

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



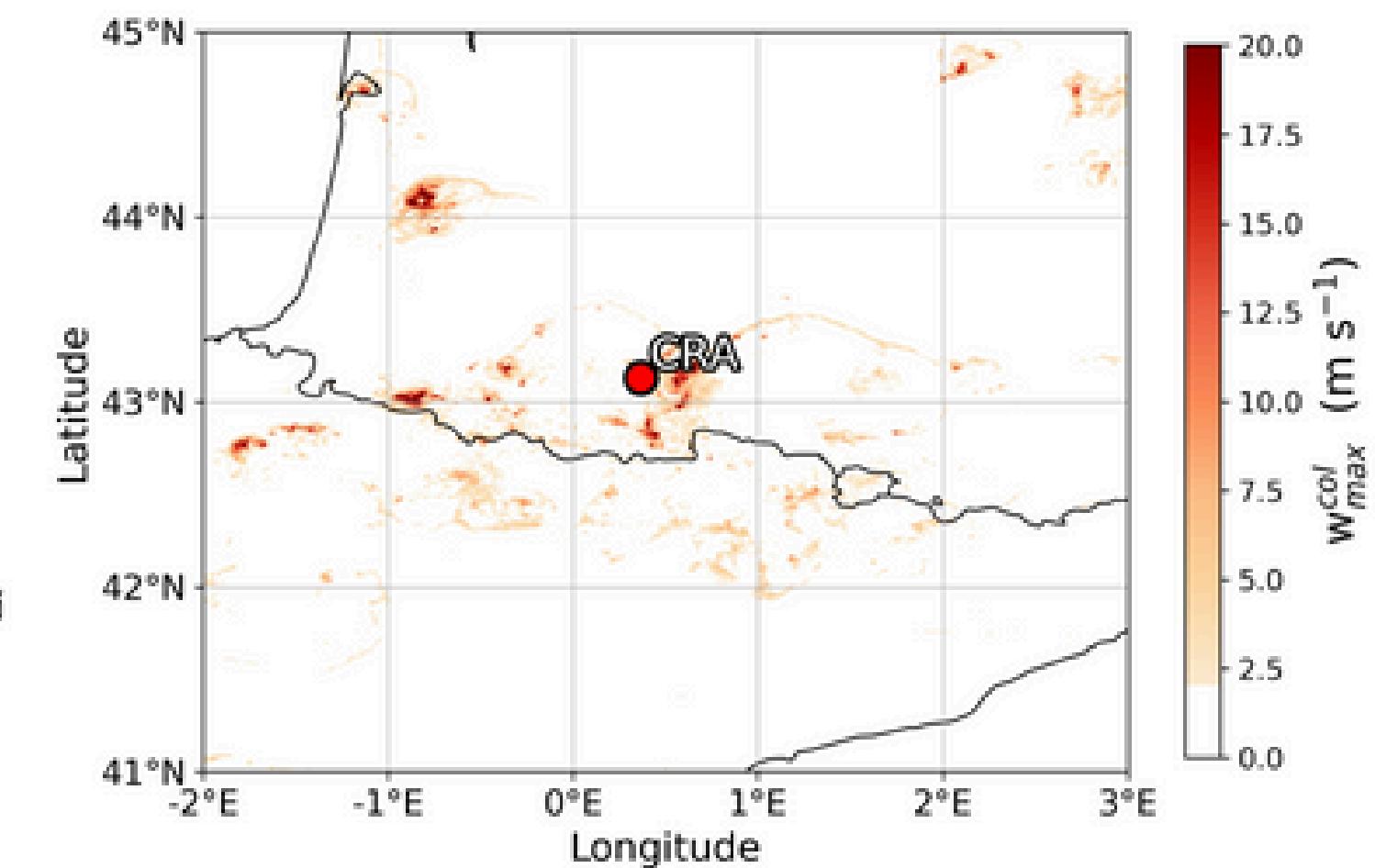
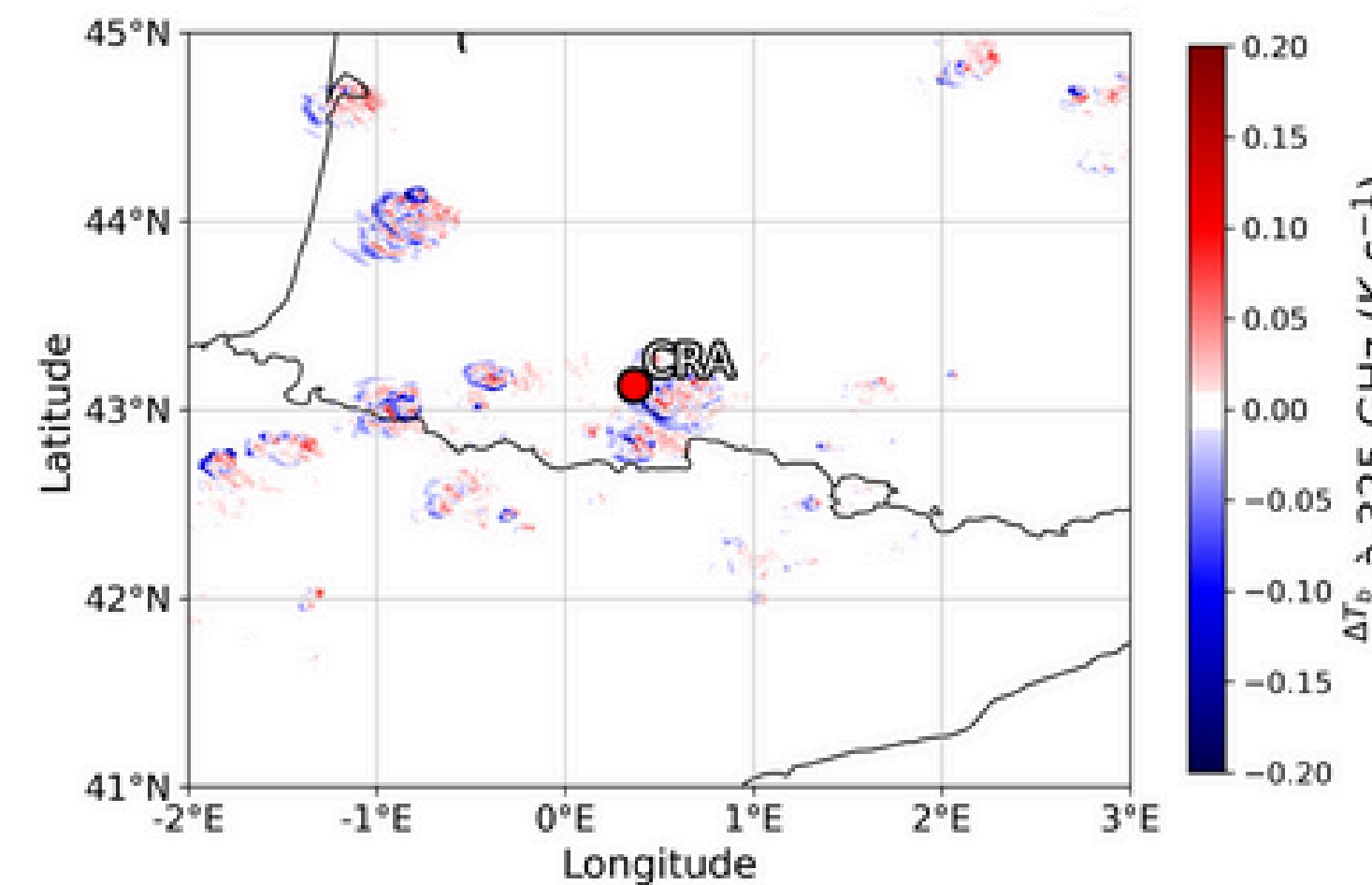
Mission C2OMODO 

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



Objectifs

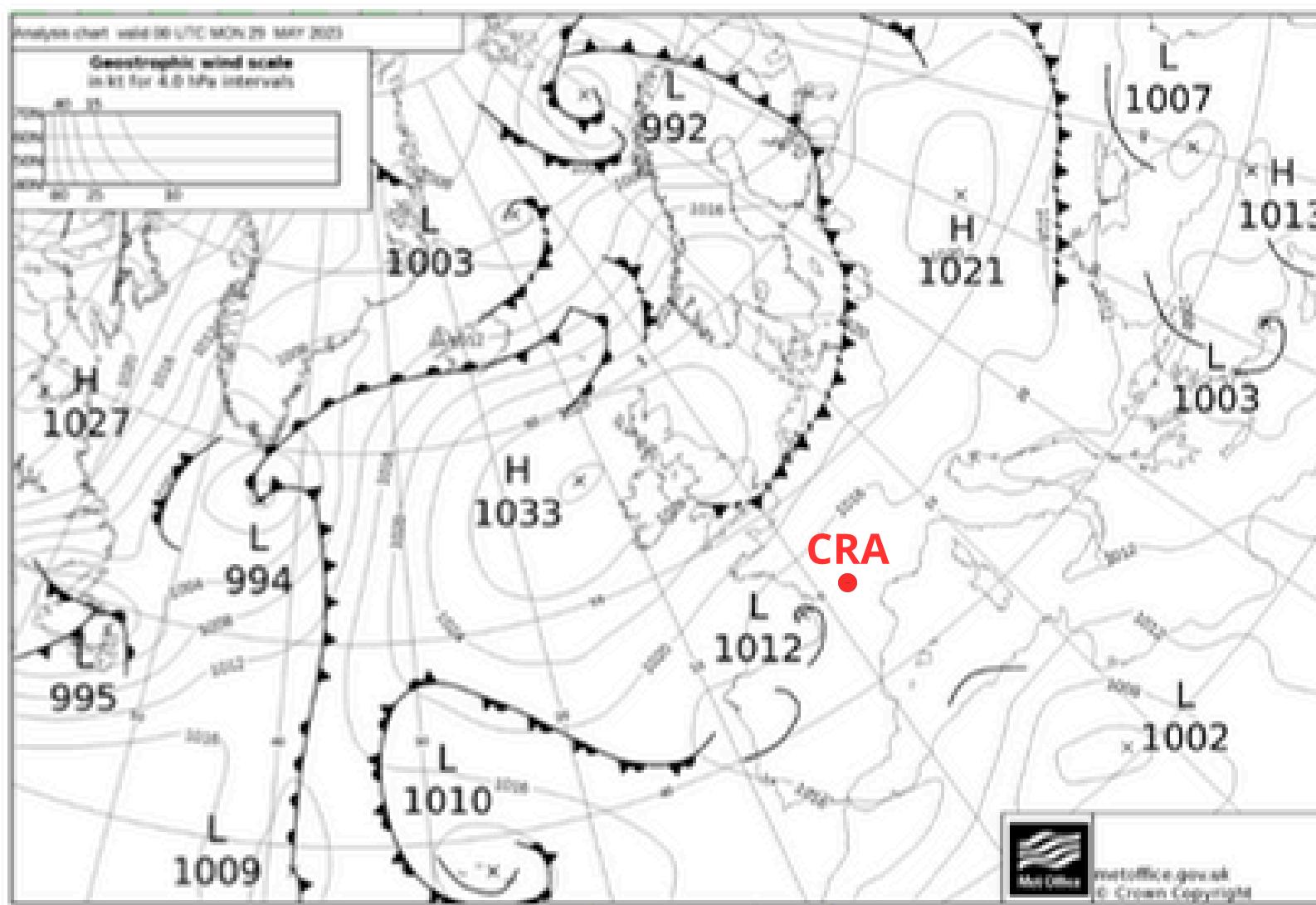
- Explorer les relations entre la taille de la cellule, w_{max} et $T_{b,min}$
→ Intérêt pour la mission



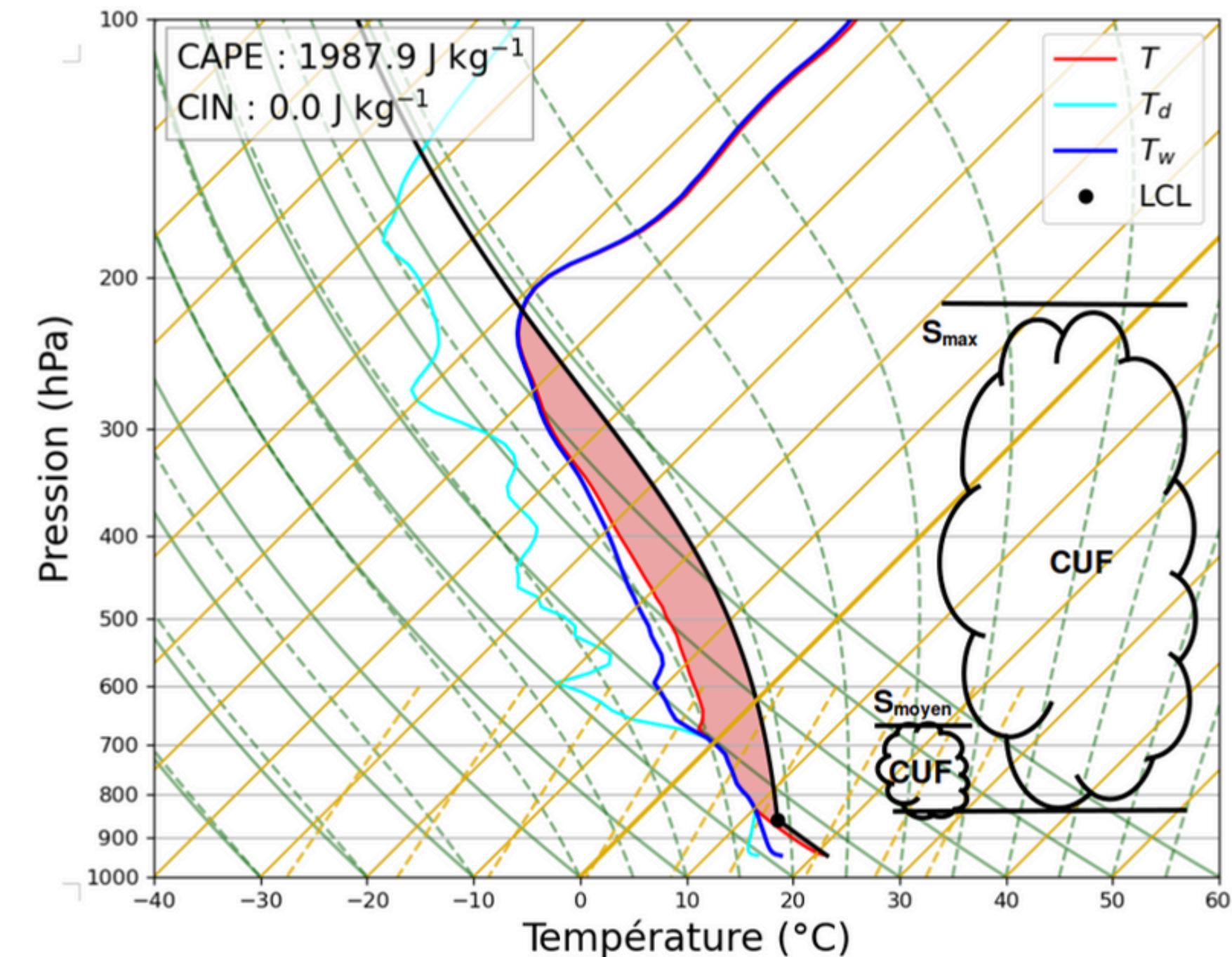
Situation météorologique : 29 mai 2023



Présence d'un marais barométrique



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



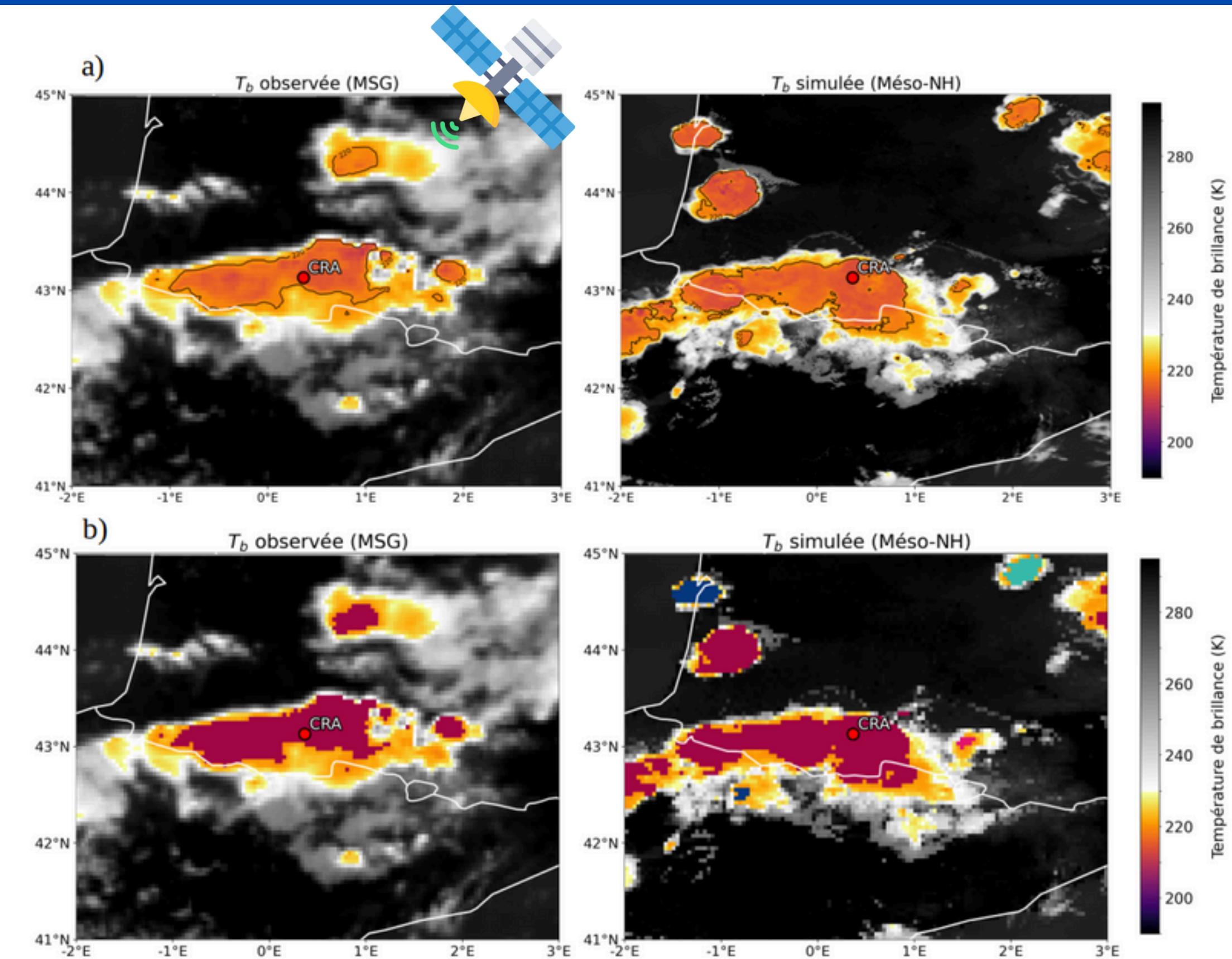
Méthodologie

Données à disposition

- Simulation Meso-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 μm

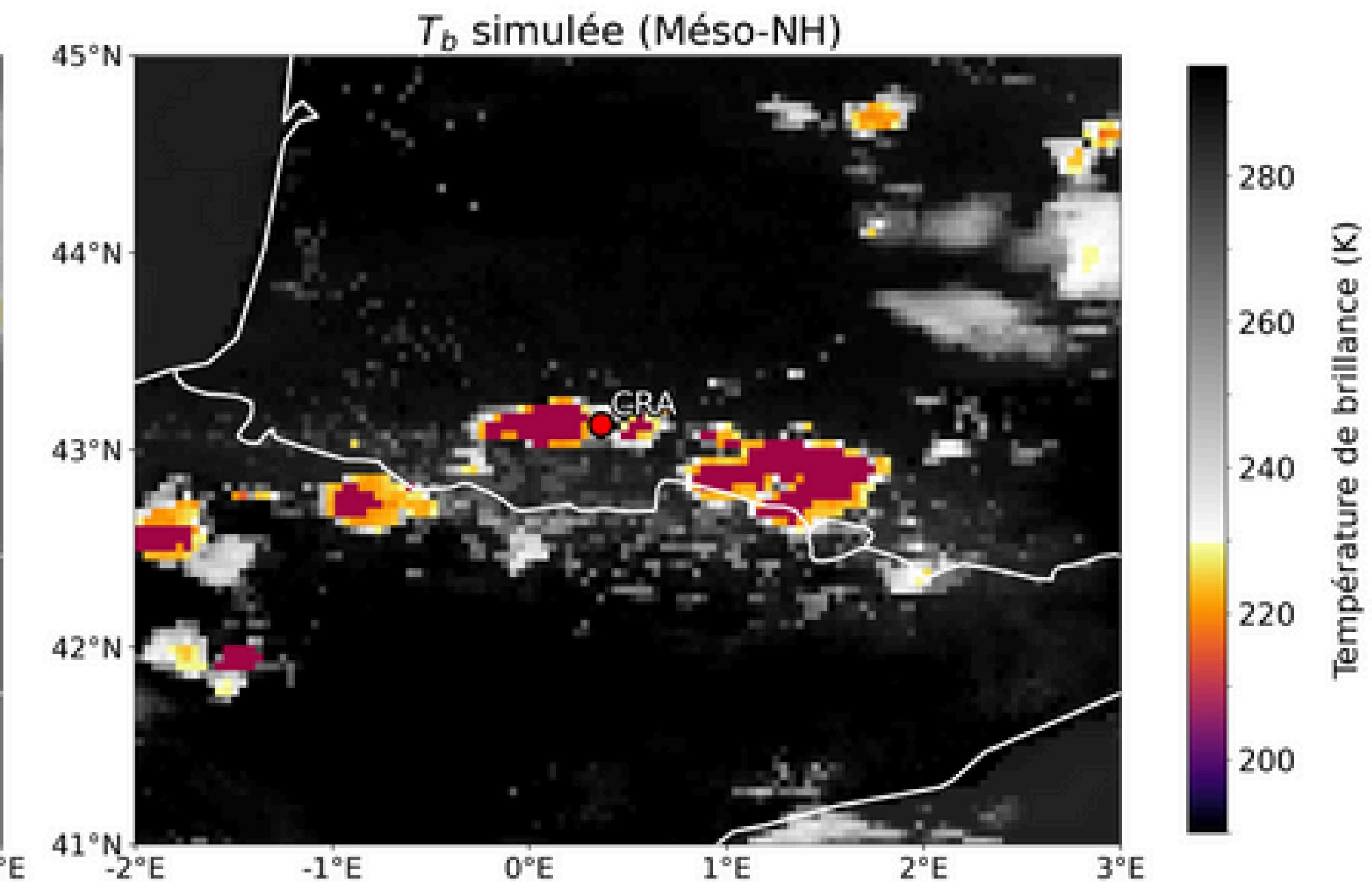
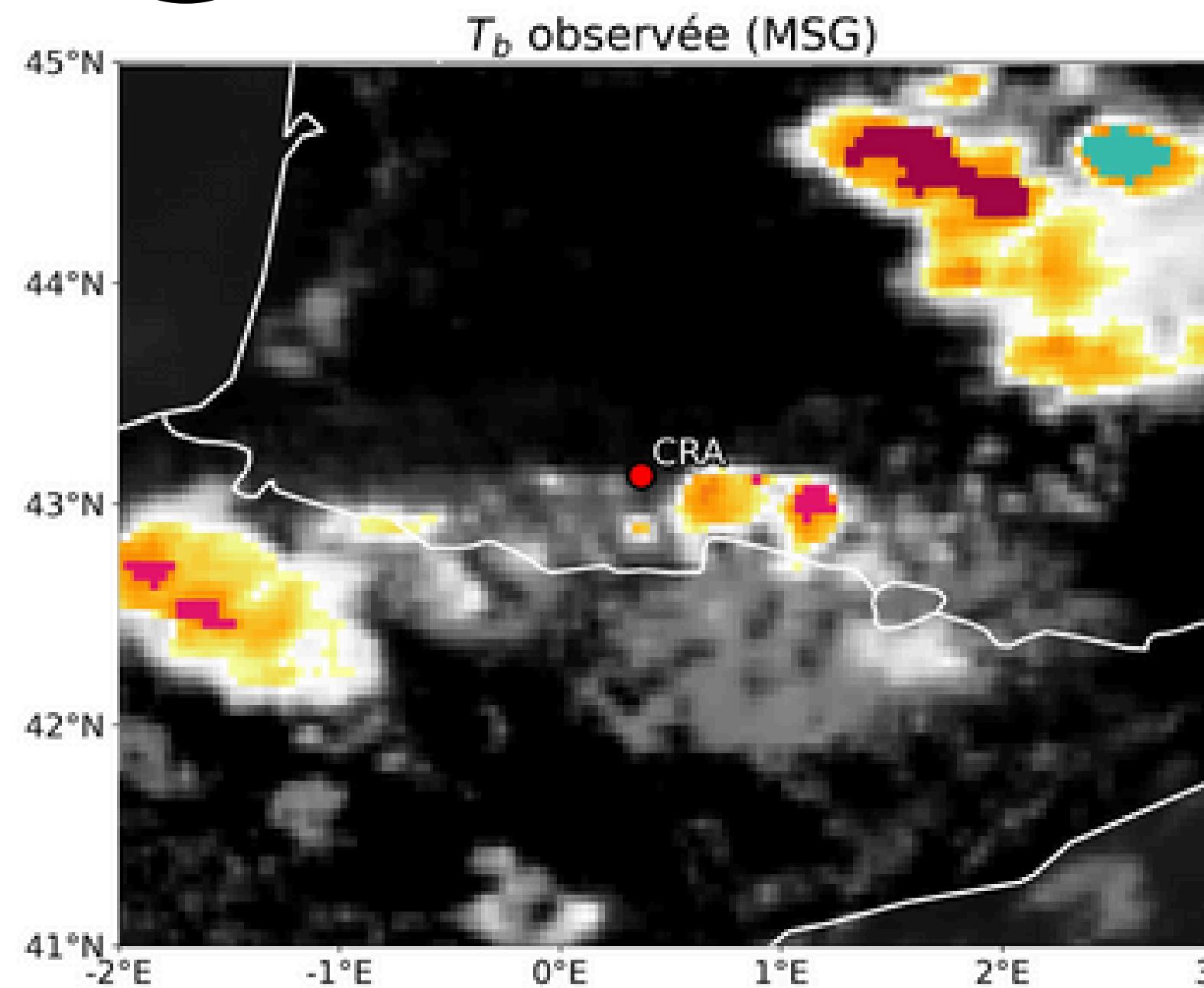
Algorithme de suivi (Maury et al. 2022)

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



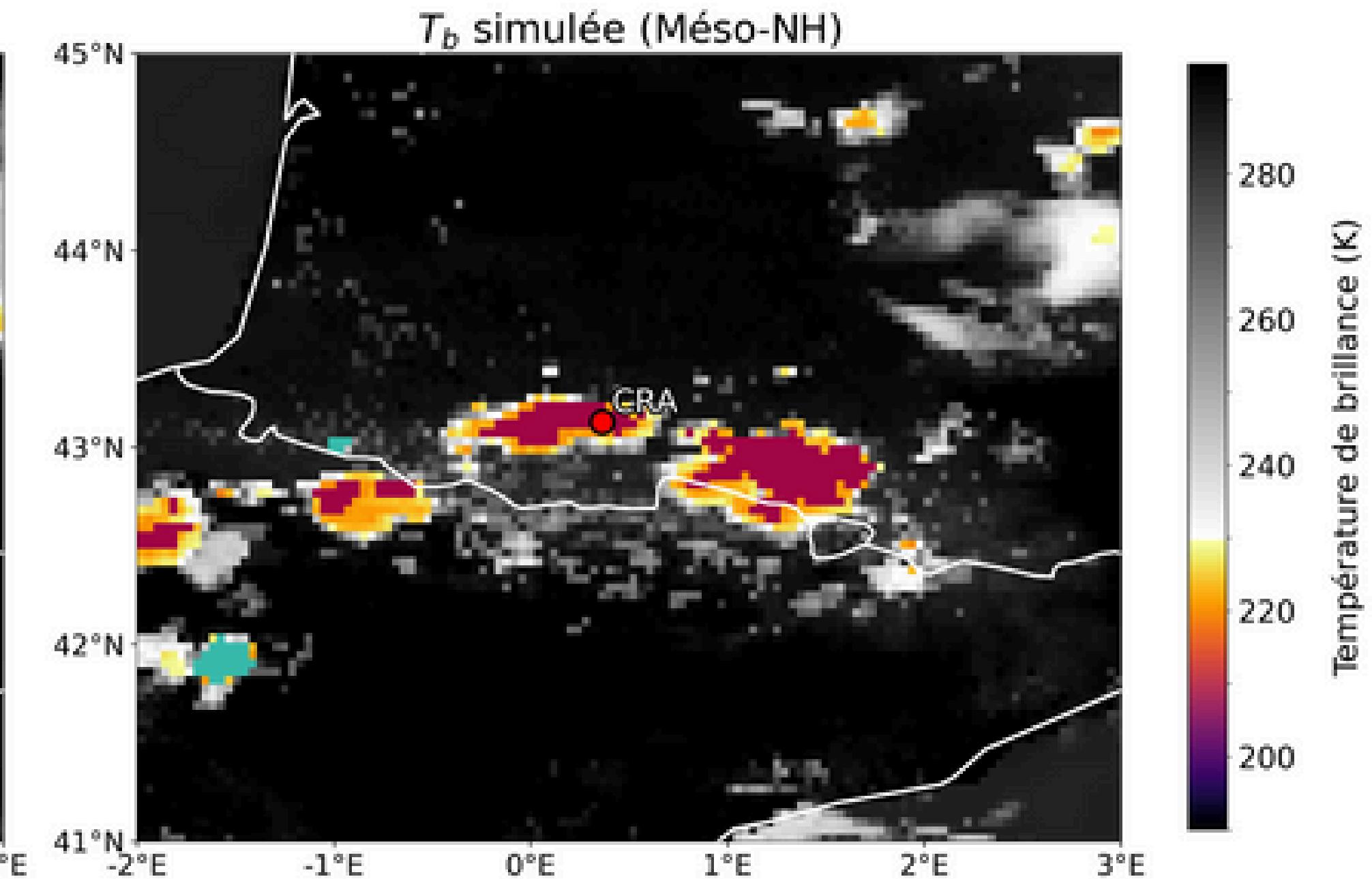
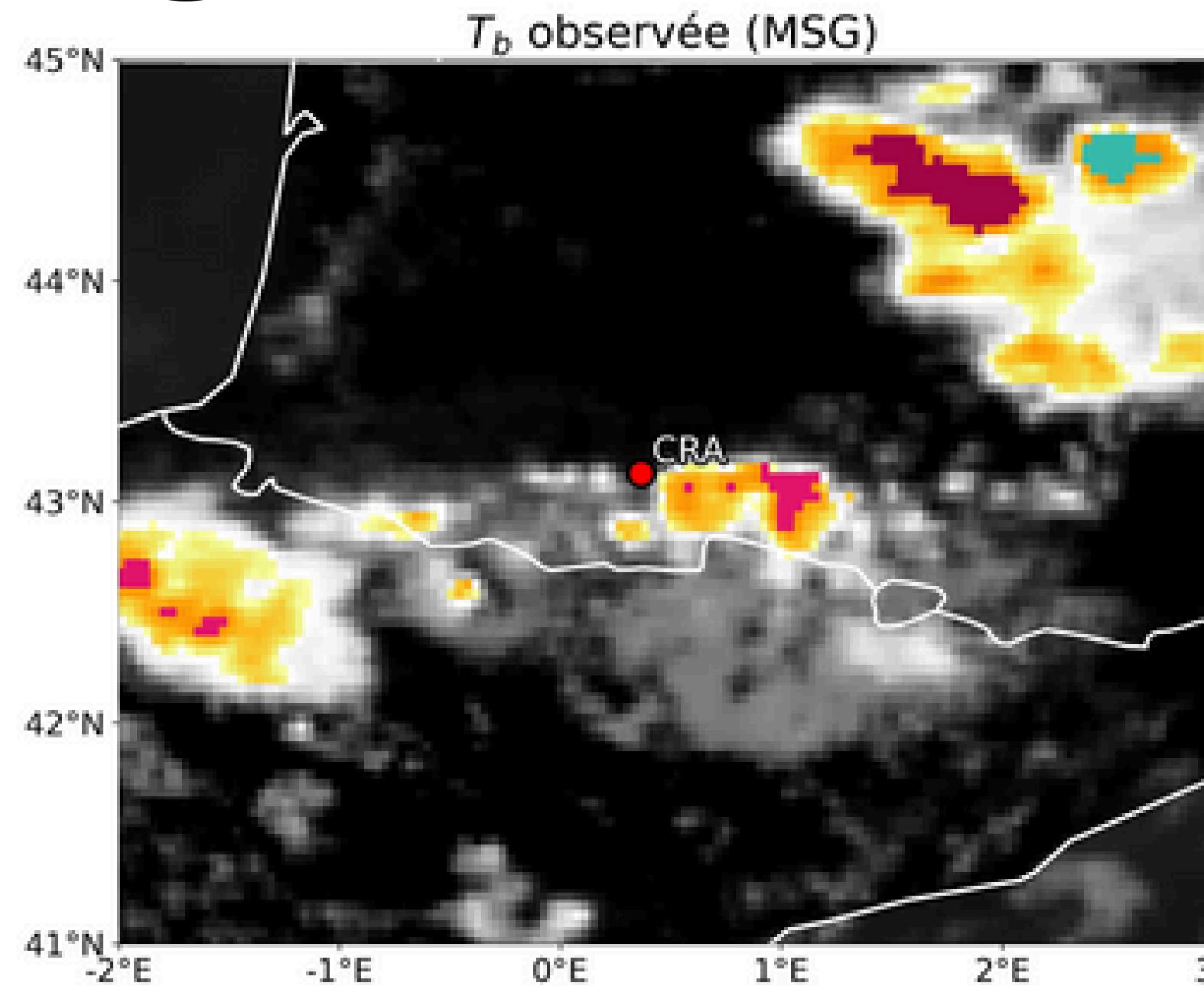
Méthodologie

14:00



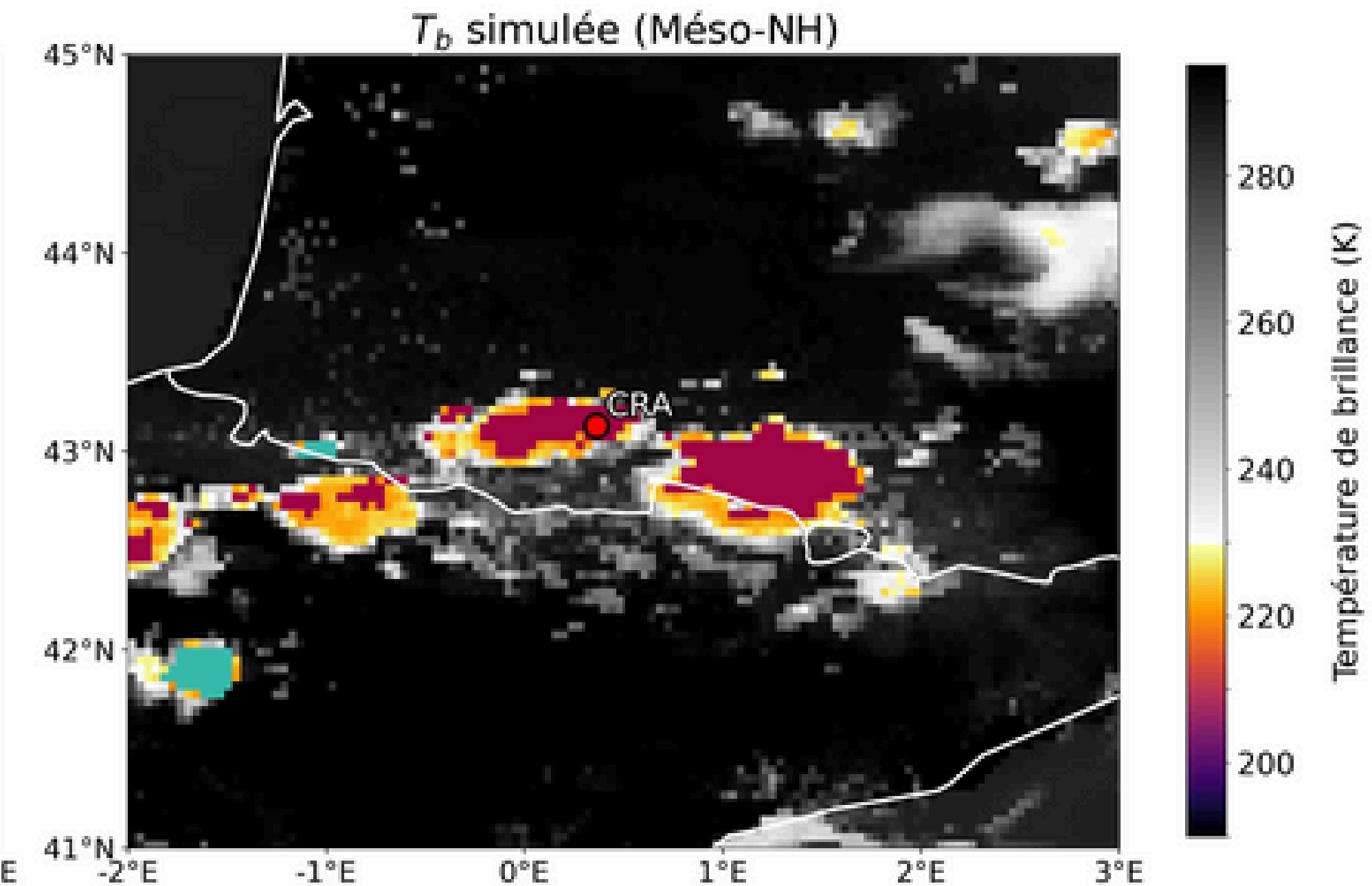
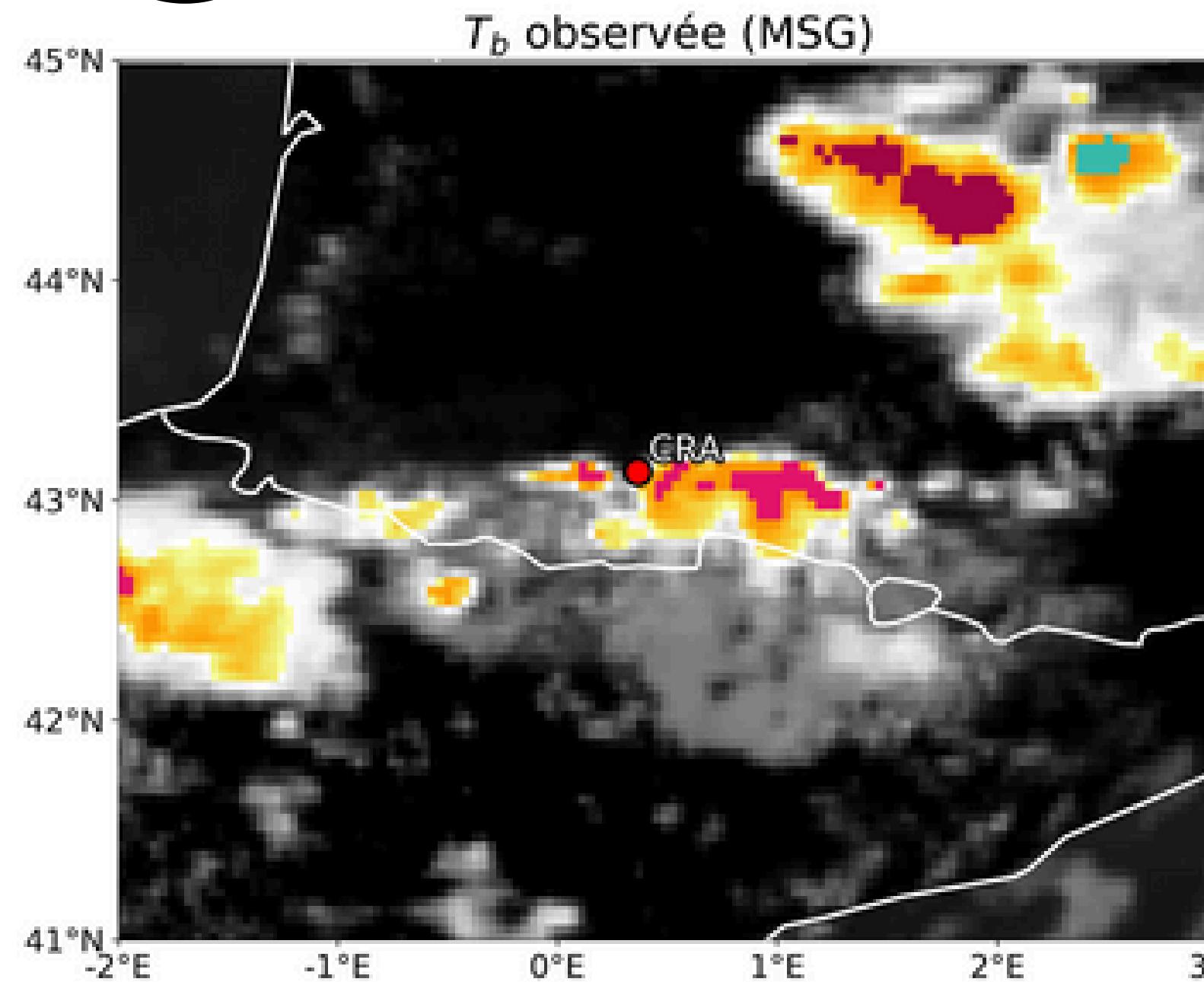
Méthodologie

14:15



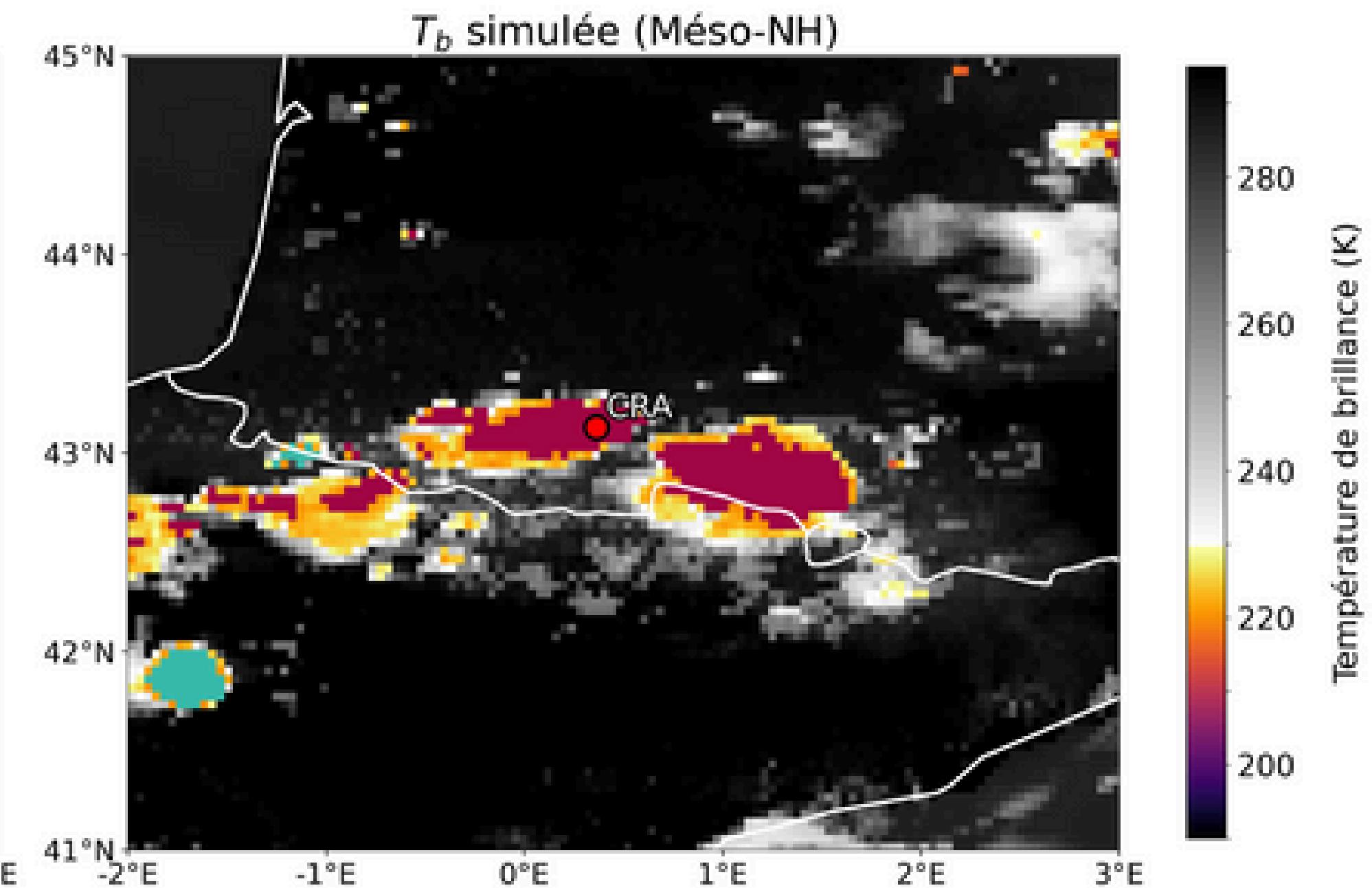
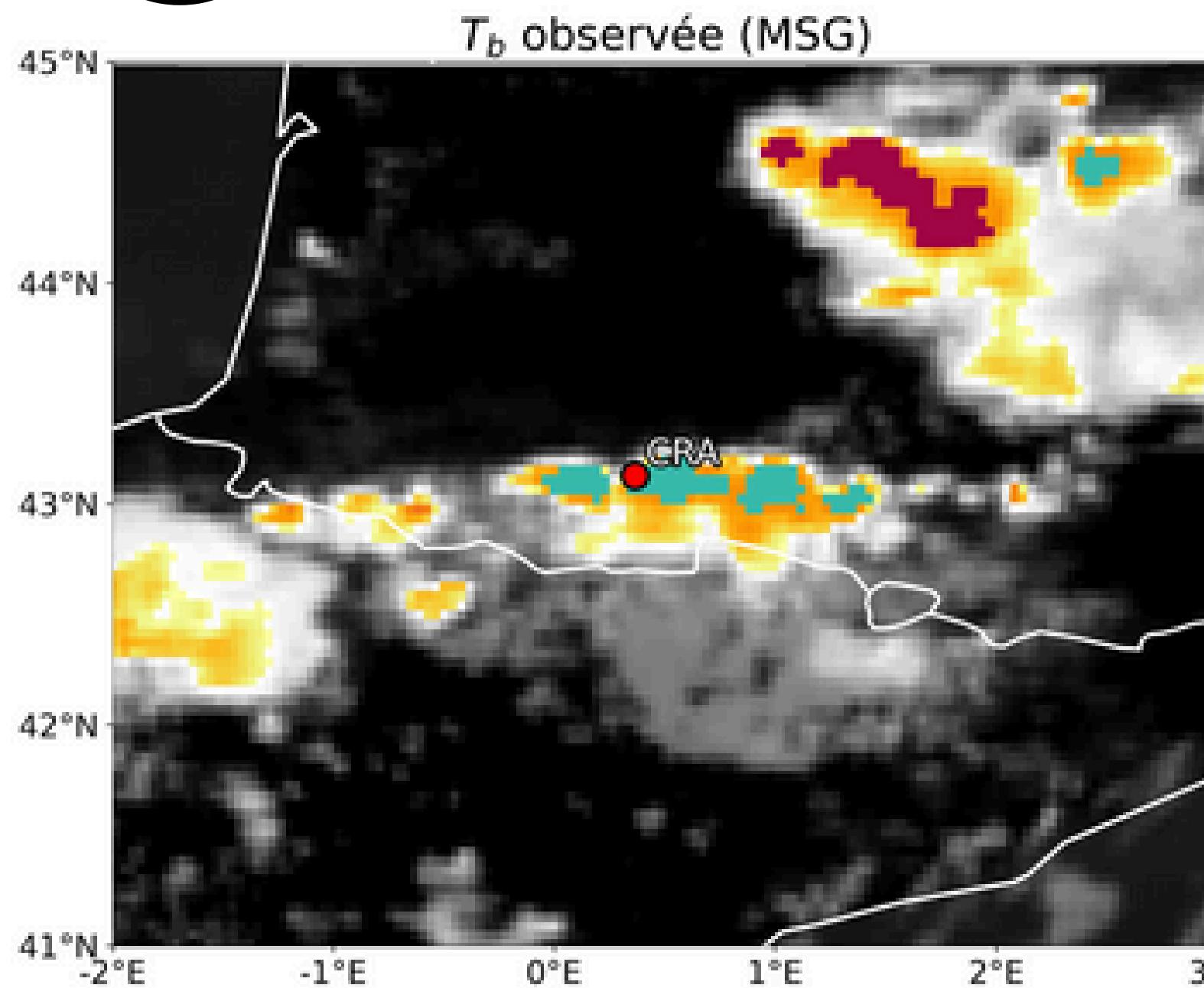
Méthodologie

14:30



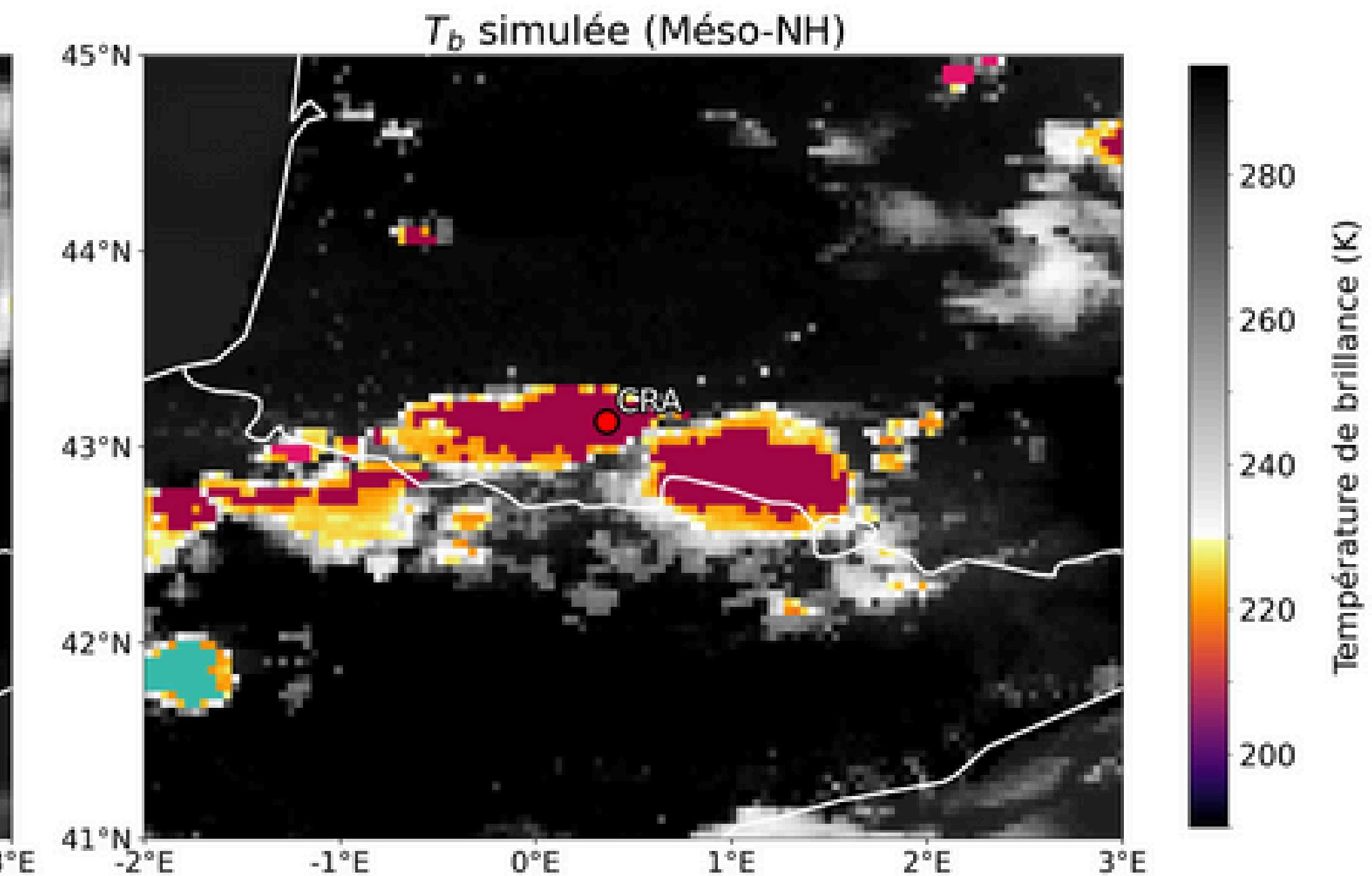
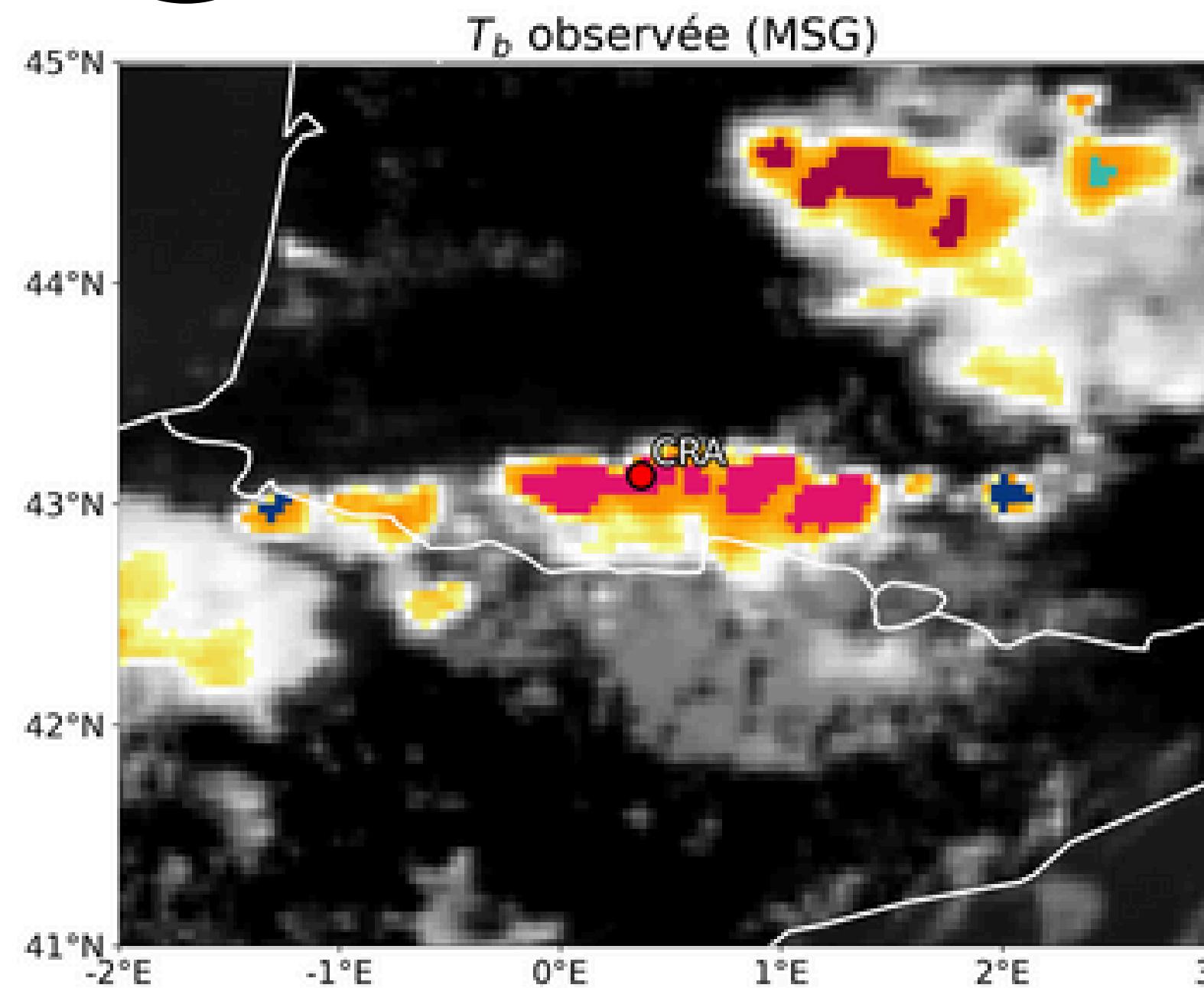
Méthodologie

14:45



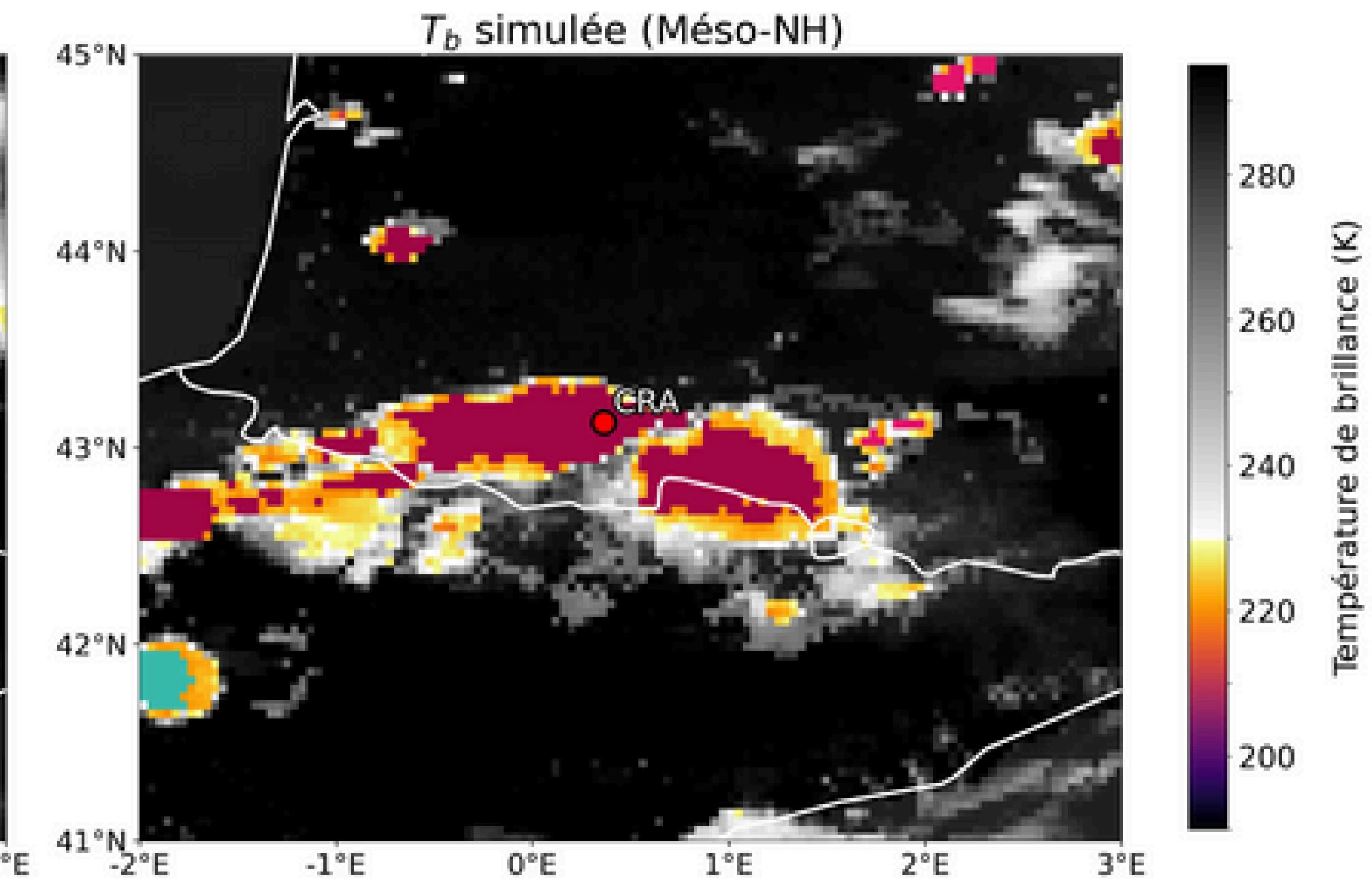
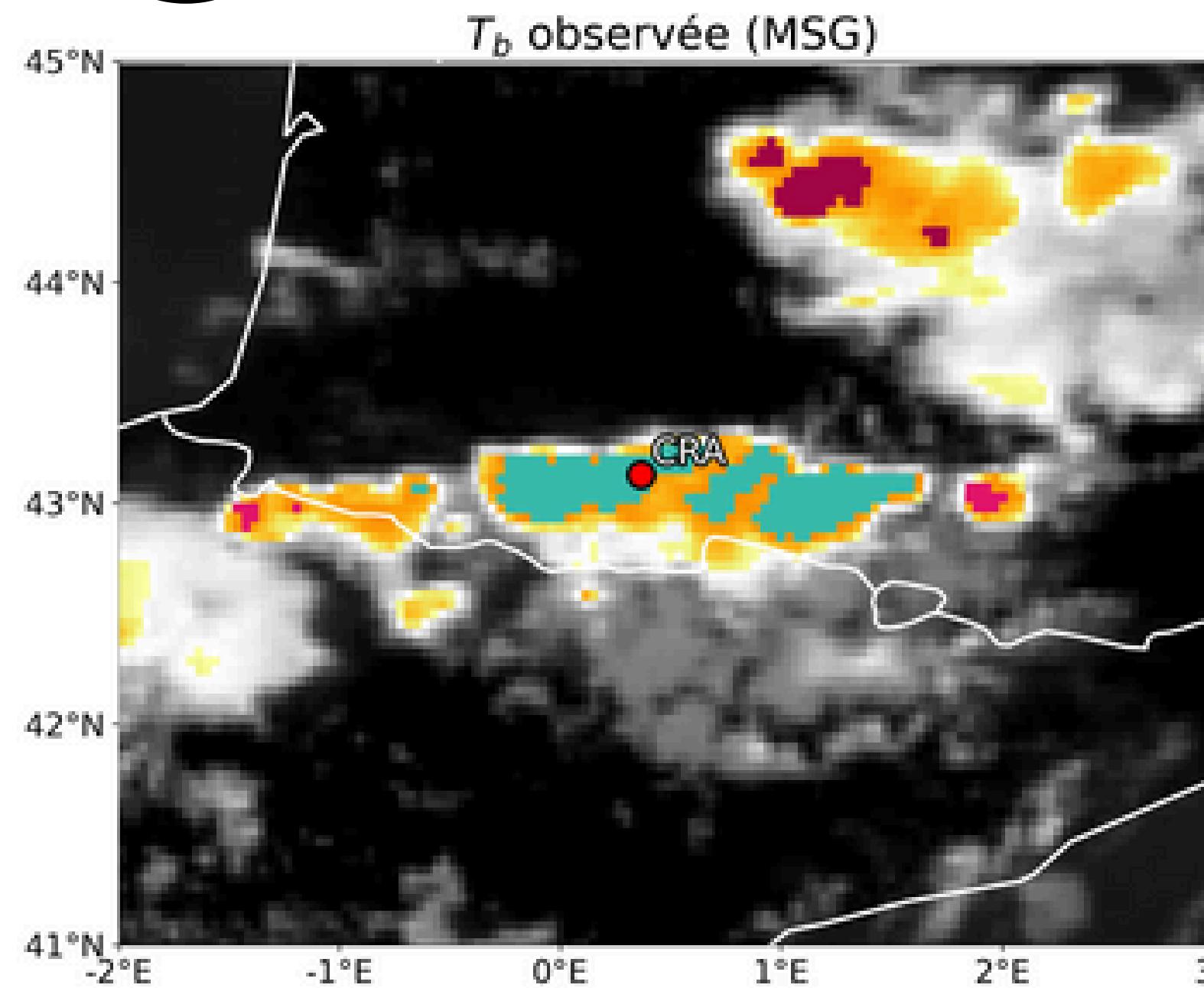
Méthodologie

15:00



Méthodologie

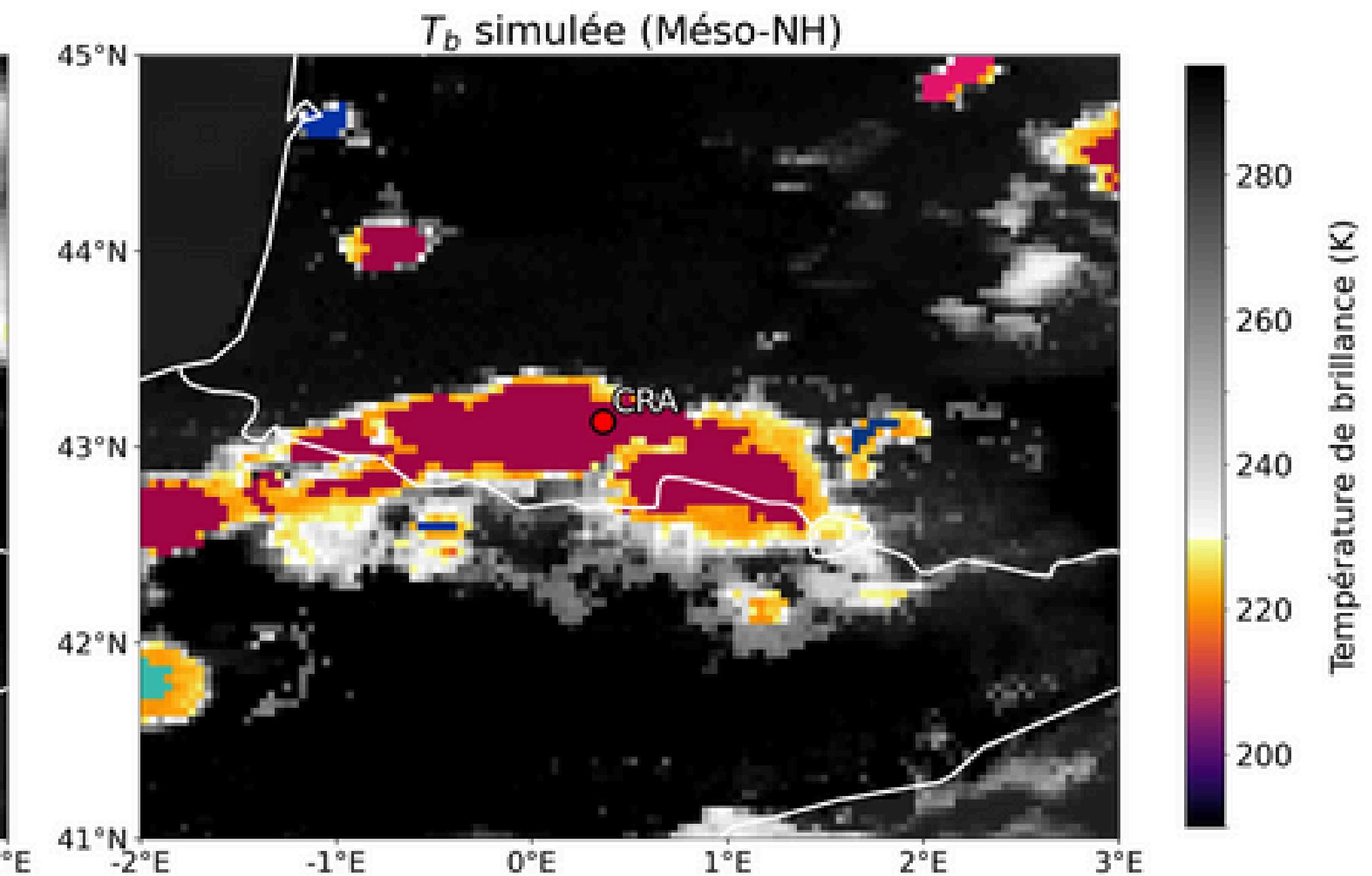
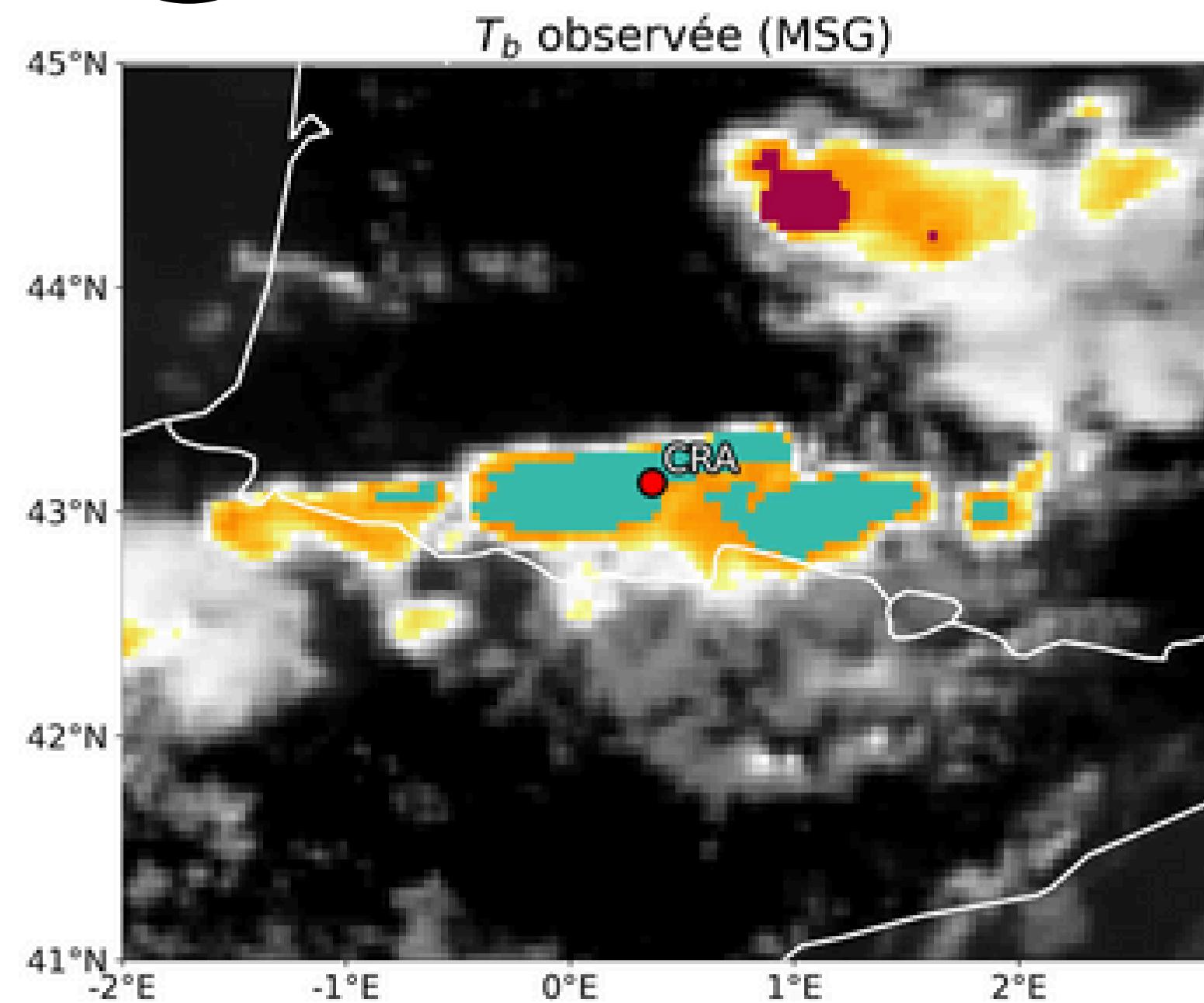
15:15



Température de brillance (K)

Méthodologie

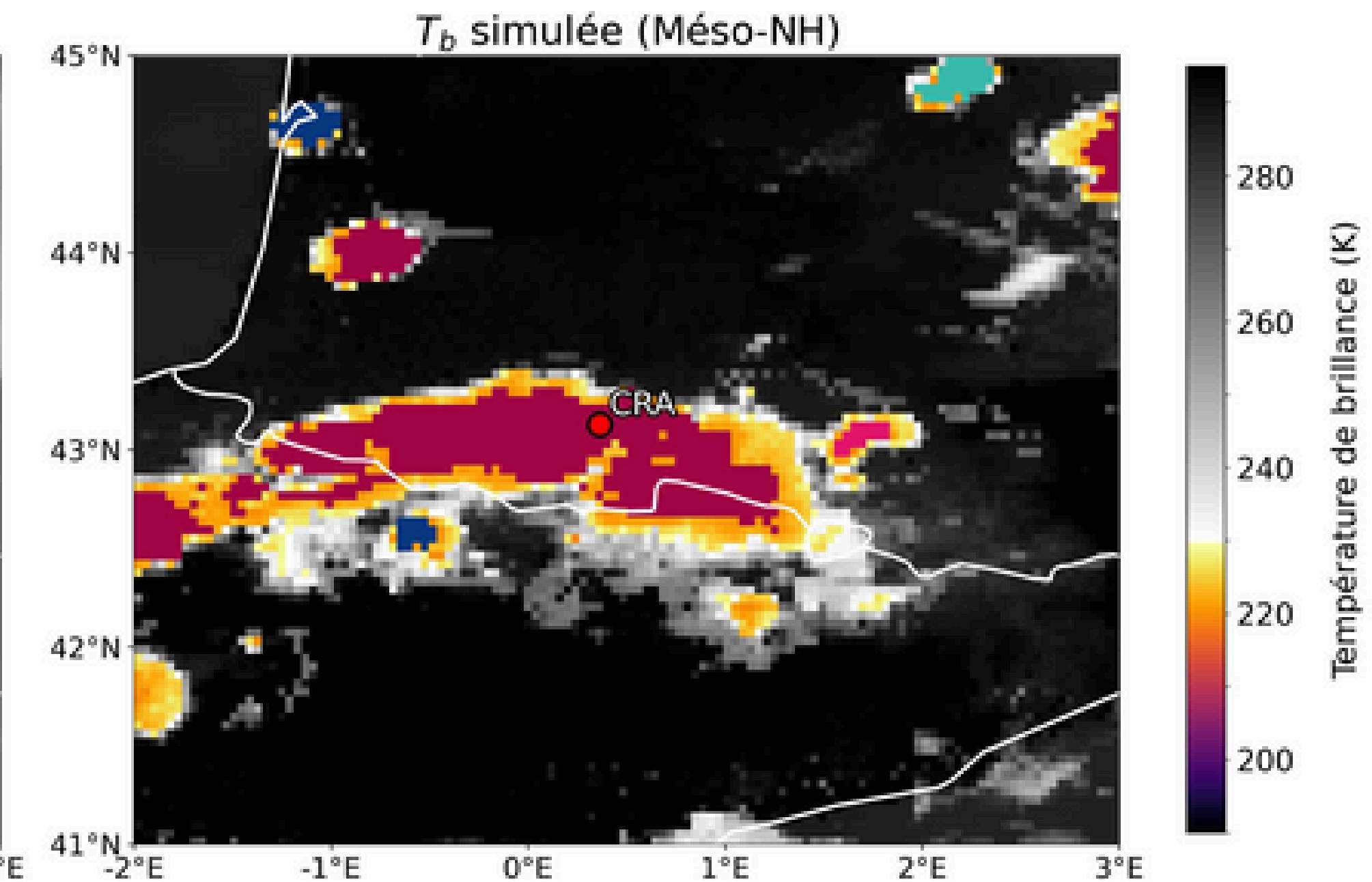
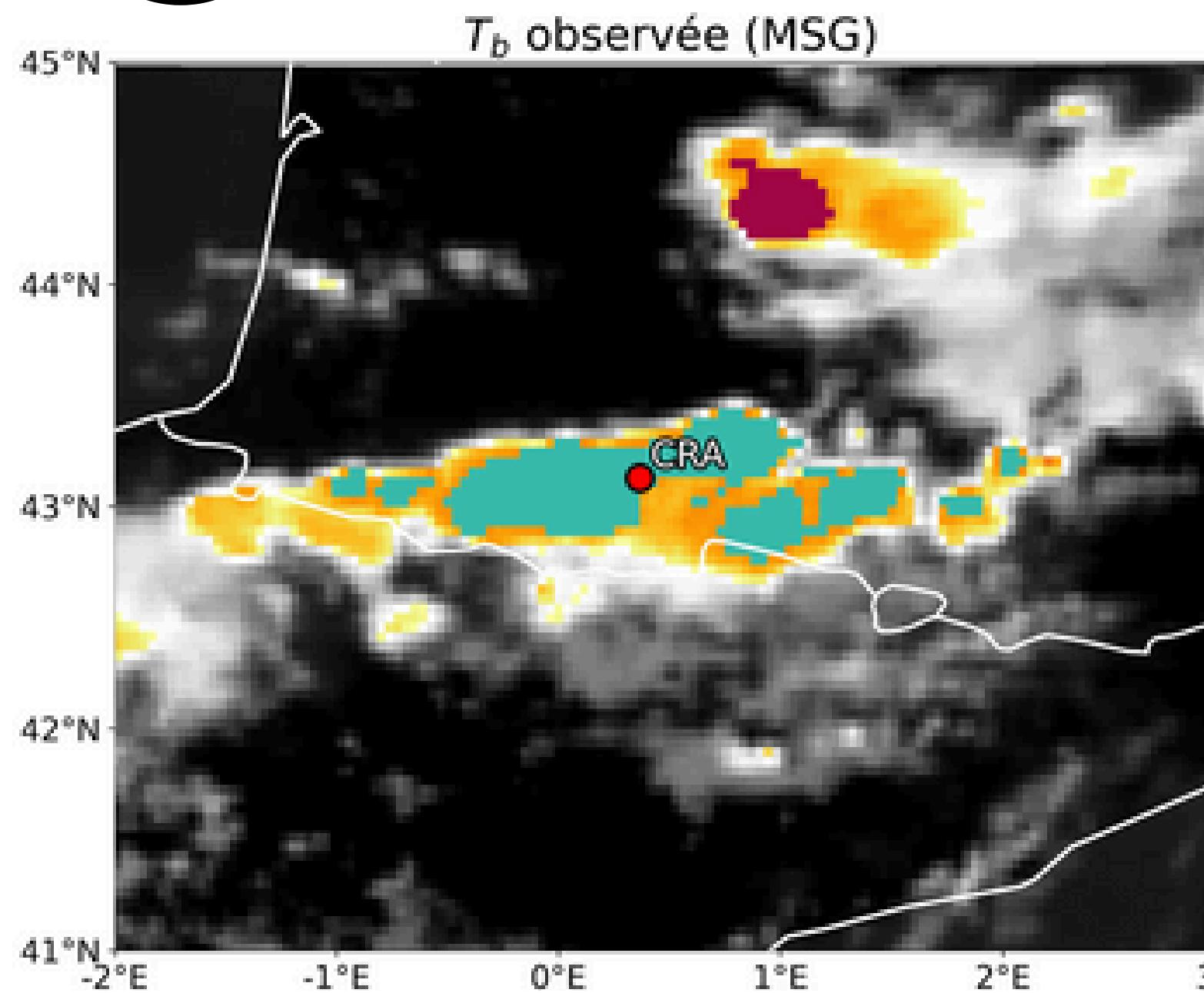
15:30



Température de brillance (K)

Méthodologie

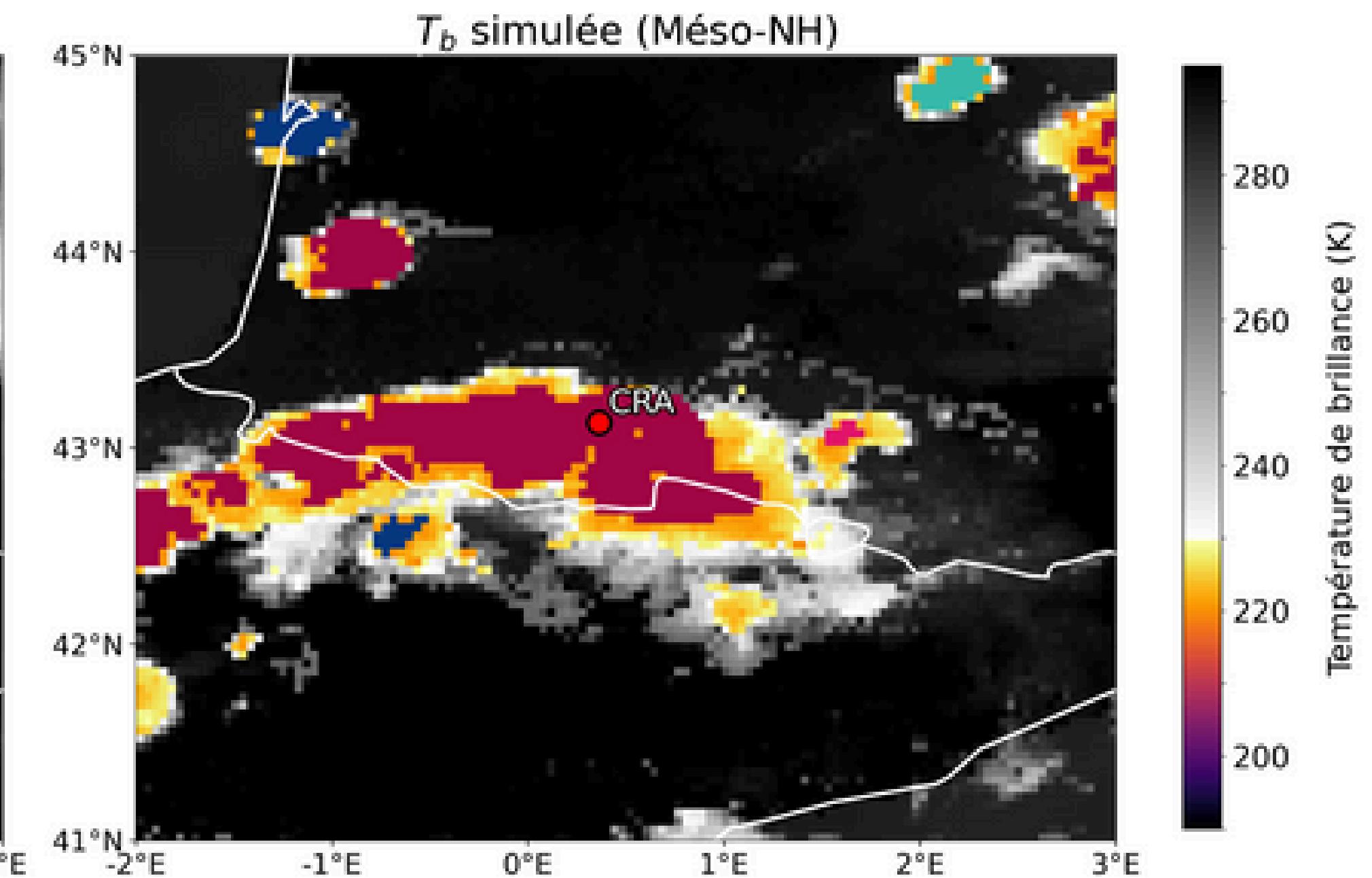
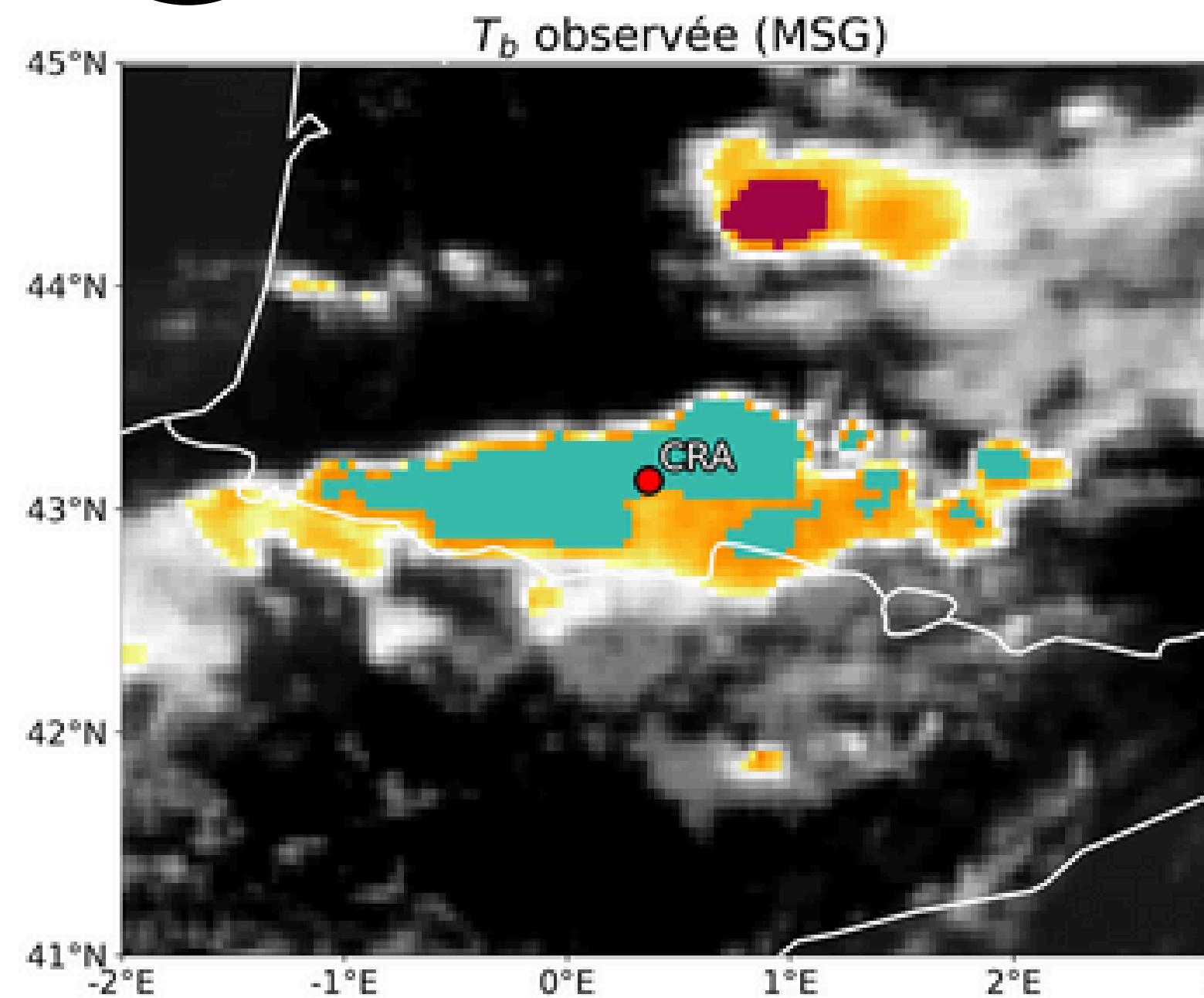
15:45



Température de brillance (K)

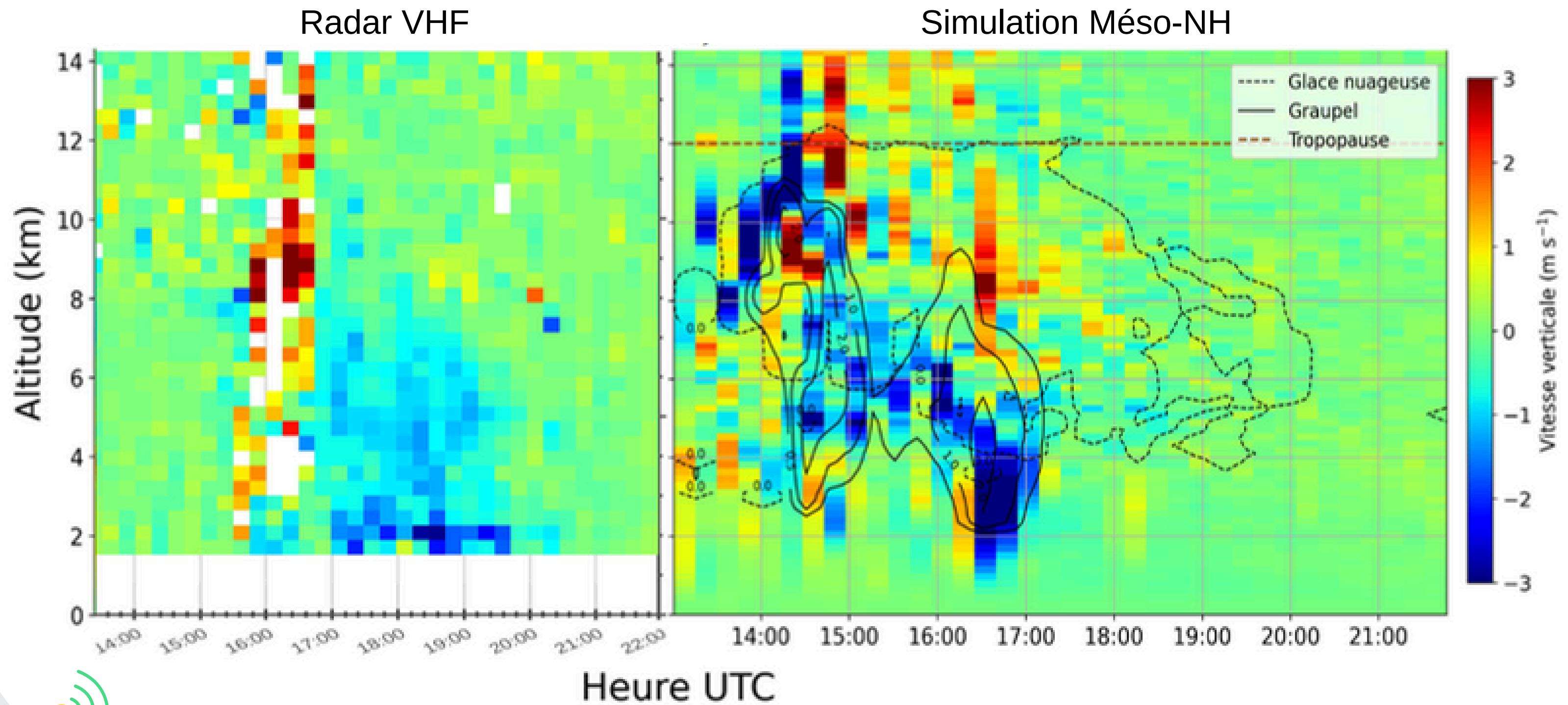
Méthodologie

16:00



Température de brillance (K)

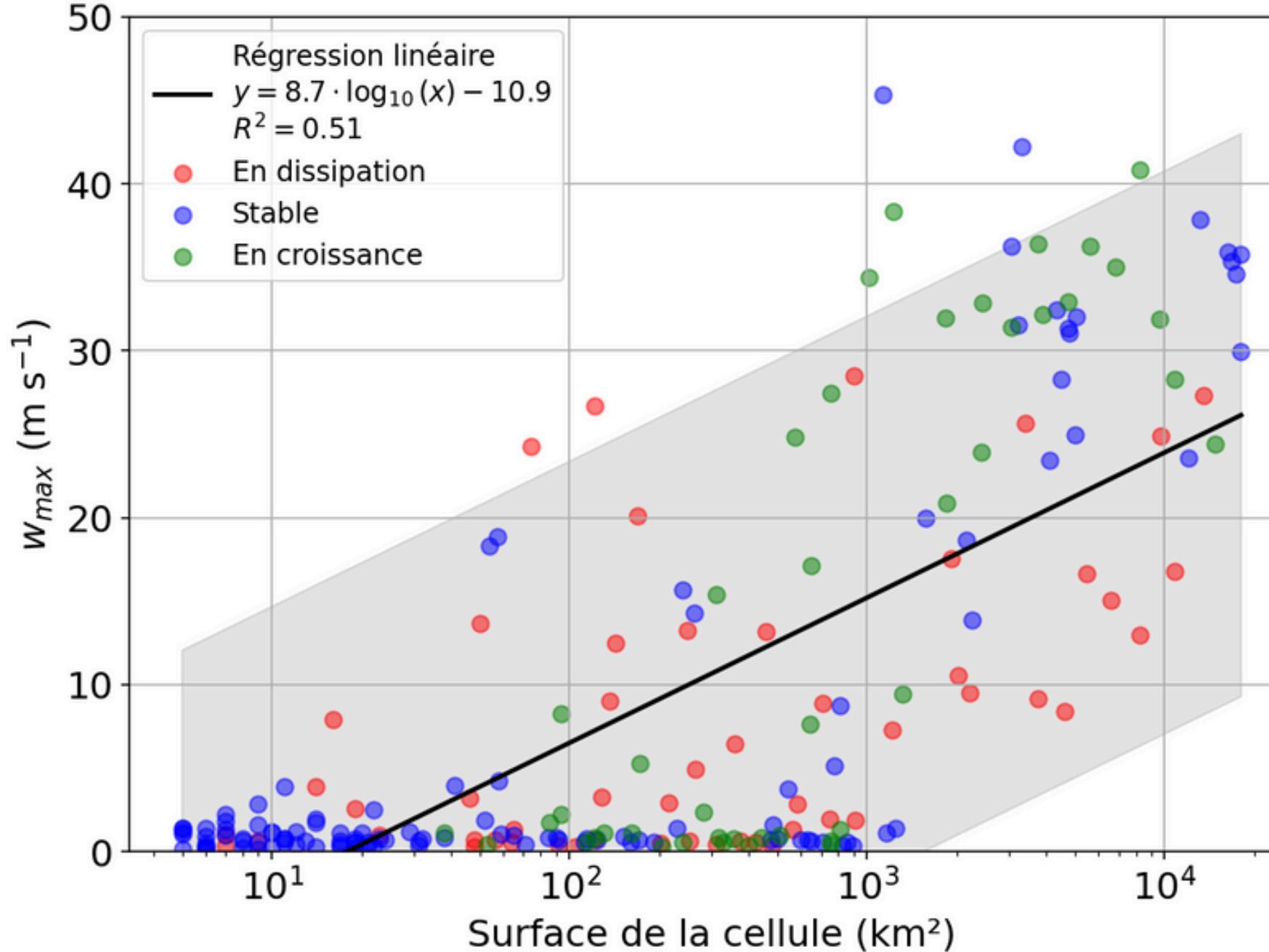
La simulation reproduit-elle la mesure du VHF ?



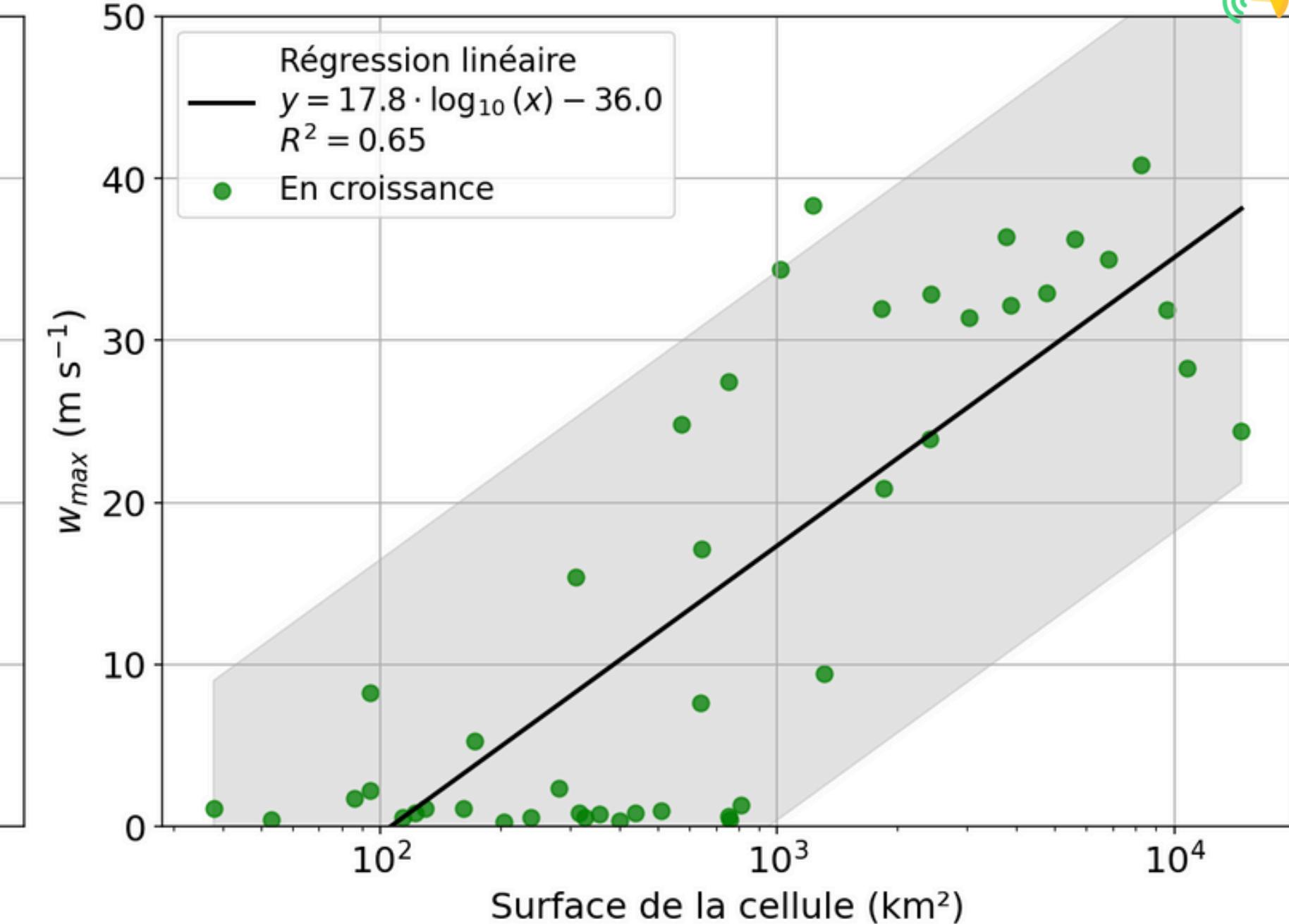
Caractéristique d'un système convectif de méso-échelle

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

Données de simulation



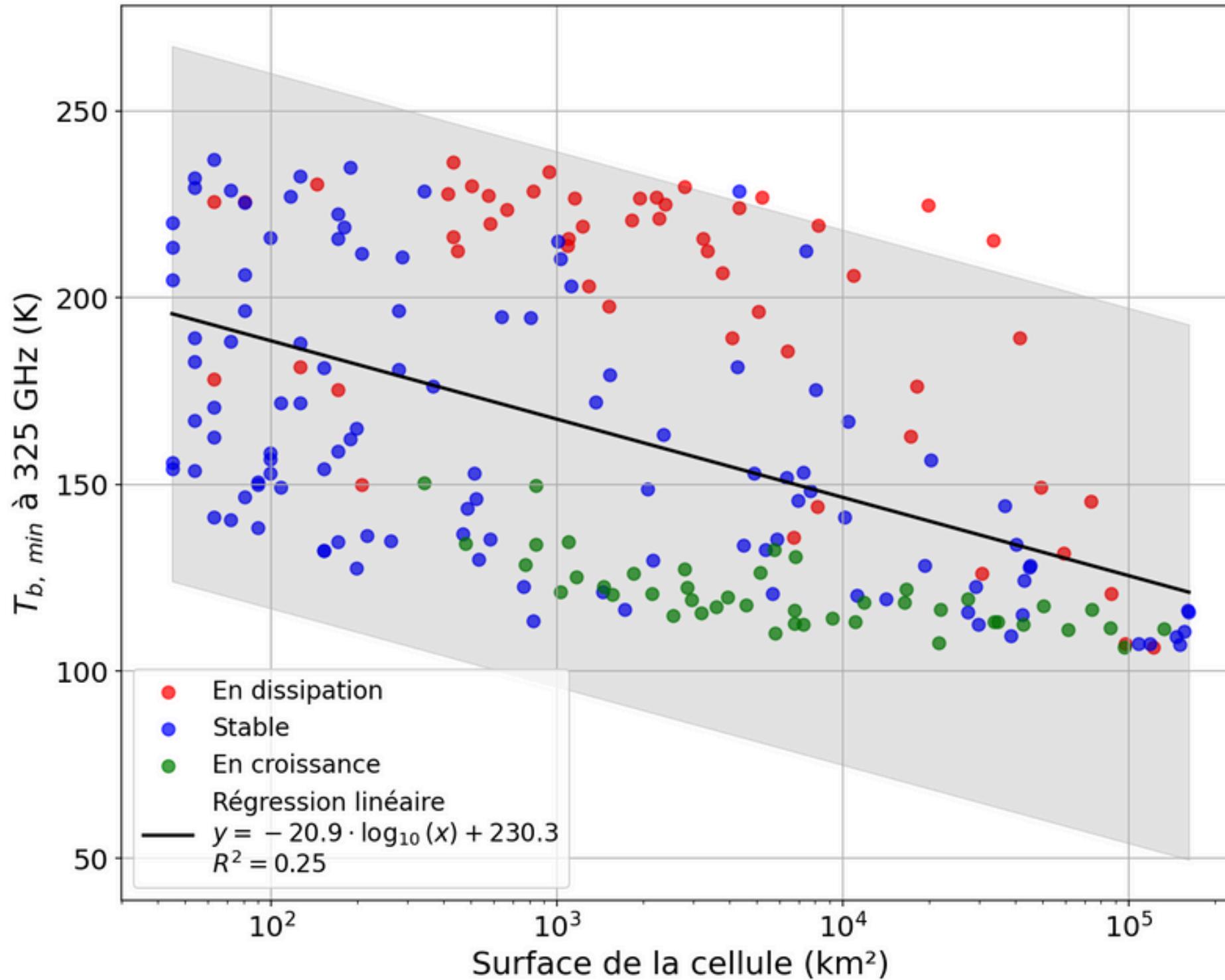
- w_{max} croît avec la taille de la cellule (Rochetin, Couvreux et al. 2014)
- Forte dispersion



Meilleure corrélation

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

Données de simulation

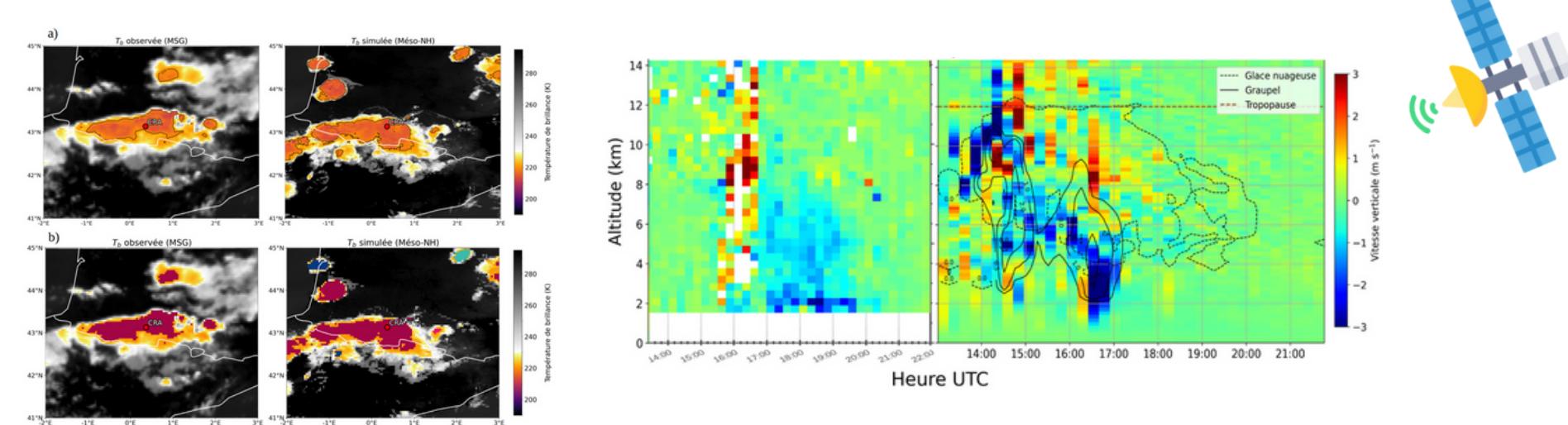


$T_{b,min}$ à 325 ± 0 GHz

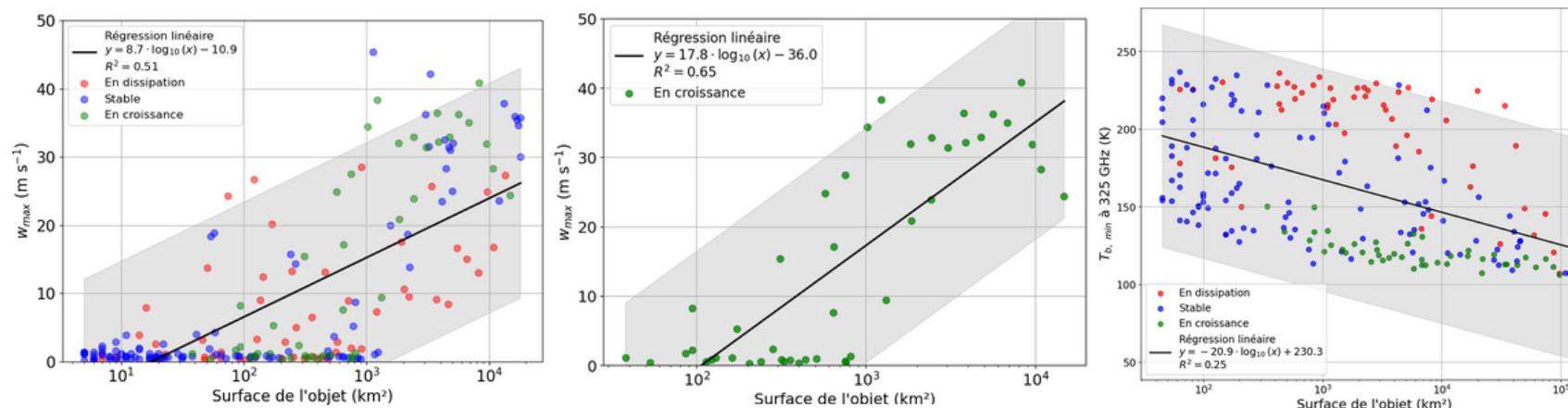
Canal sensible au contenu en glace au sommet du nuage

- $T_{b,min}$ 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

