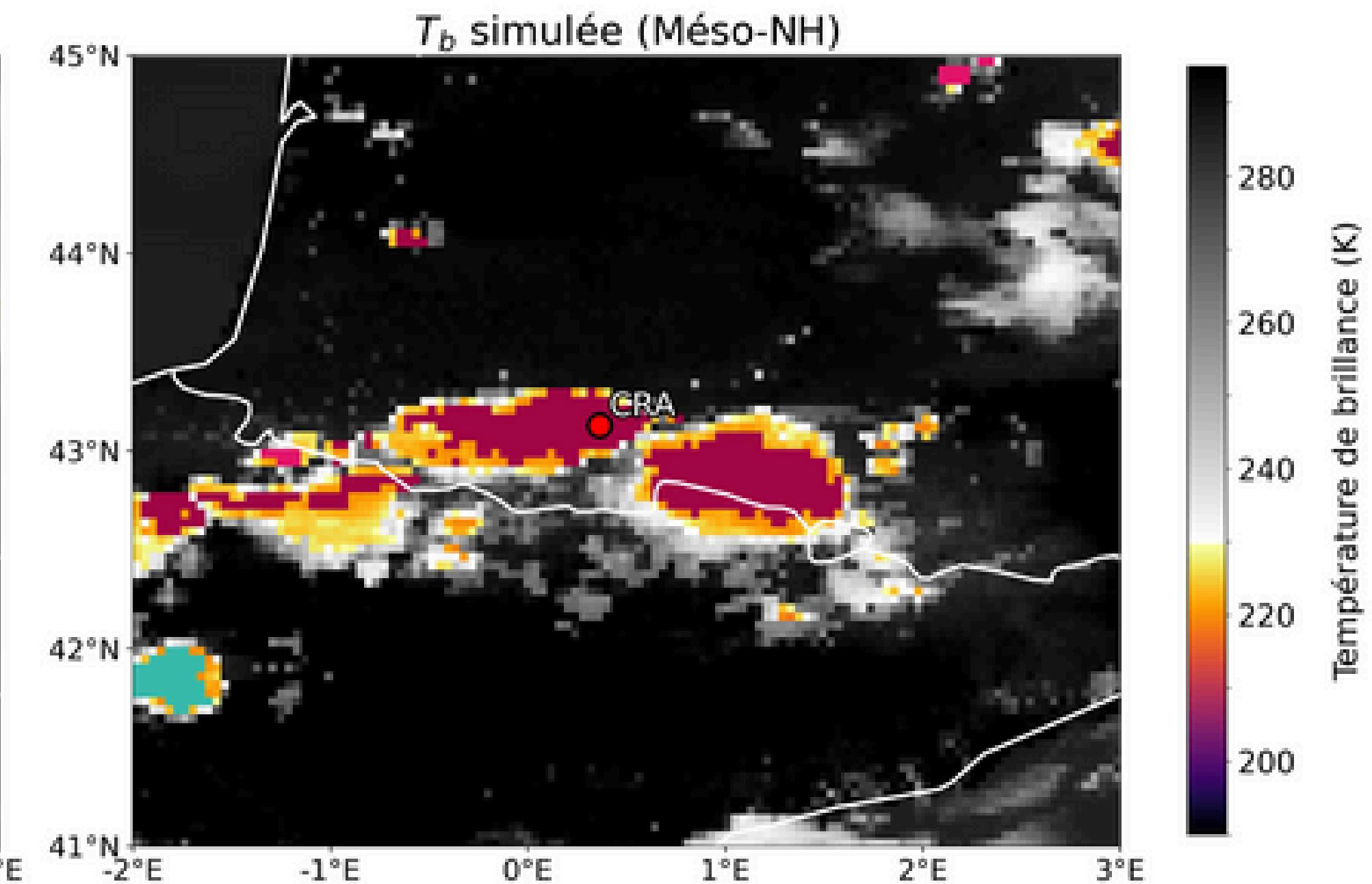
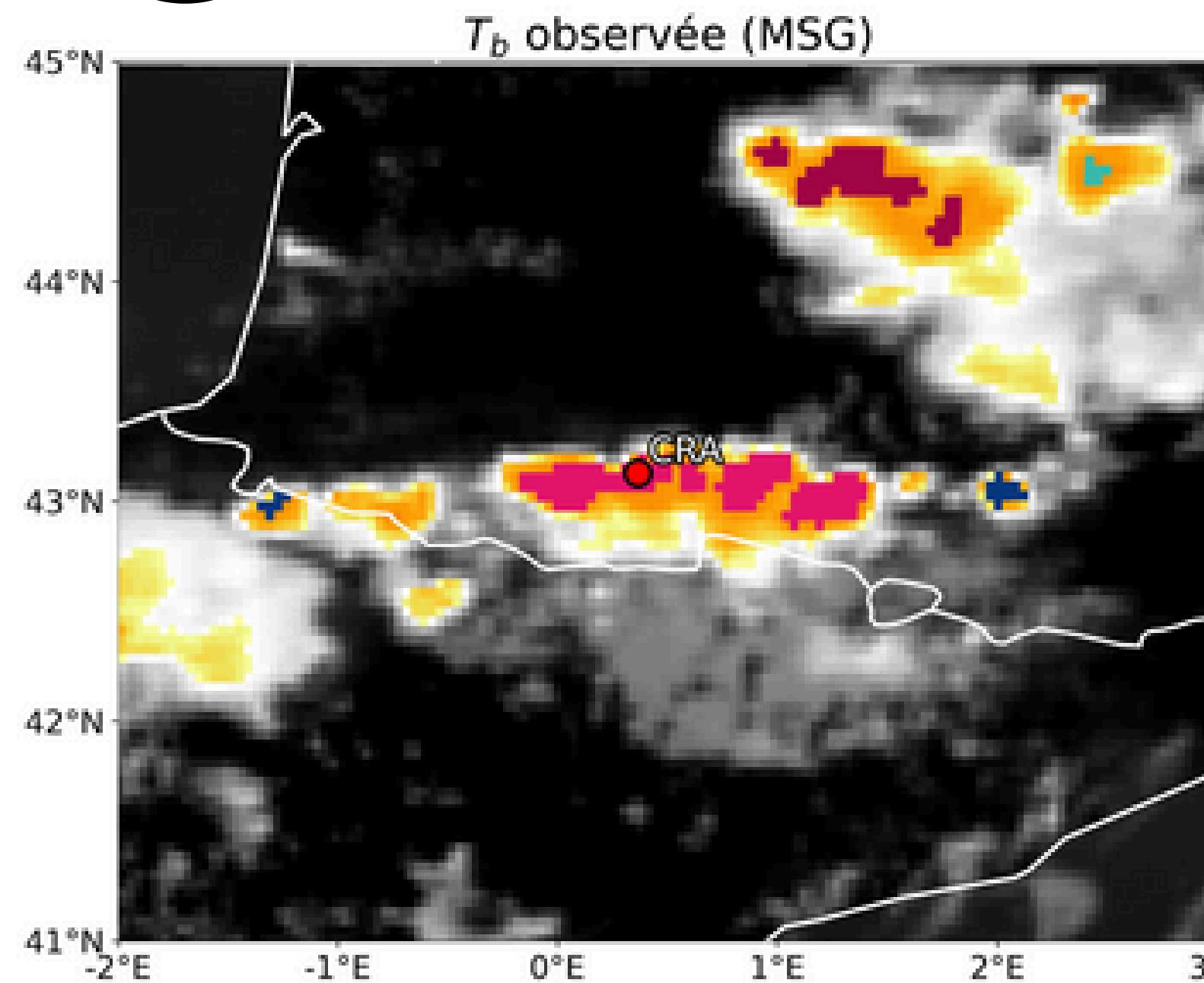
# Méthodologie

14:45



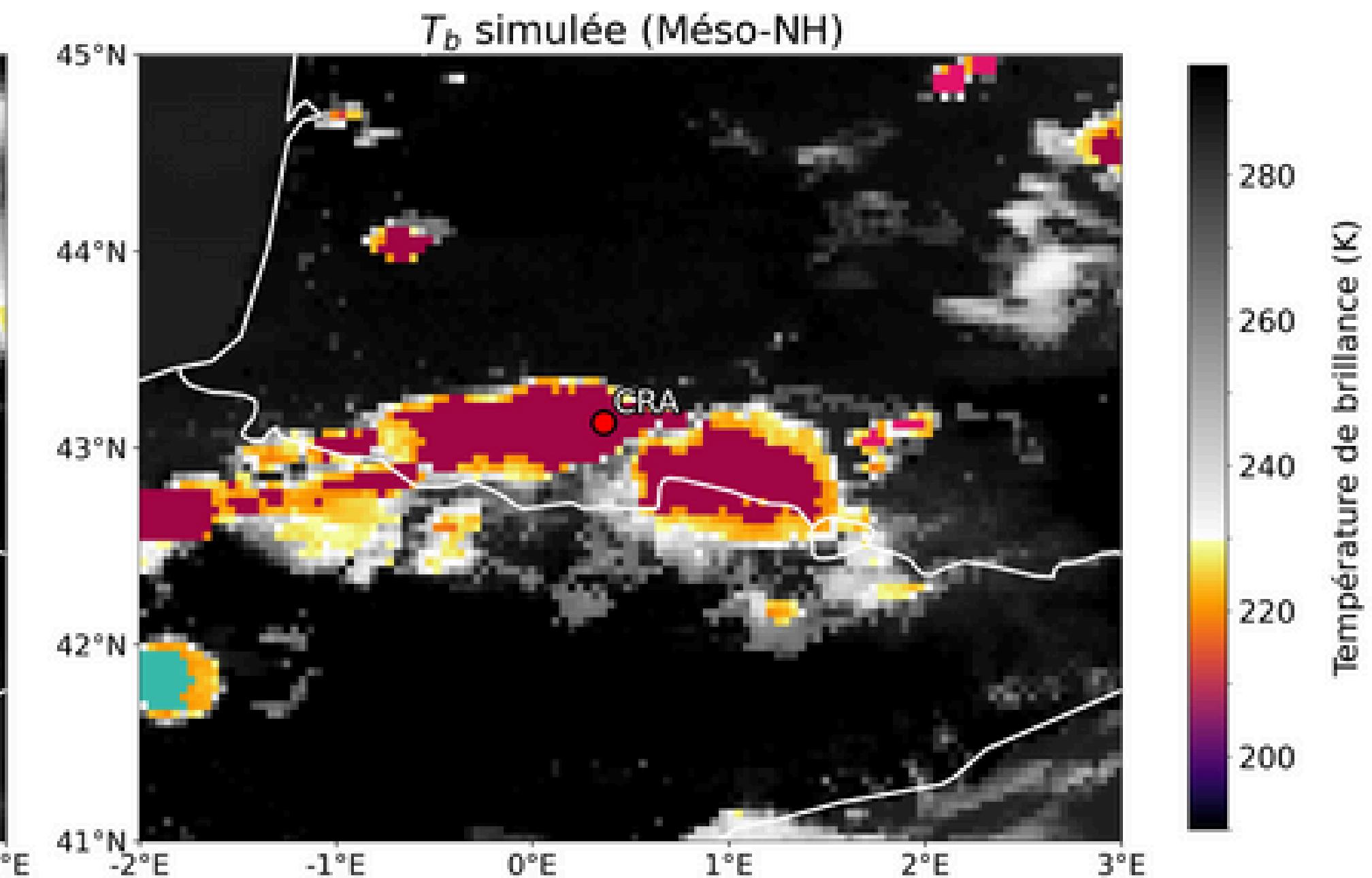
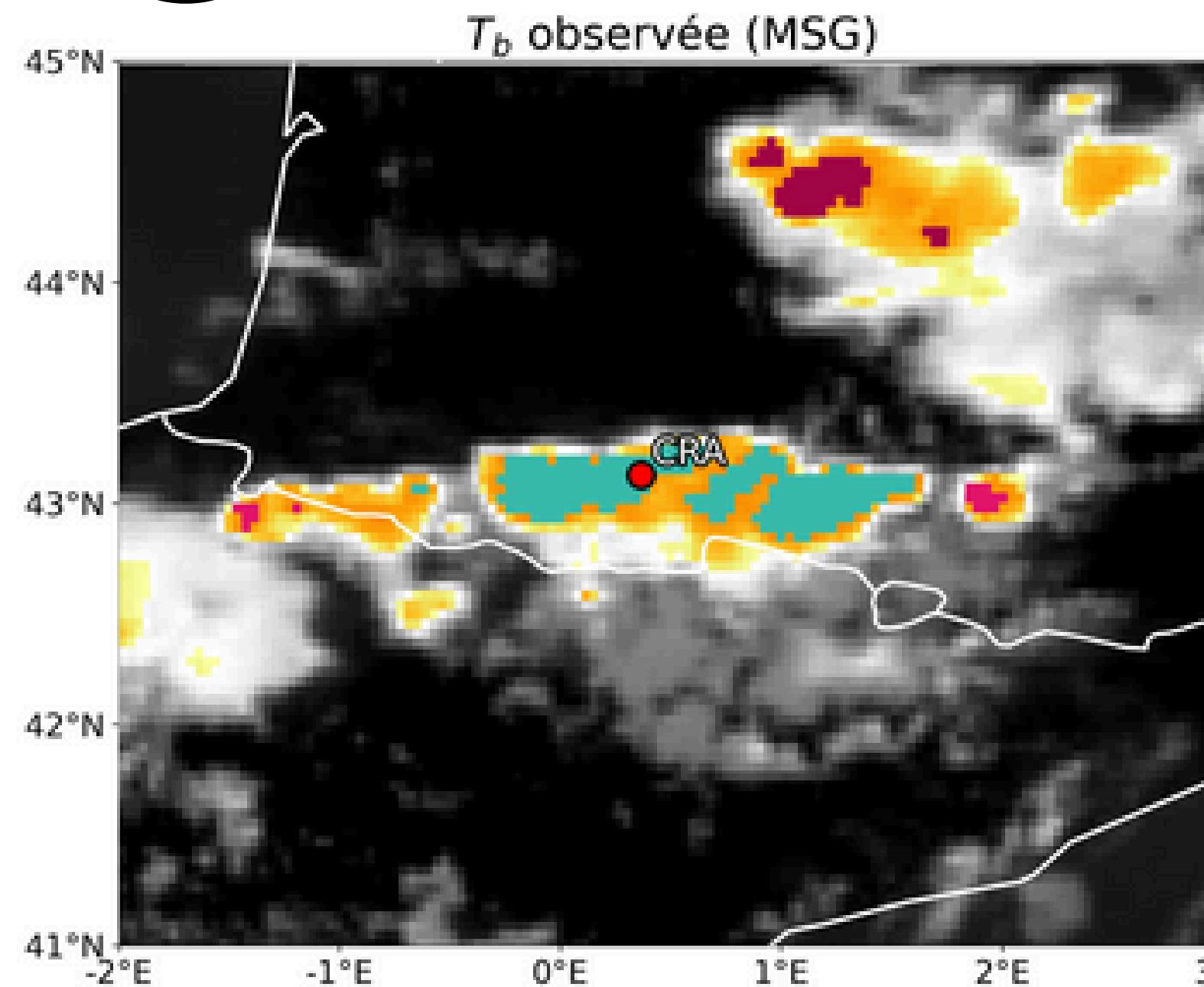
# Méthodologie

15:00



# Méthodologie

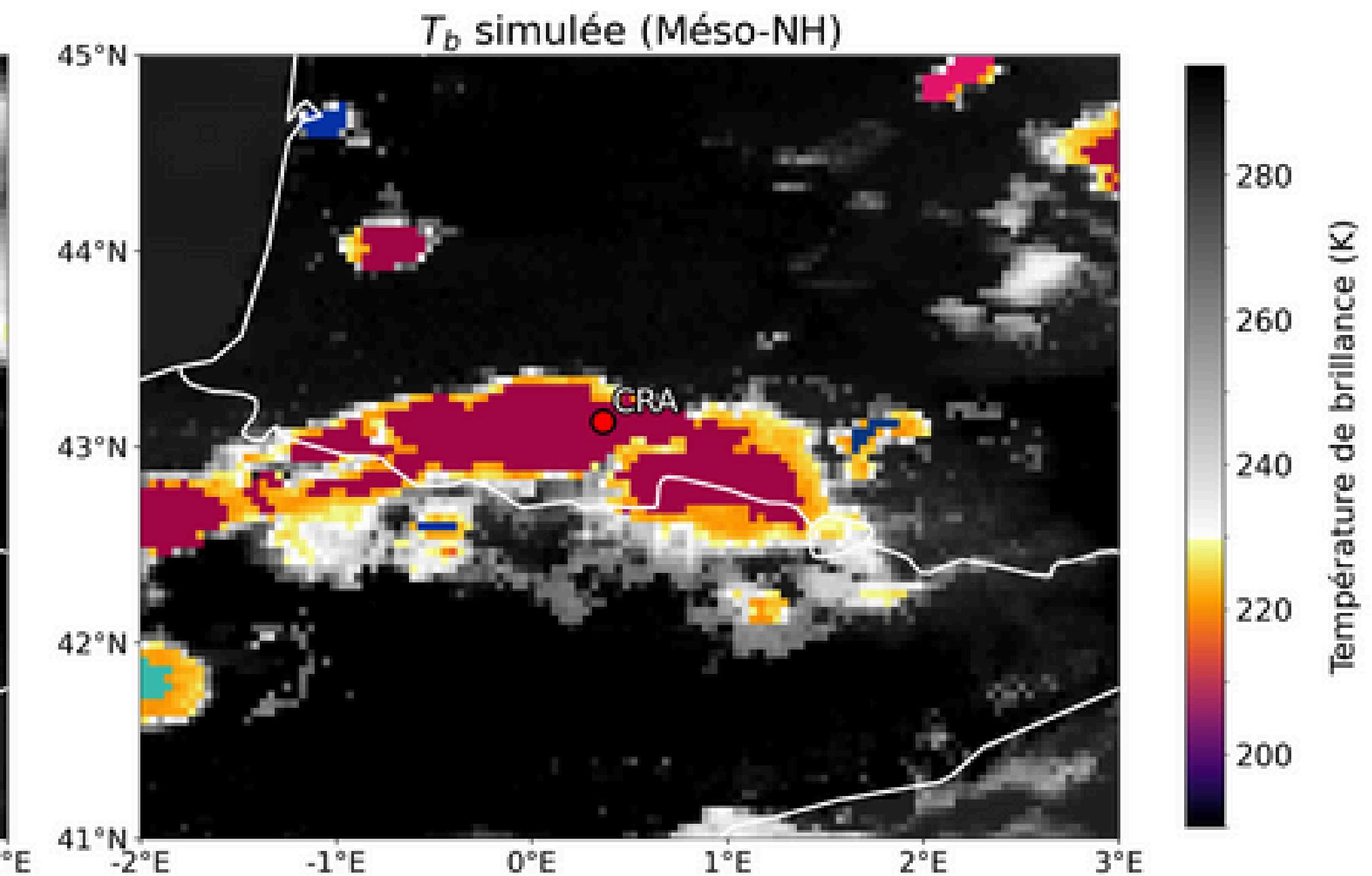
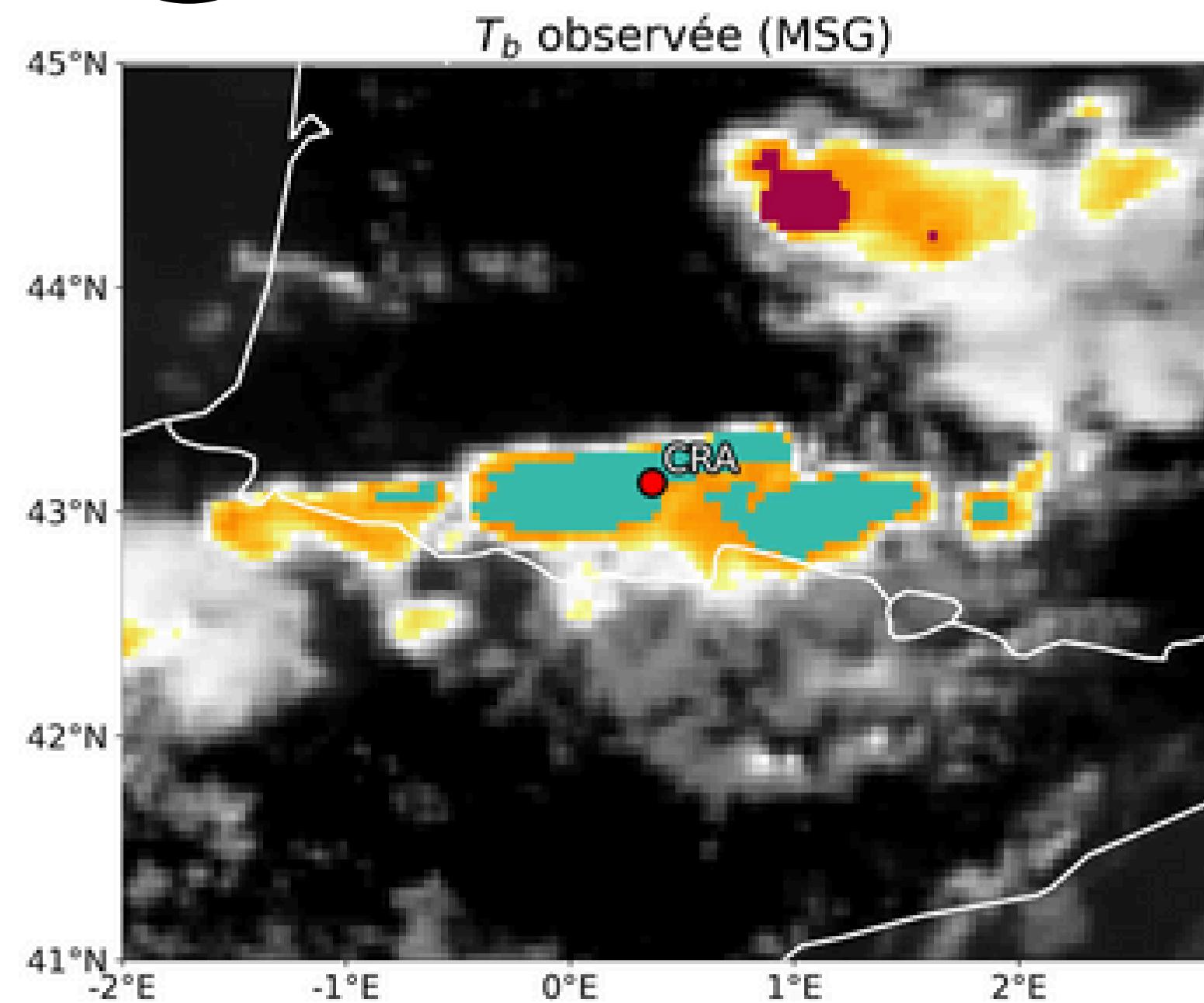
15:15



Température de brillance (K)

# Méthodologie

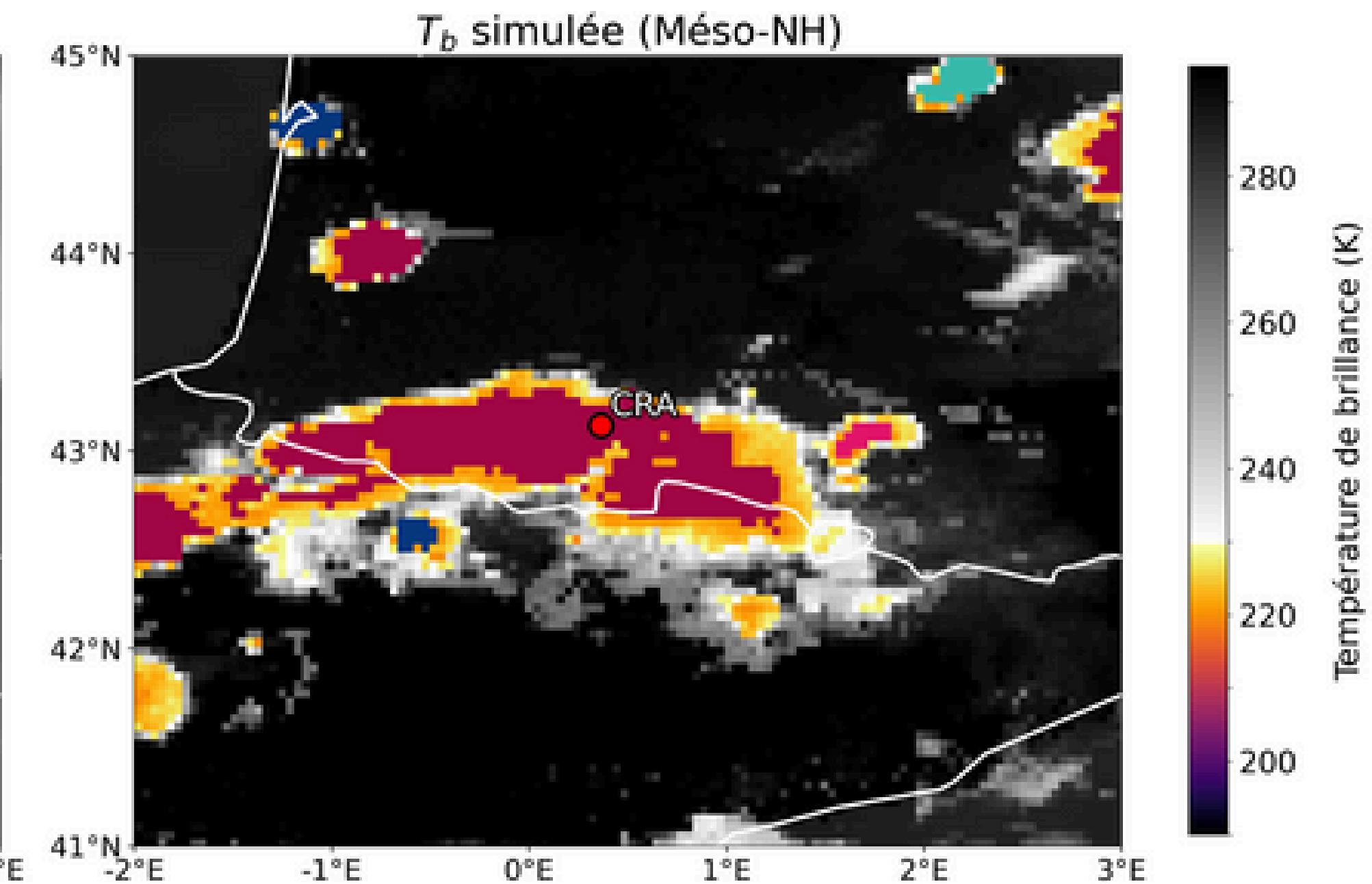
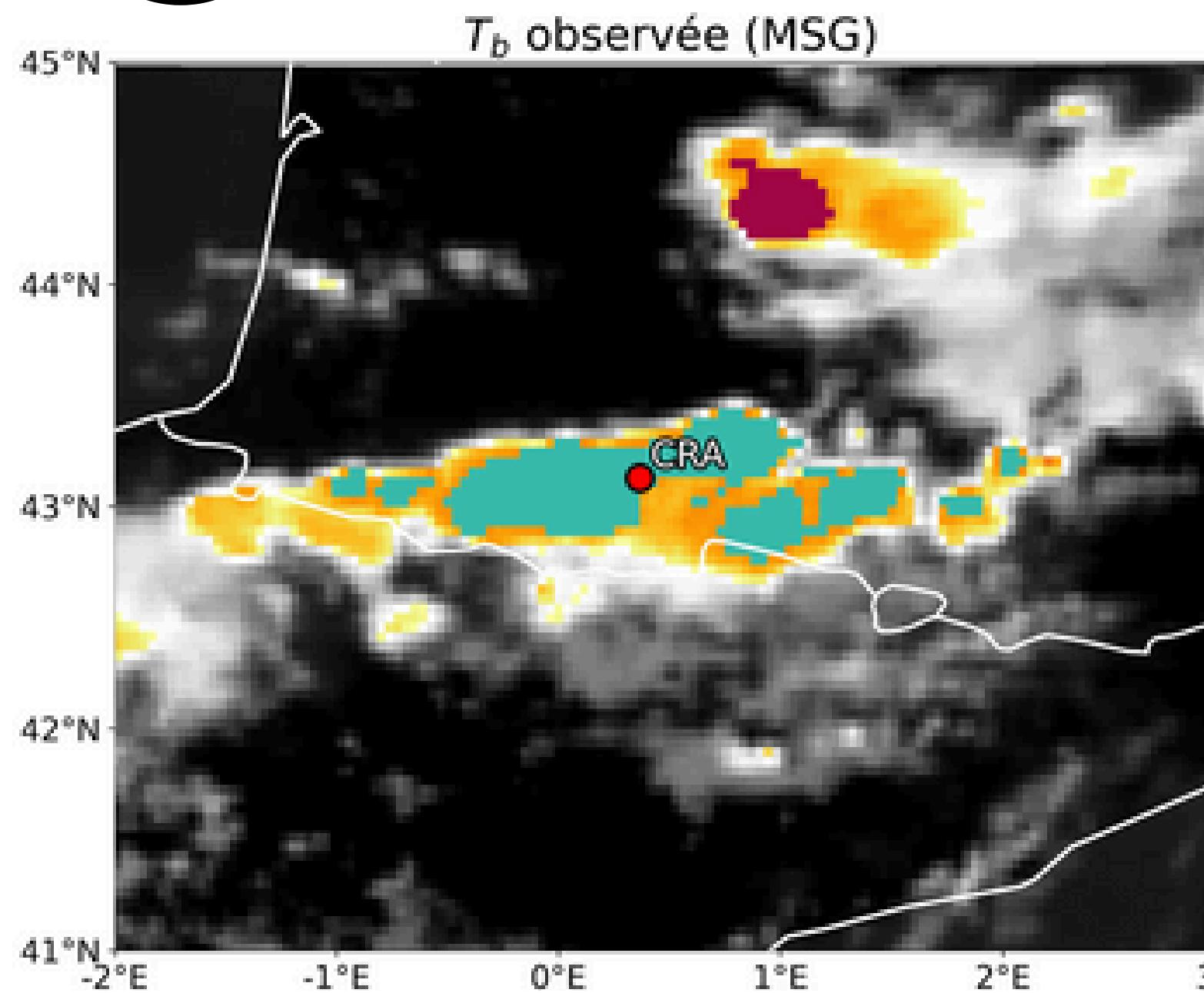
15:30



Température de brillance (K)

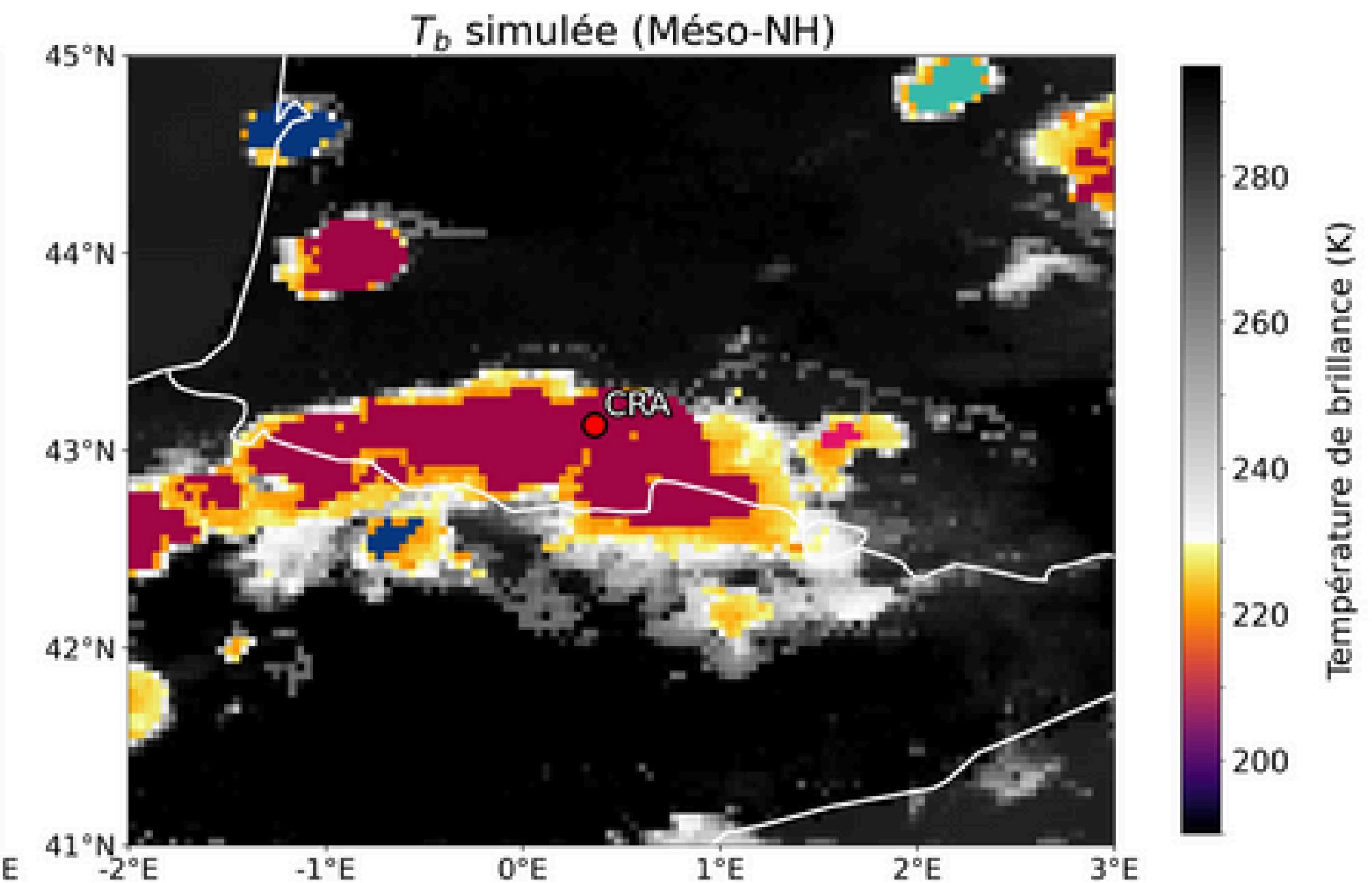
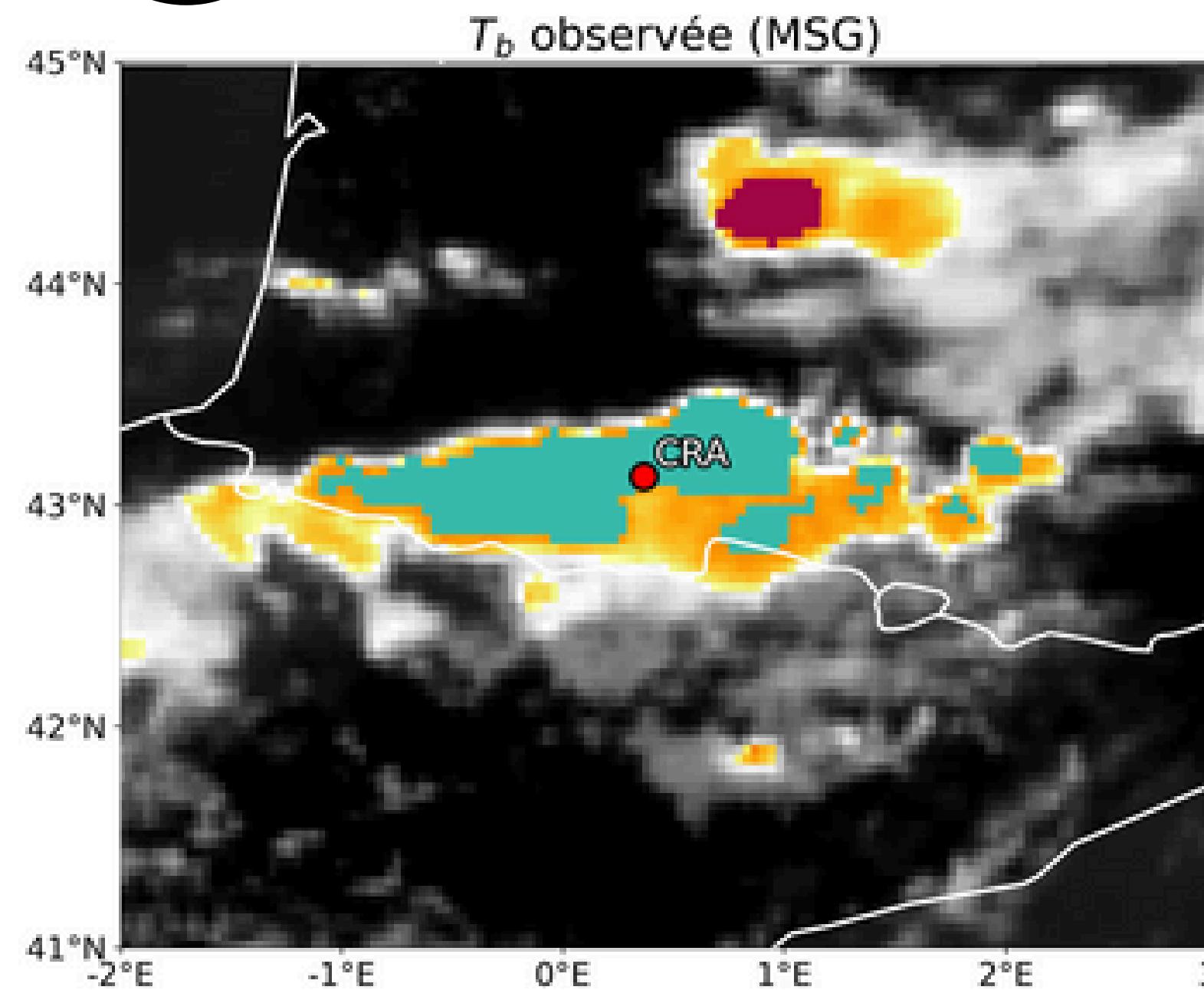
# Méthodologie

15:45



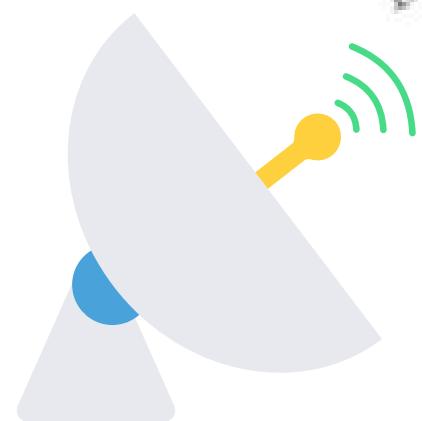
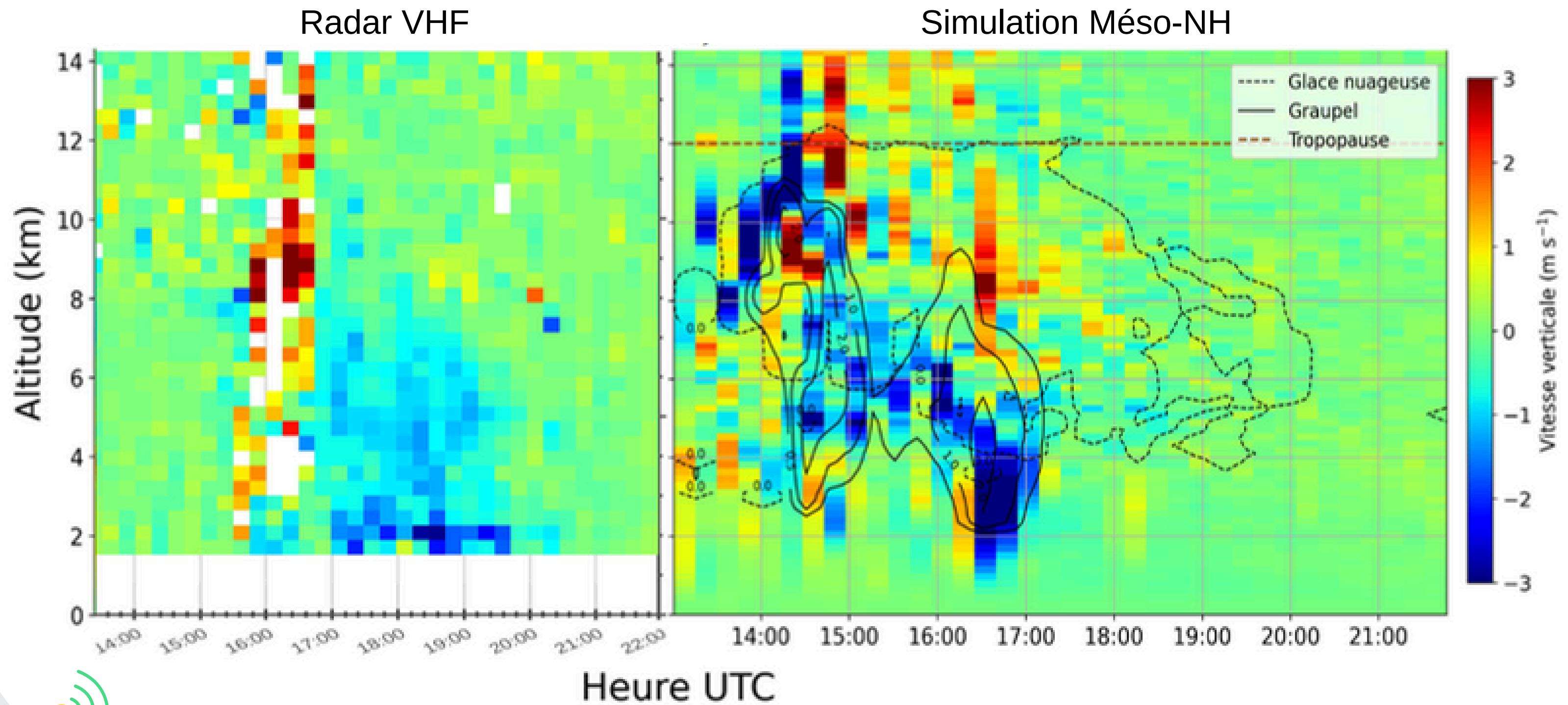
# Méthodologie

16:00



Température de brillance (K)

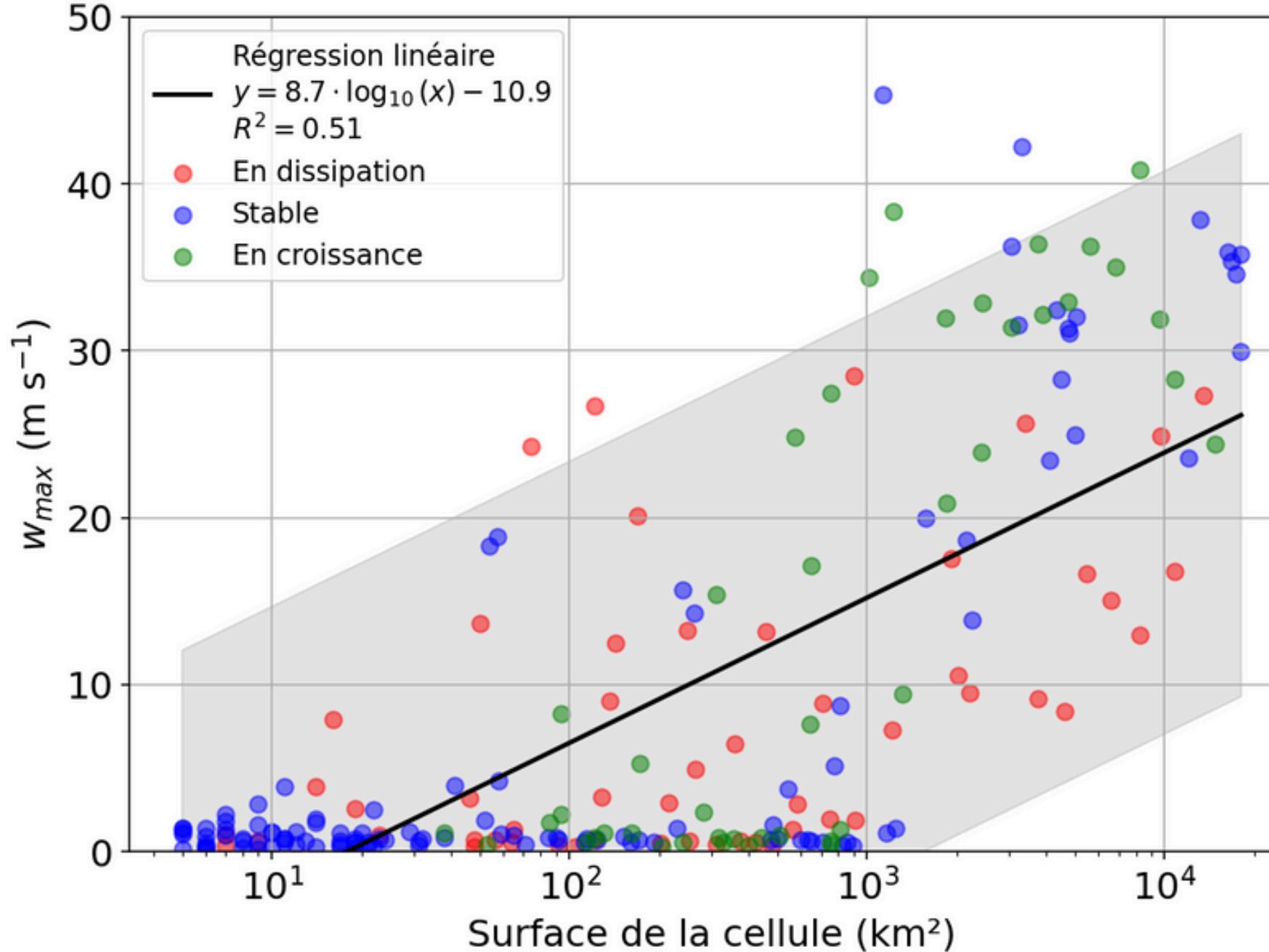
# La simulation reproduit-elle la mesure du VHF ?



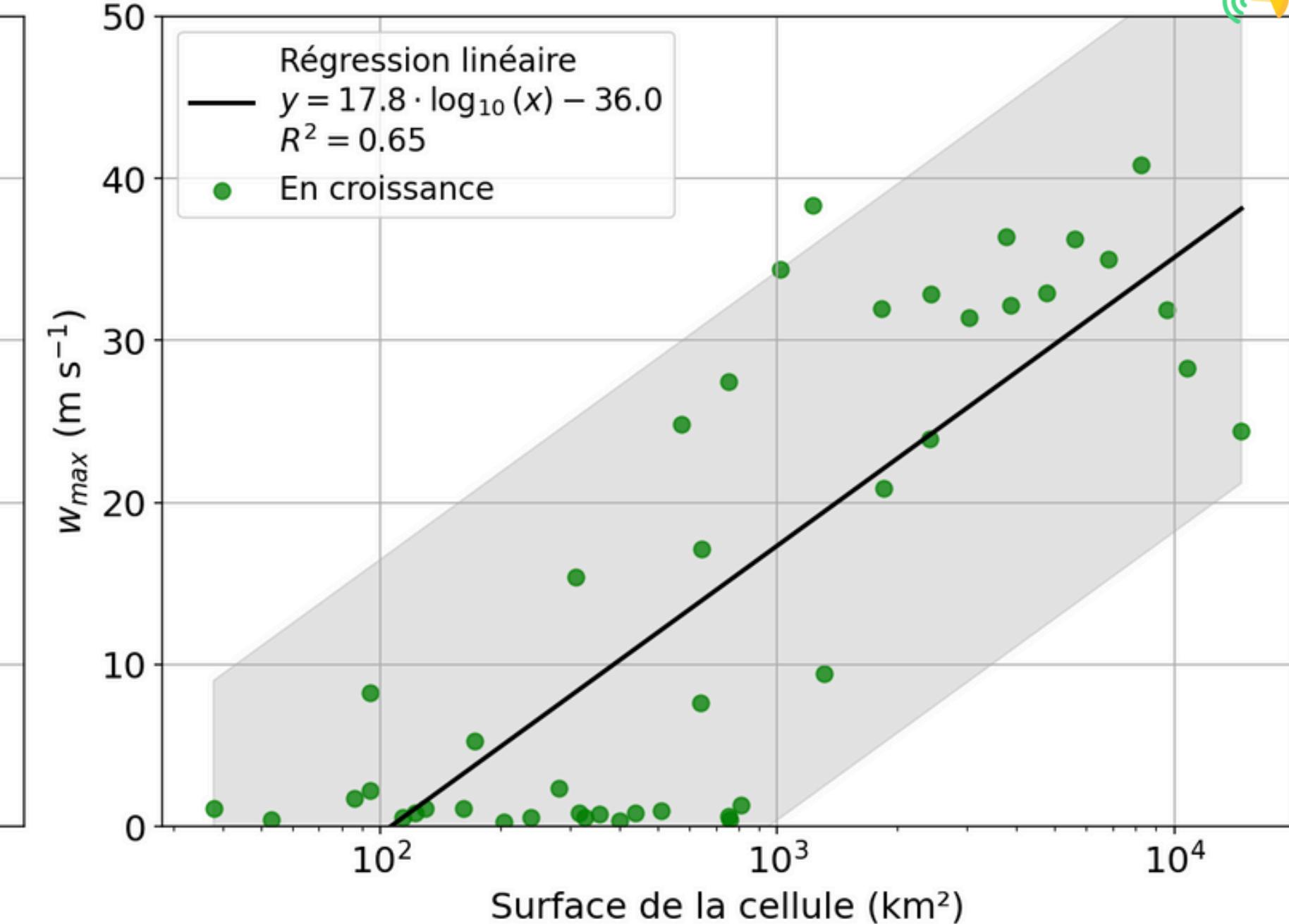
Caractéristique d'un système convectif de méso-échelle.

# Quelle relation entre la taille de la cellule et $w_{max}$ ?

## Données de simulation



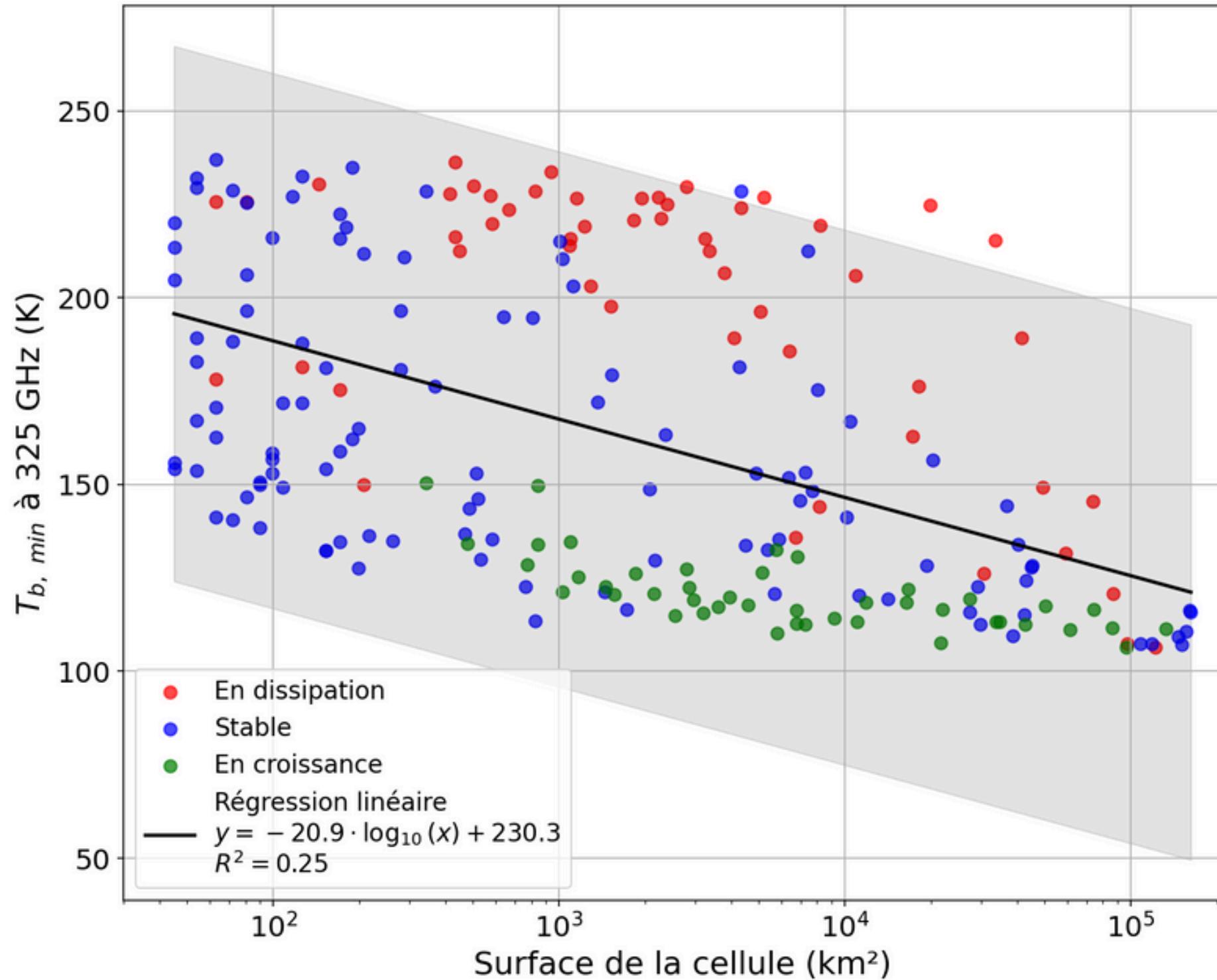
- $w_{max}$  croît avec la taille de la cellule (Rochetin, Couvreux et al. 2014).
- Forte dispersion.



- Meilleure corrélation.

# Quelle relation entre la taille de la cellule et $T_{b,min}$ ?

## Données de simulation

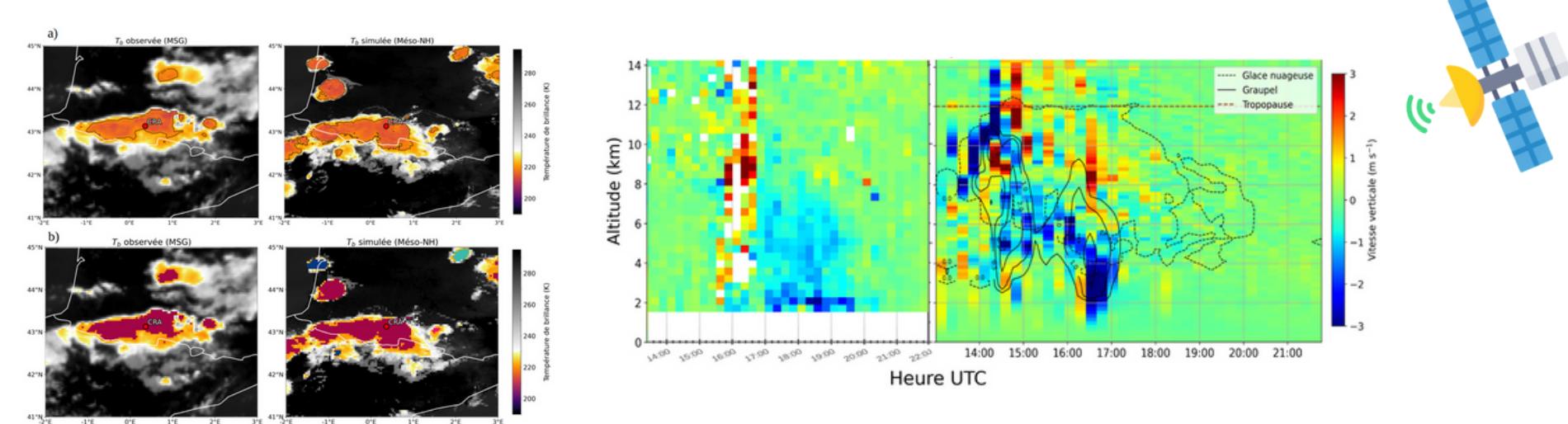


$T_{b,min}$  à 325 ± 0 GHz

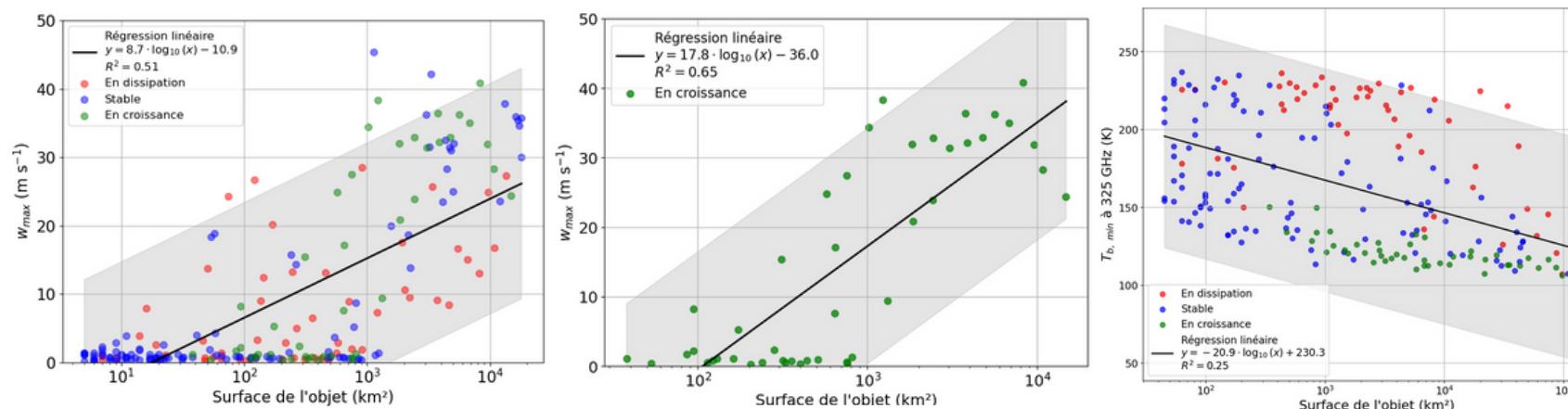
Canal sensible au contenu en glace au sommet du nuage.

- $T_{b,min}$  décroît avec la surface de la cellule.
- Accumulation des cristaux de glace pendant la croissance.
- Tendance significative.

# Conclusion et perspectives



- $w_{max}$  augmente avec la taille de la cellule.
- Vitesses maximales pour les cellules en croissance.
- $T_{b,min}$  décroît avec la taille de la cellule.



- Limite d'acquisition du radar VHF.
- Étendre l'analyse à plusieurs simulations.

## Bibliographie

- Maury, N. et al. (2022). « Use of large-eddy simulations to design an adaptive sampling strategy to assess cumulus cloud heterogeneities by remotely piloted aircraft ». In : Atmospheric Measurement Techniques 15.2, p. 335-352. doi : 10.5194/amt-15-335-2022.
- Rochetin, Nicolas, Fleur Couvreux et al. (2014). « Deep Convection Triggering by Boundary Layer Thermals. Part I : Les Analysis and Stochastic Triggering Formulation ». eng. In : Journal of the atmospheric sciences 71.2, p. 496-514. issn : 0022-4928.
- Auguste, Franck et Jean-Pierre Chaboureau (2022). « Deep Convection as Inferred From the C2OMODO Concept of a Tandem of Microwave Radiometers ». eng. In : Frontiers in remote sensing 3.17, p. 13207-13225. issn : 2673-6187.

