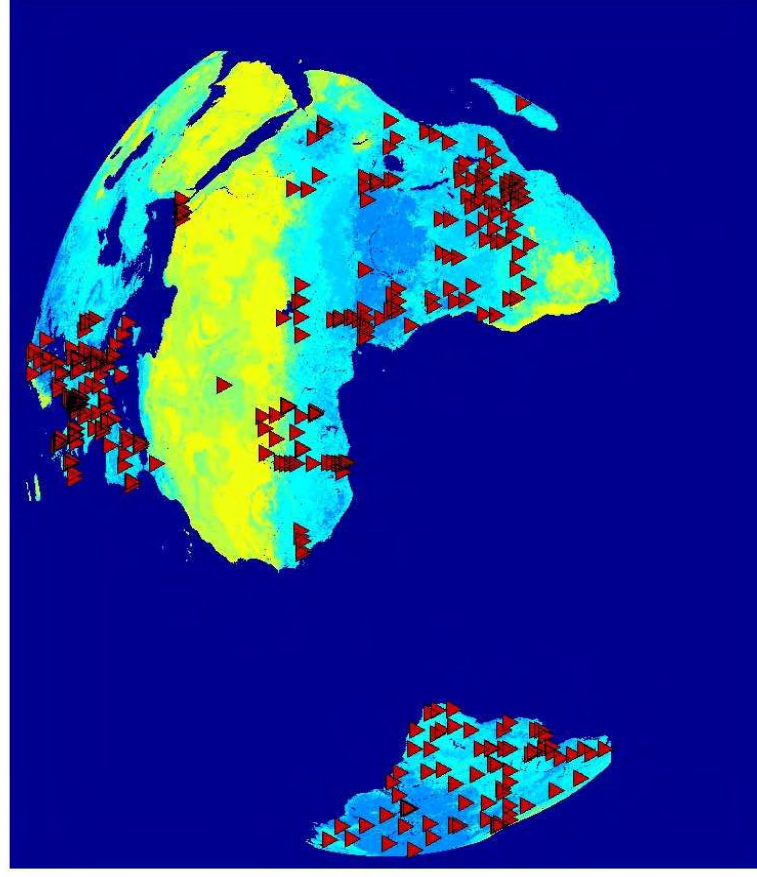


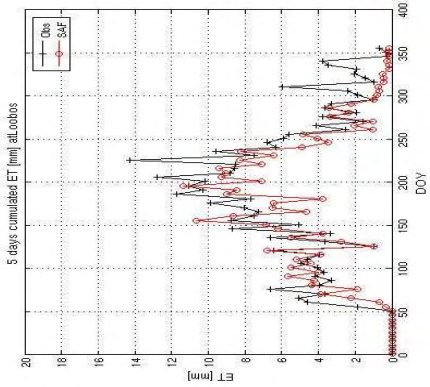
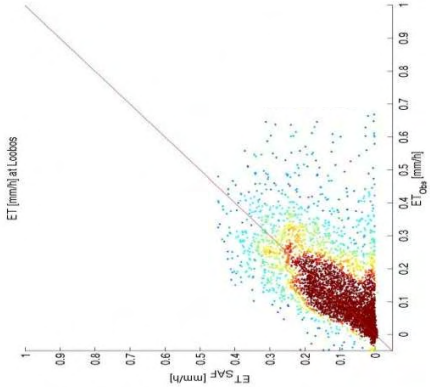
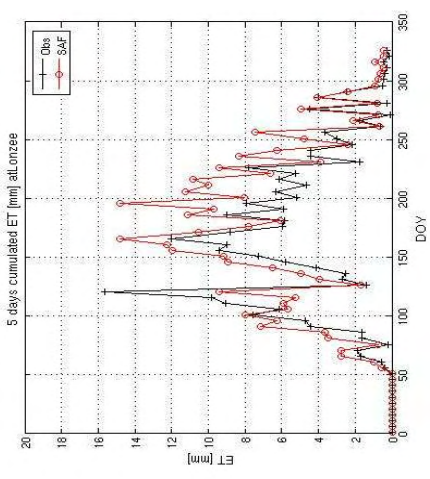
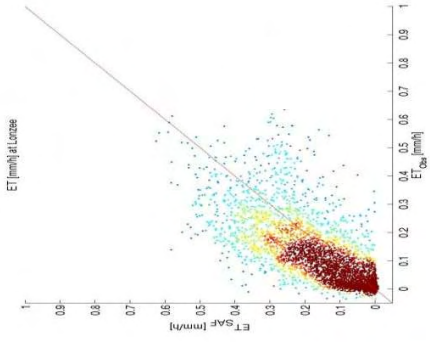
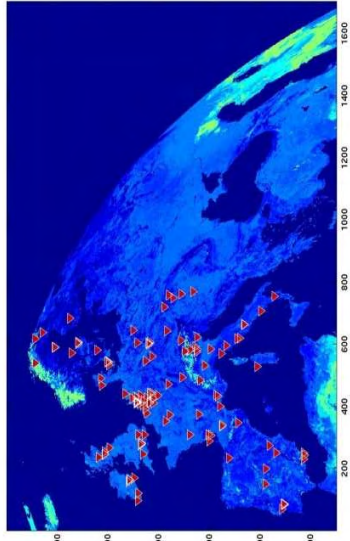
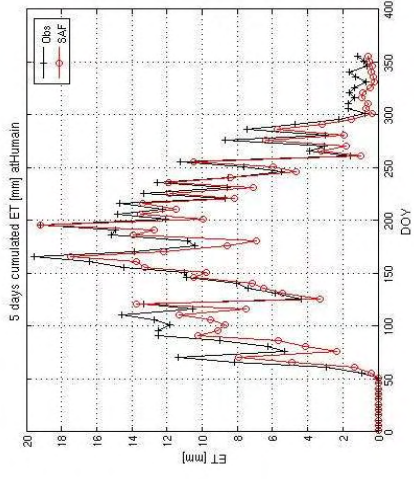
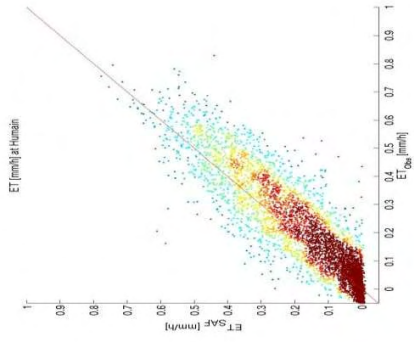
Validation

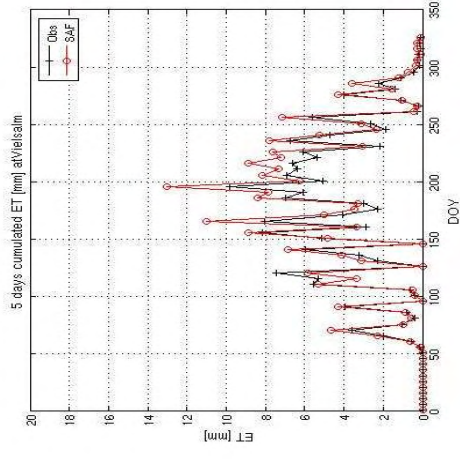
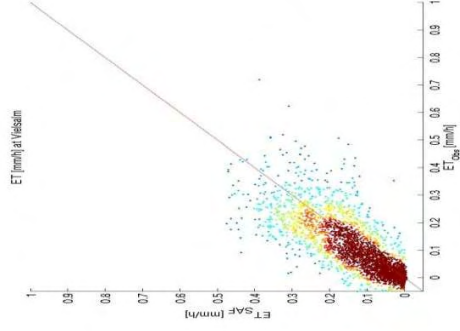
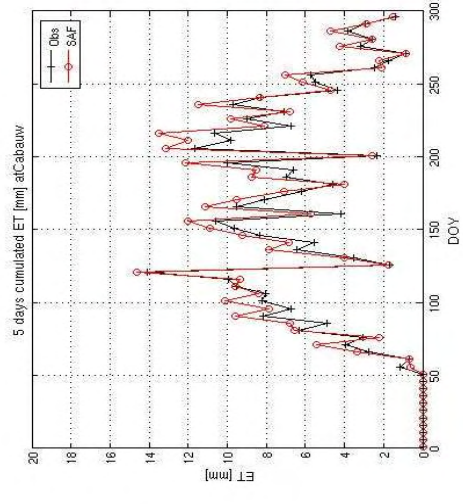
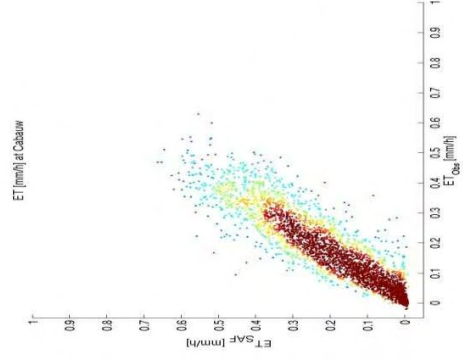
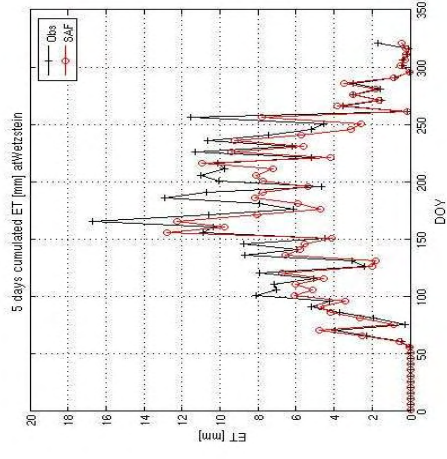
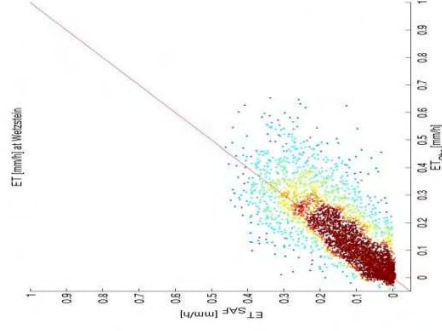
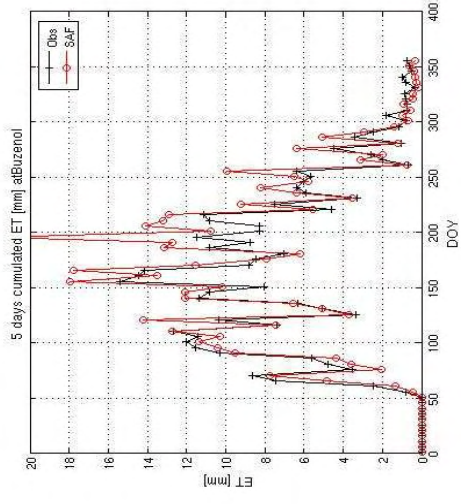
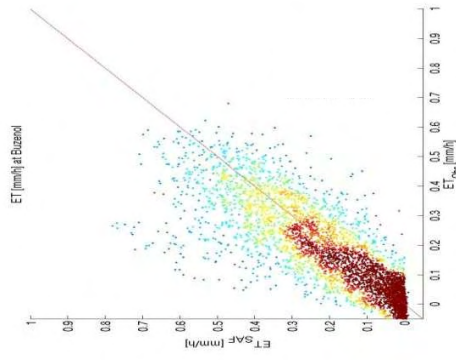
(Off-line)

Compare output generated by the operational (grid) version of the model to in situ observations at pre-defined locations



Exemples validation des produits LSA-SAF MET Set de données: 2007





Station	Type Vég	Pays	Biais	RMS	Corr
Amplero	G	IT	0.02	0.11	0.82
Buzenol	G	BE	0.02	0.10	0.81
Cabauw	G	NL	0.02	0.07	0.90
Humain	G	BE	-0.04	0.08	0.90
Monte Bondone	G	IT	0.02	0.12	0.76
Tojal	G	PT	0.05	0.10	0.74
Hesse	DBF	FR	0.00	0.09	0.56
Roccarespamp	DBF	IT	-0.02	0.08	0.85
Loobos	ENF	NL	-0.03	0.10	0.63
Wetzstein	ENF	DE	-0.02	0.08	0.79
Sodankylä	ENF	FI	0.08	0.12	0.46
Lonzée	C	BE	0.03	0.09	0.73
Las Majadas	EMF	ES	0.01	0.06	0.46
Puéchabon	EMF	FR	-0.07	0.09	0.65
Kaamanen	B	FI	-0.01	0.07	0.69
Vielsalm	MF	BE	0.02	0.06	0.80
Demokeya	Ss	SD	-0.12	0.18	0.40

Herbe

Forêt de feuillus à feuillus caduques

Forêt de résineux à feuilles persistantes

Cultures

Forêt méditerranéenne

Tourbière

Forêt mixte

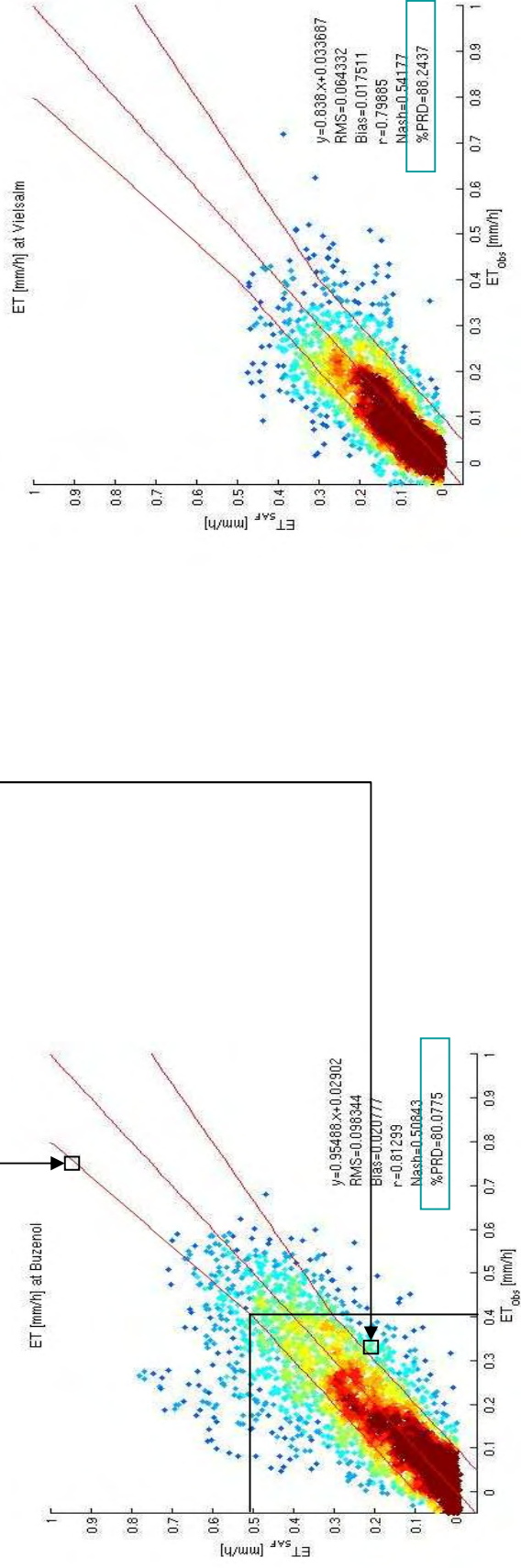
Savane sahélienne

Précision requise du produit (LSA-SAF)

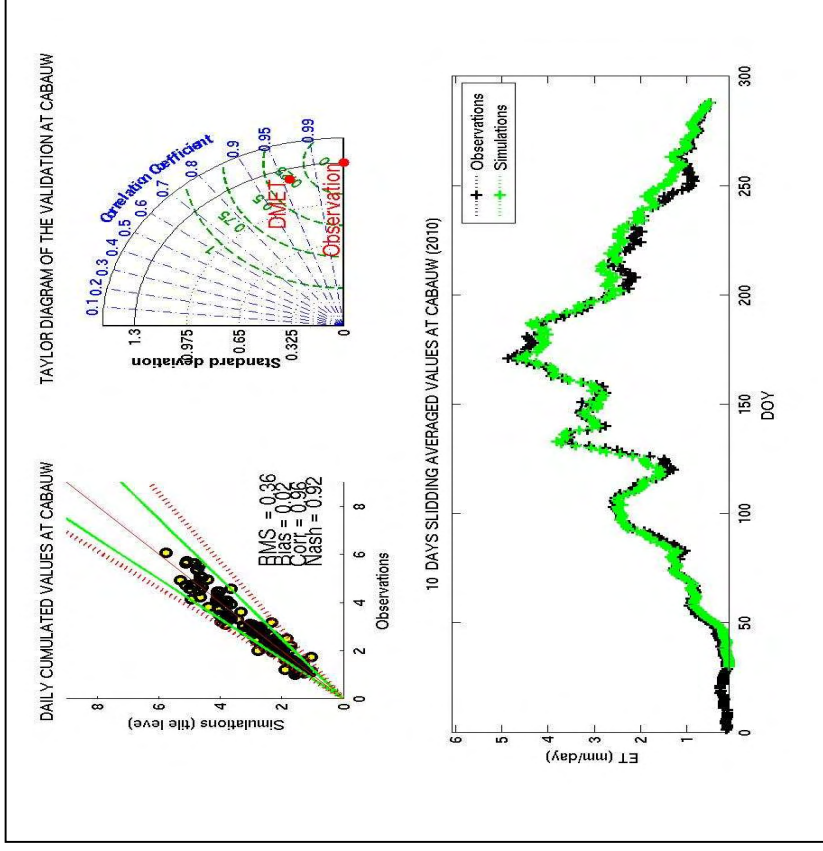
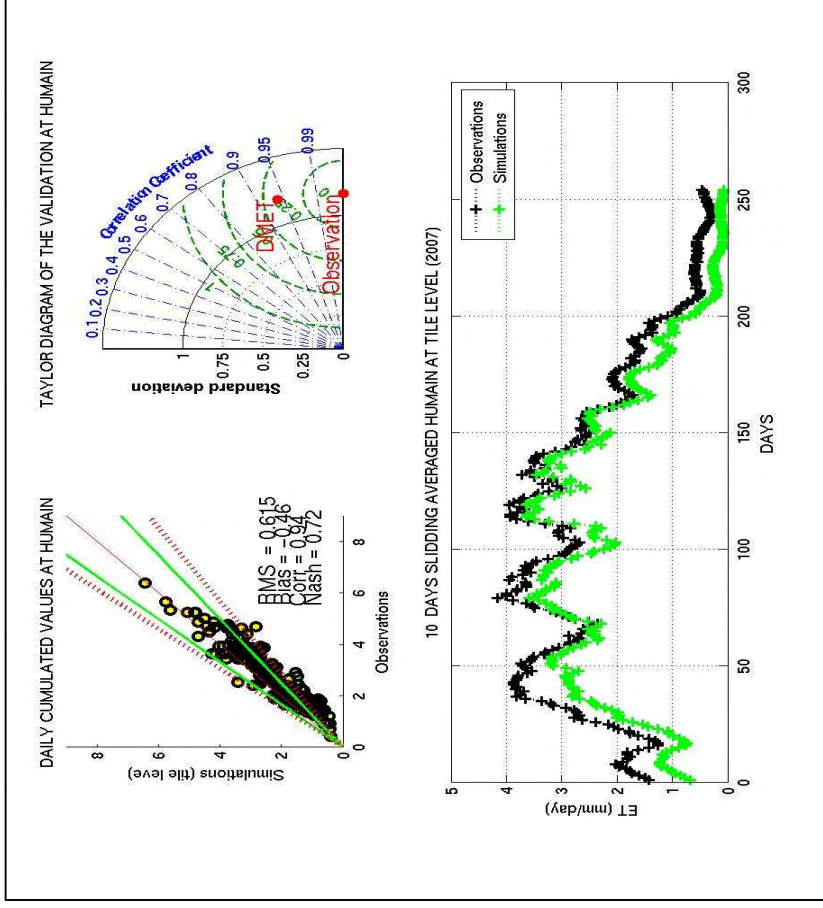
MET)

si $ET > 0.4 \text{ mm h}^{-1}$ → Erreur < 25%

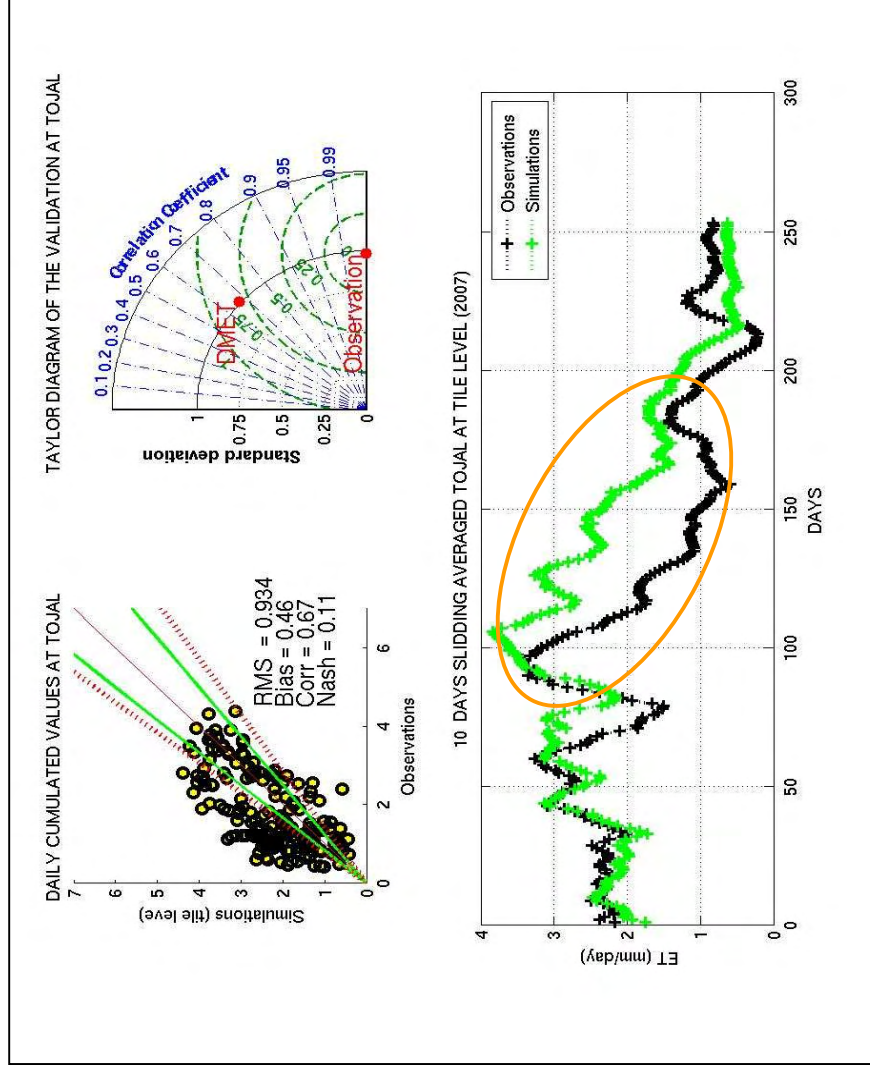
si $ET < 0.4 \text{ mm h}^{-1}$ → Erreur < 0.1 mm h^{-1}



Exemples validation du produit LSA-SAF DMET



Détection d'anomalies → amélioration dans les versions ultérieures du produit



Tests de cohérence

Le produit MET de la LSA-SAF a des caractéristiques

uniques:

- Séries continues (ciel serein ou nuageux)
- Basé sur des données déduites de MSG SEVIRI
- Résolution spatiale et temporelle de MSG SEVIRI
- Pas de temps 30 minutes
- Temps quasi-réel
- Couverture spatiale de

à comparer à

Produits ET en provenance d'autres sources (avec des caractéristiques différentes).

Exemples:

produits de modèles de prévisions numériques du temps ou systèmes d'assimilation de données

ECMW

GLDA

F

ECMWF

GLDAS

LSA-SAF MET

0.03°x0.03°
(équateur)

res

spatial 0.25°x0.25°
spatiale

résolution

0.25°x0.25°
spatiale

résolution

30 minutes

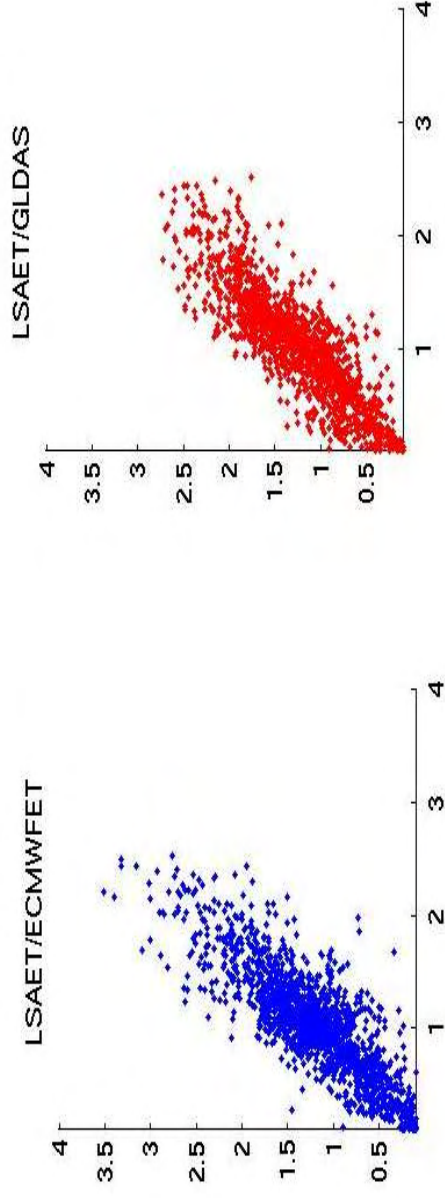
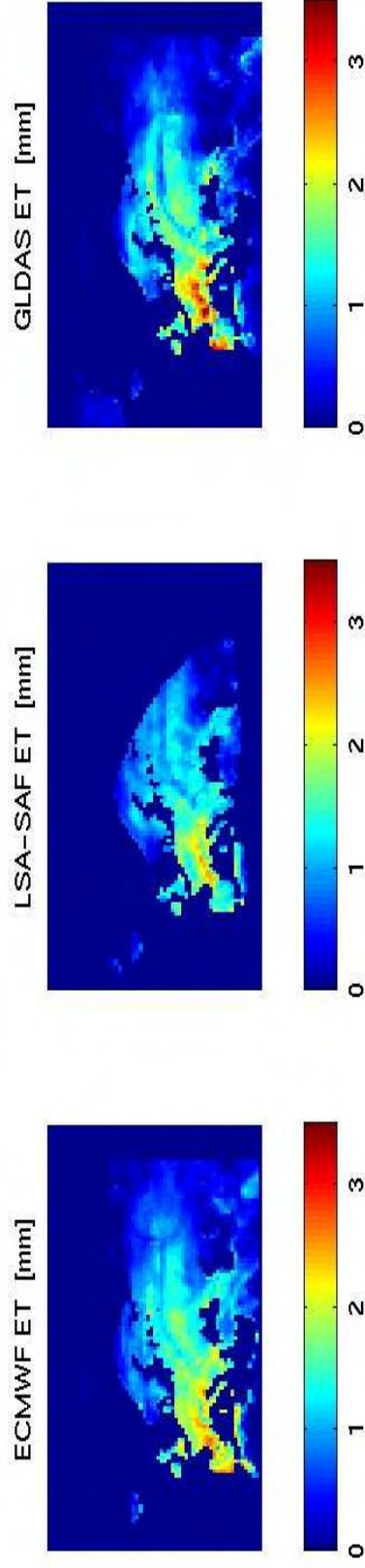
cumul de 3 heures

cumul de 3 heures

Validation

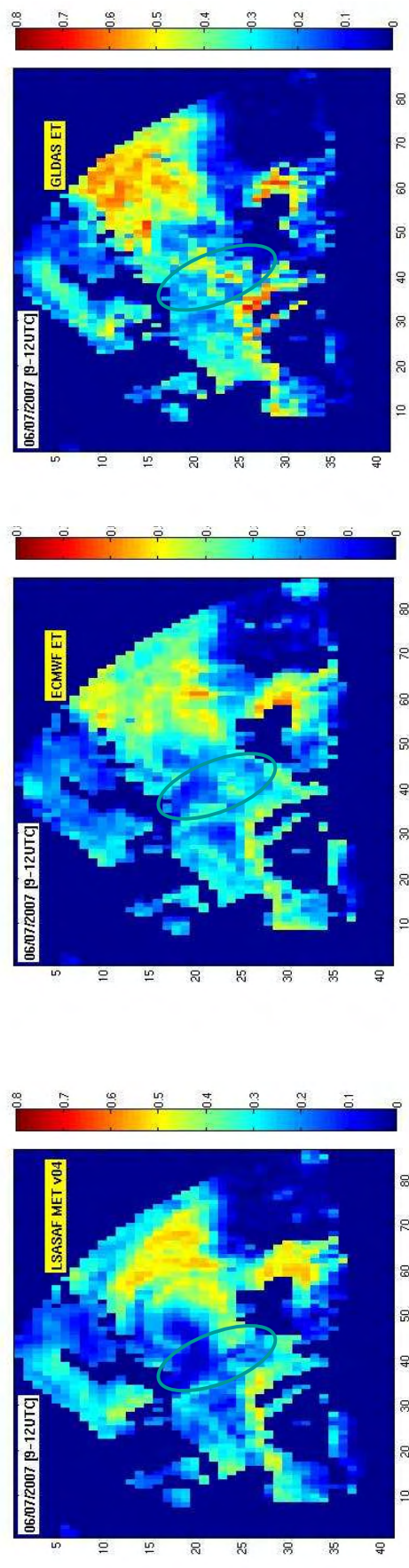
(Models inter-comparison)

Cumulated (12:00 to 18:00 UTC) Evapotranspiration
from LSA-SAF ET, ECMWF and GLDAS for the day
15.08.2007



Comparison à la même résolution spatiale et temporelle (1°x1°, 3 heures)

Exemple: 6 juillet 2007: 9-12 UTC



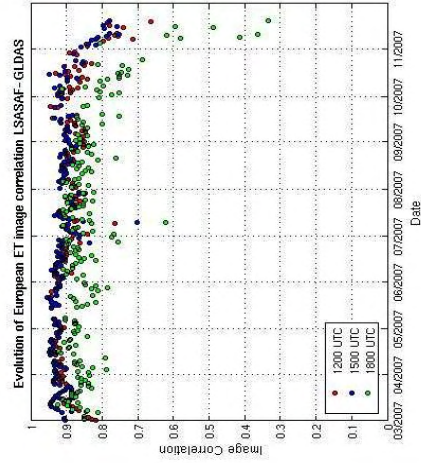
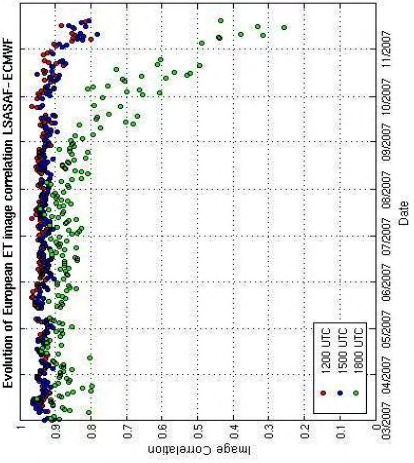
Configurations spatiales similaires → accord entre modèles

Différences induites par rayonnement solaire

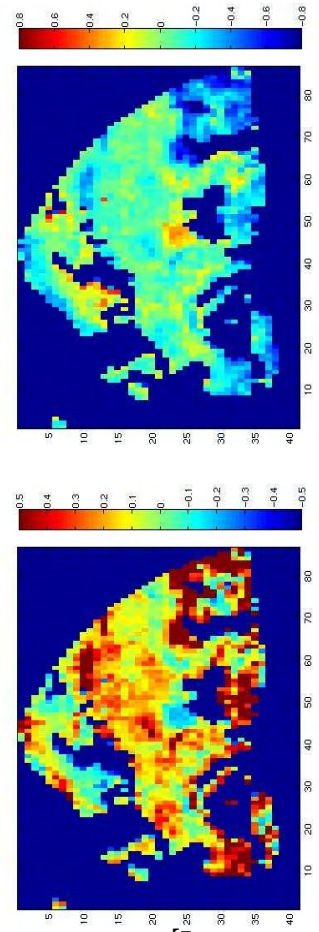
Différences induites par humidité du sol (+ paramètres associés du modèle)

Analyse de l'année 2007 (mars à novembre)

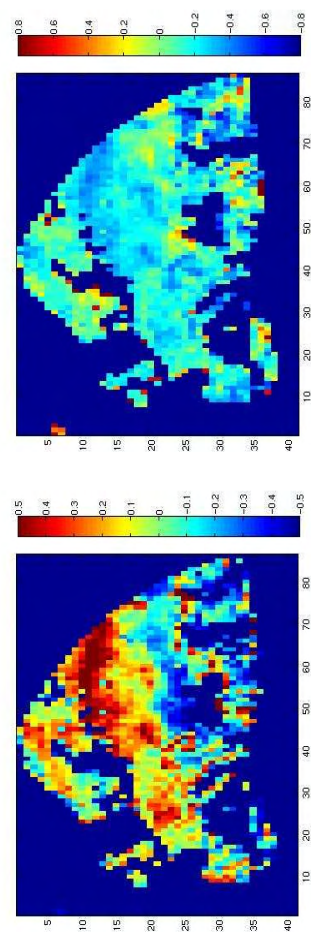
Corrélation spatiale



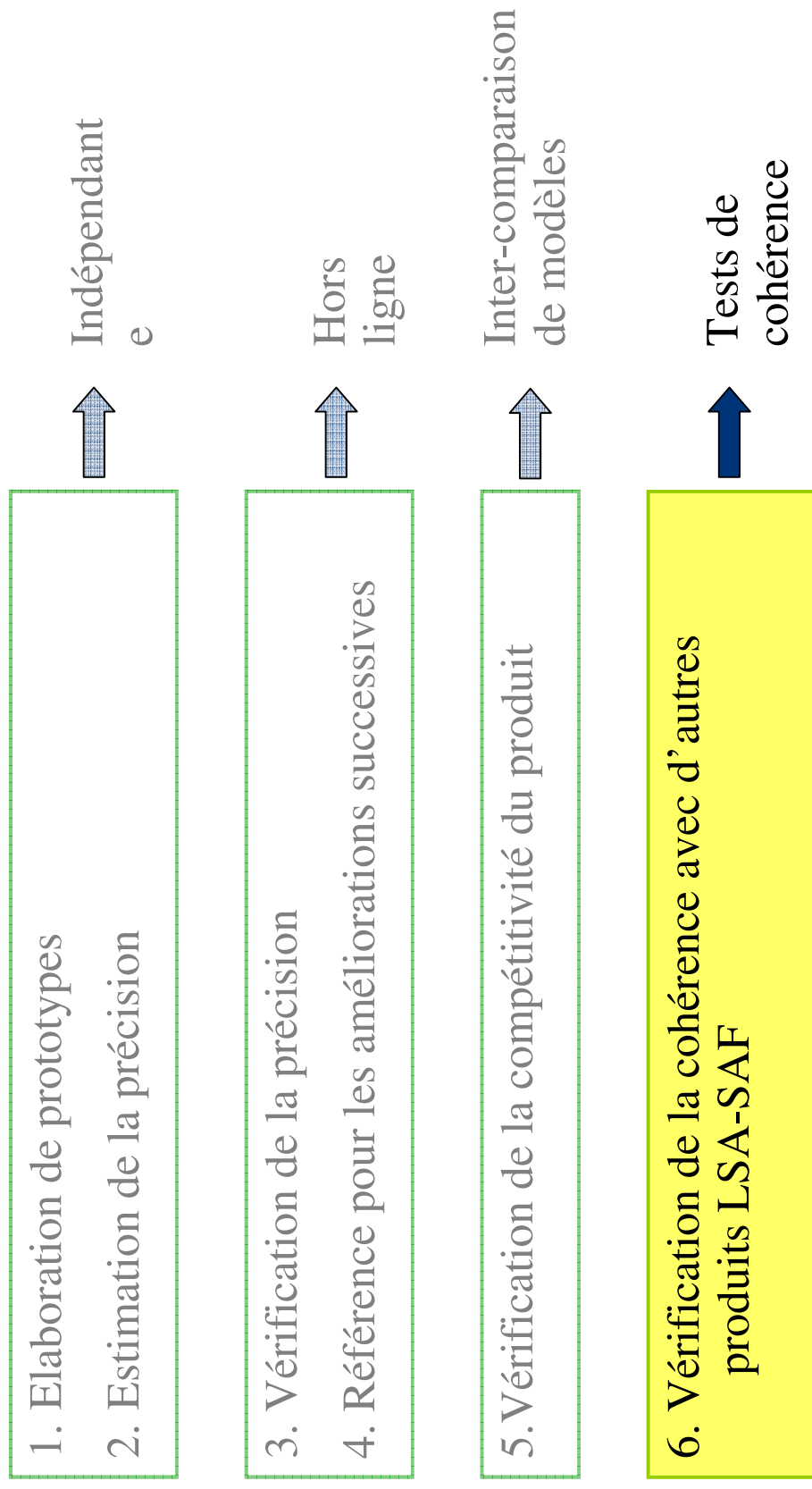
1 - pente



GLDAS - LSA-SAF



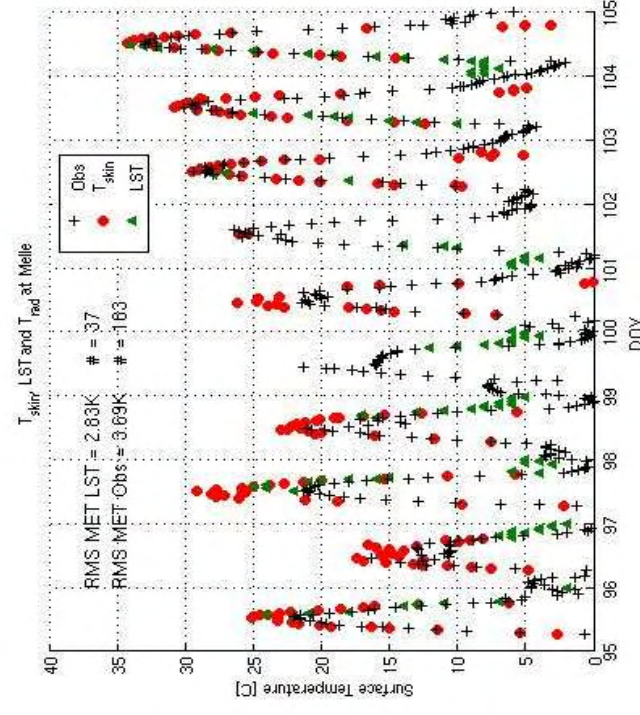
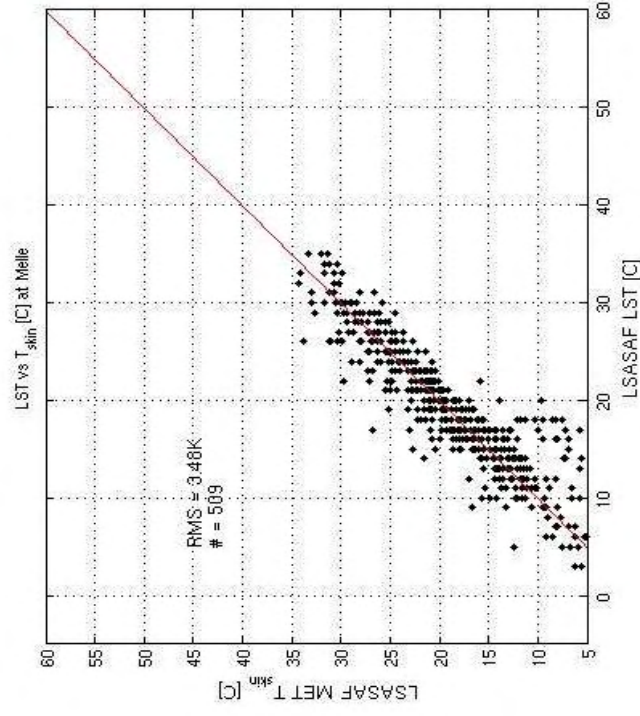
La validation est essentielle pour



Cohérence avec LSA-SAF LST (Land Surface Temperature)

Comparaison du LSA-SAF LST avec la température de 'skin' (peau) du modèle LSA-SAF ET

Bilan d'énergie: $(1-\alpha).S + \varepsilon.(I-\sigma.T_{sk}^4) + H + LE - G = 0$



Possible applications

Hydrologie



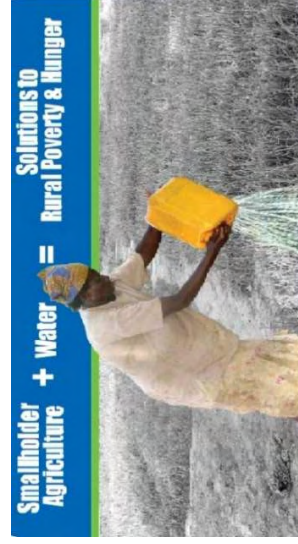
Modélisation de la croissance
des cultures



Suivi de: la sécheresse, la désertification, la
déforestation,...



Gestion de l'eau

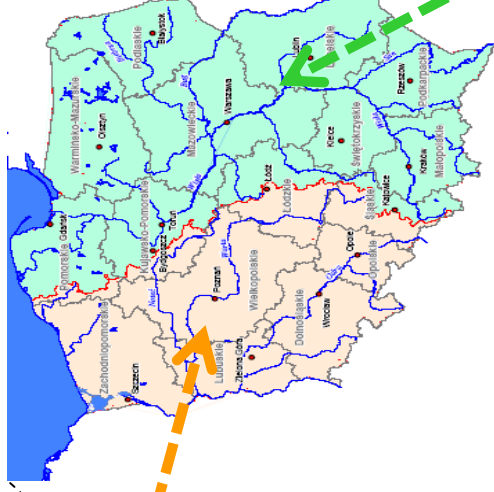


Etudes du climat

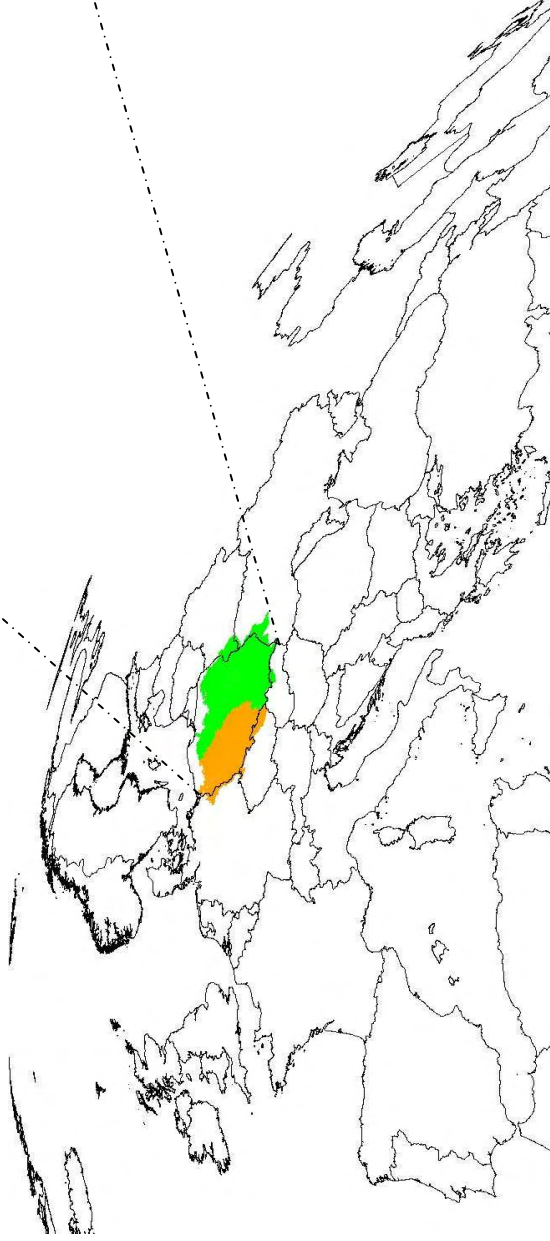


Applications in Hydrology

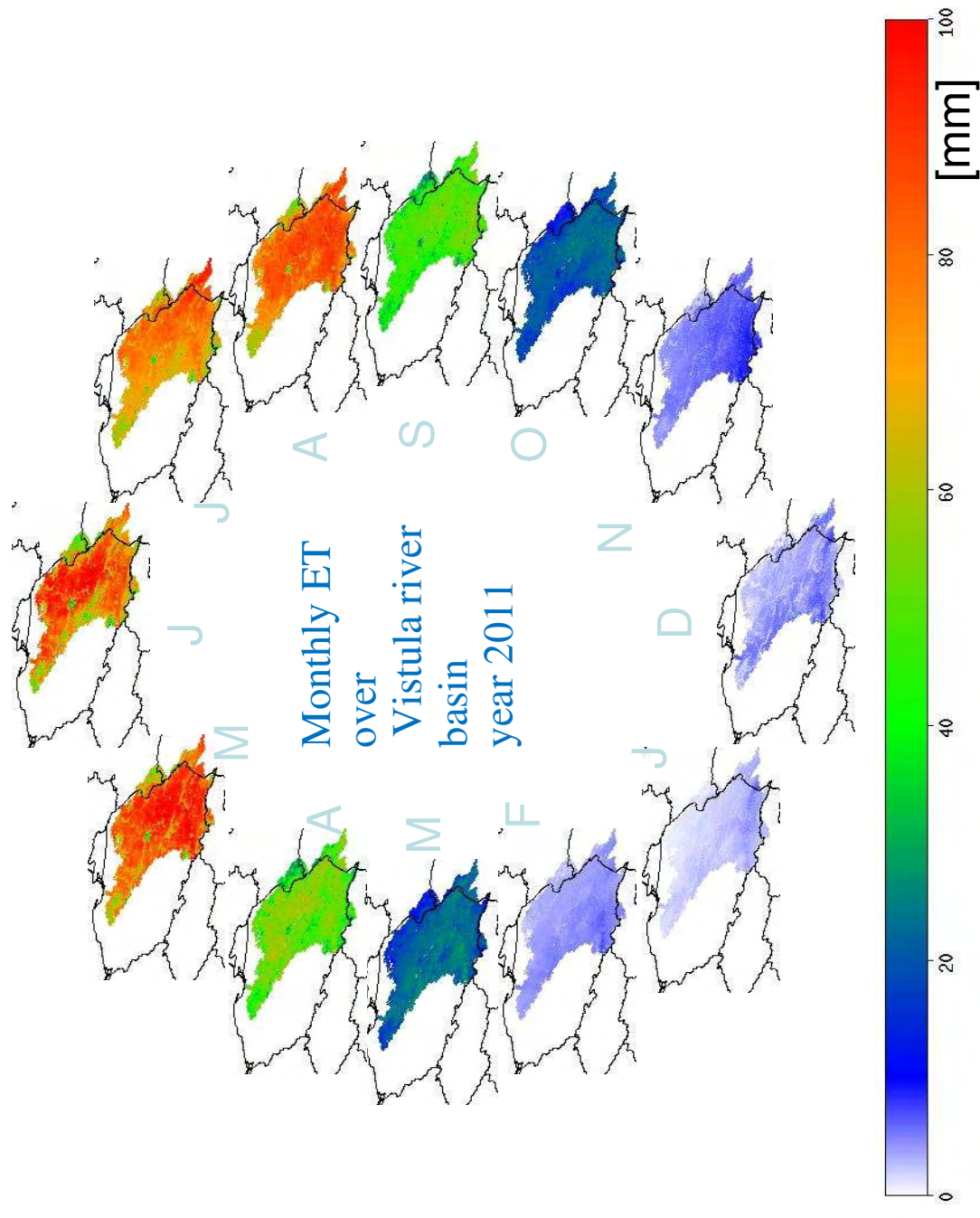
•Oder river basin



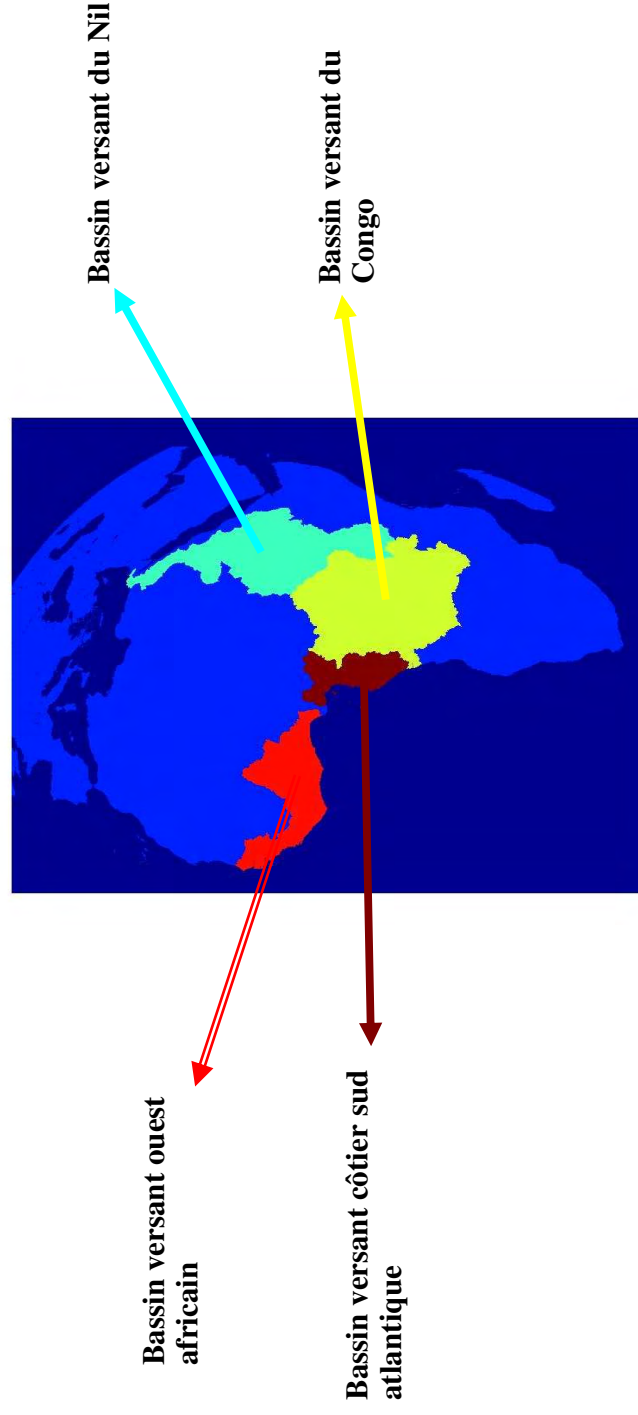
•Vistula river basin



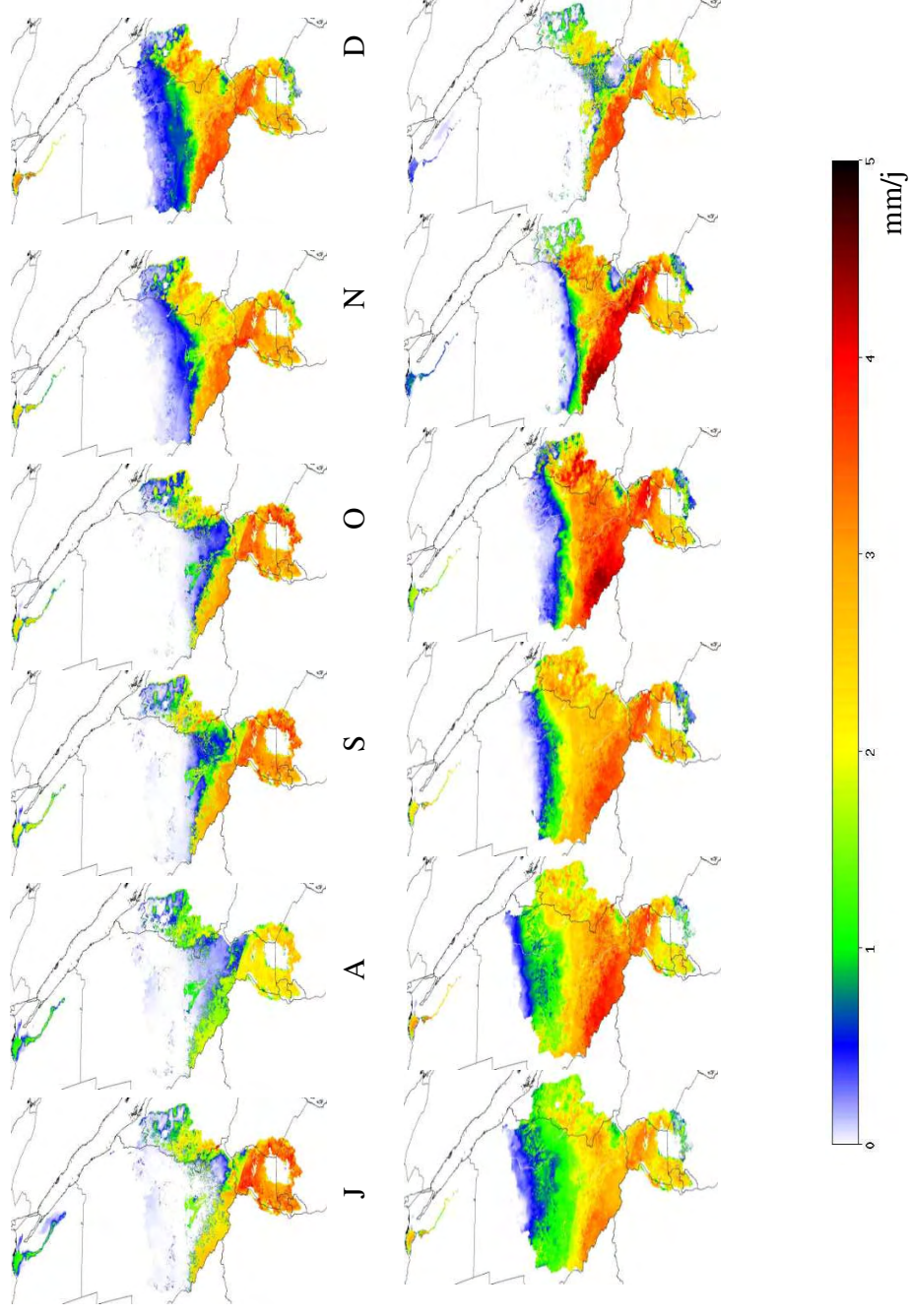
Applications in Hydrology



Cumul mensuel de l'ET pour une sélection de bassins hydrologiques en Afrique



Evapotranspiration mensuelle (mm/j) pour le bassin versant du Nil (2010).



Question...

En disposant des estimations d'évapotranspiration journalière (réelle et potentielle) ,comment pourrions-nous d'une façon simple nous faire une idée de l'évolution de la sécheresse sur une region donnée?.

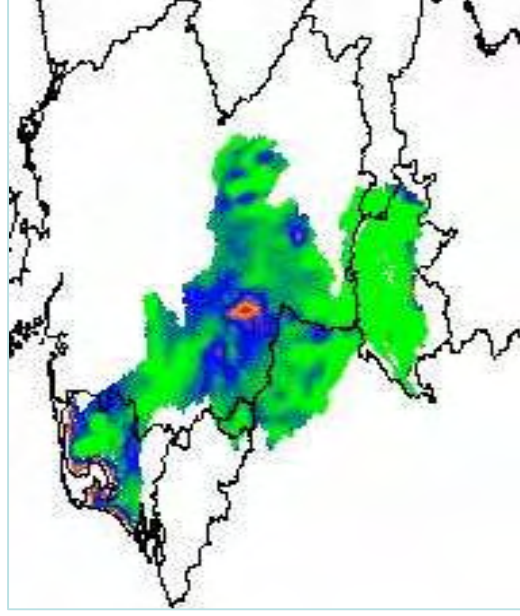
Meteorological drought monitoring

$$\text{Drought index (\%)} = \frac{\text{AET}}{\text{PET}}$$

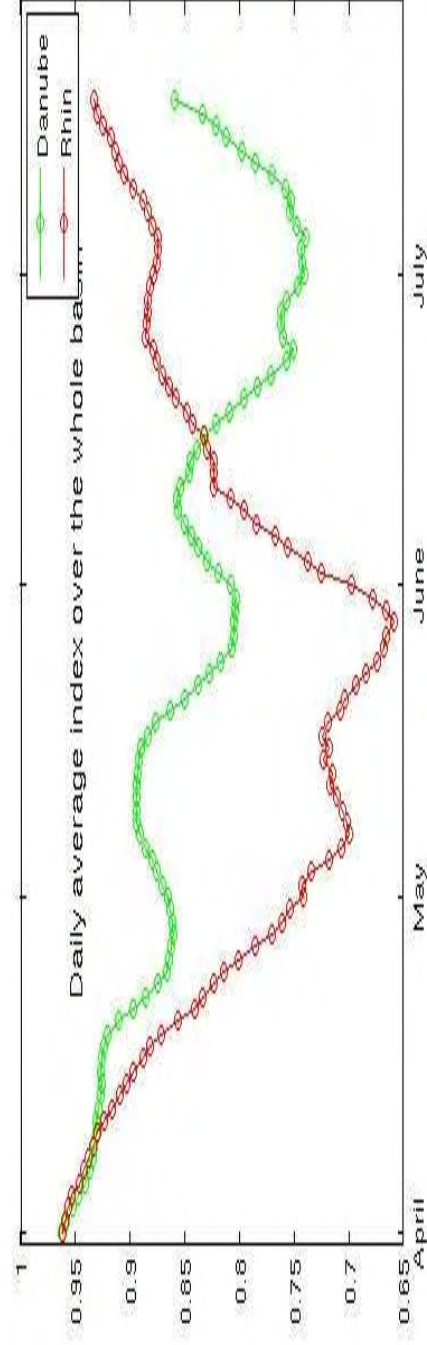
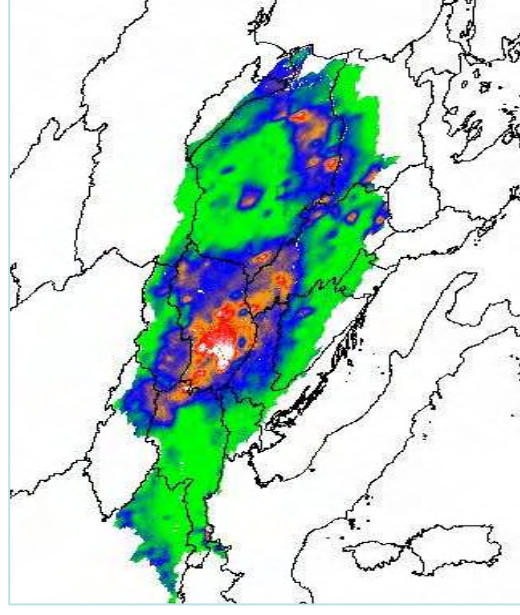
- AET → DMET product (LSA-SAF daily ET)
- PET → LSA-SAF ET algorithm, but removing hydric stress
- Drought index is computed daily on each grid cell, and can be averaged over the entire region of interest.

Applications in drought monitoring

- Rhin river basin



- Danube river basin



•Crop monitoring: dry matter productivity (DMP)

- From GLOBAM project (Sepulcre-Canto et al., 2012)

•DMP
$$NPP = \sum 0.48R(fAPAR)\epsilon\Delta t;$$

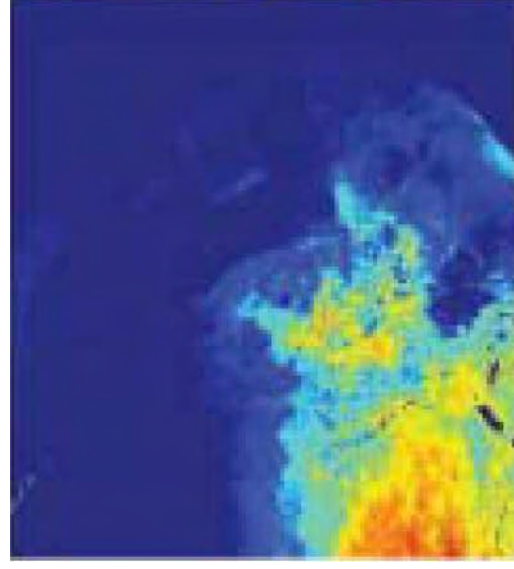
•Solar
radiation

$\epsilon = \epsilon^* T_1 T_2$

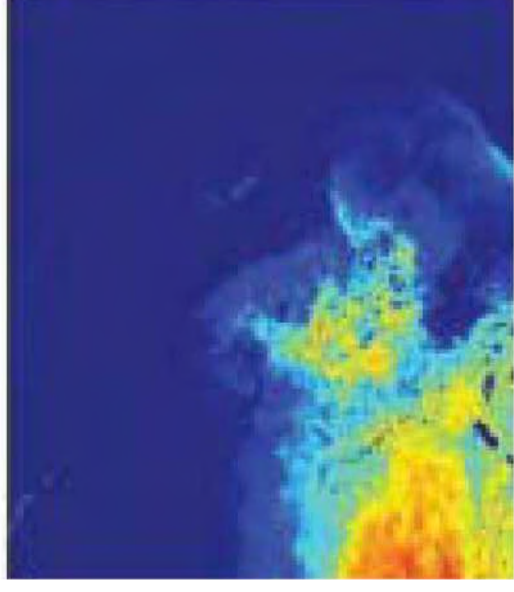
•Soil moisture
regulator

$$W = 0.5 + 0.5 \frac{(ET)}{(ET_0)}$$

•Without W



•With W

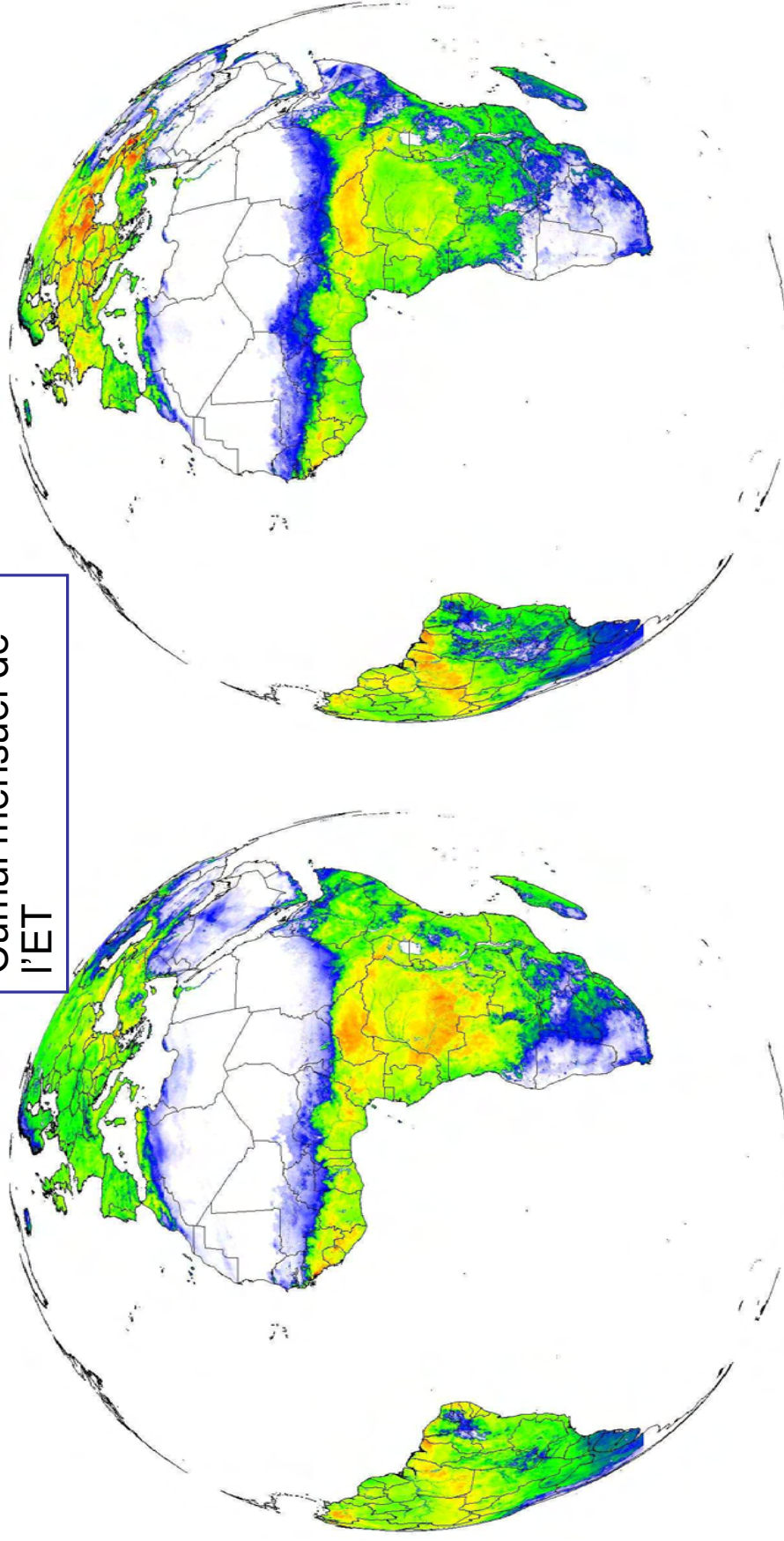


DMP ($10^4 \text{ kg ha}^{-1} \text{ day}^{-1}$)

x



Cumul mensuel de l'ET

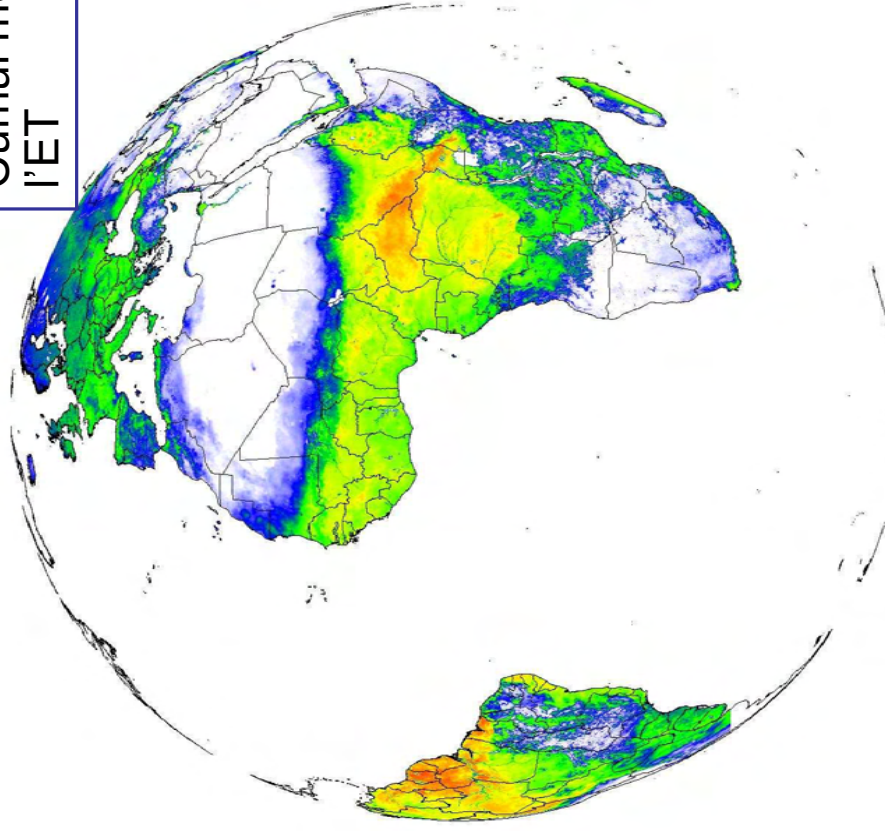


Mai 2010

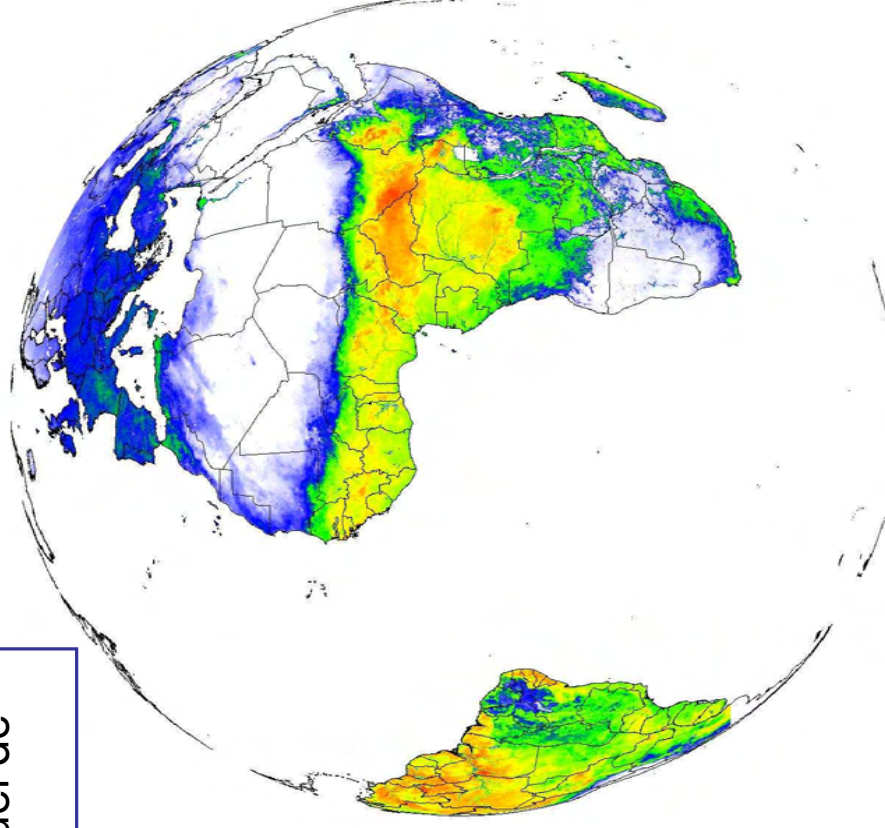
Juin 2010



Cumul mensuel de
l'ET



Sept. 2010

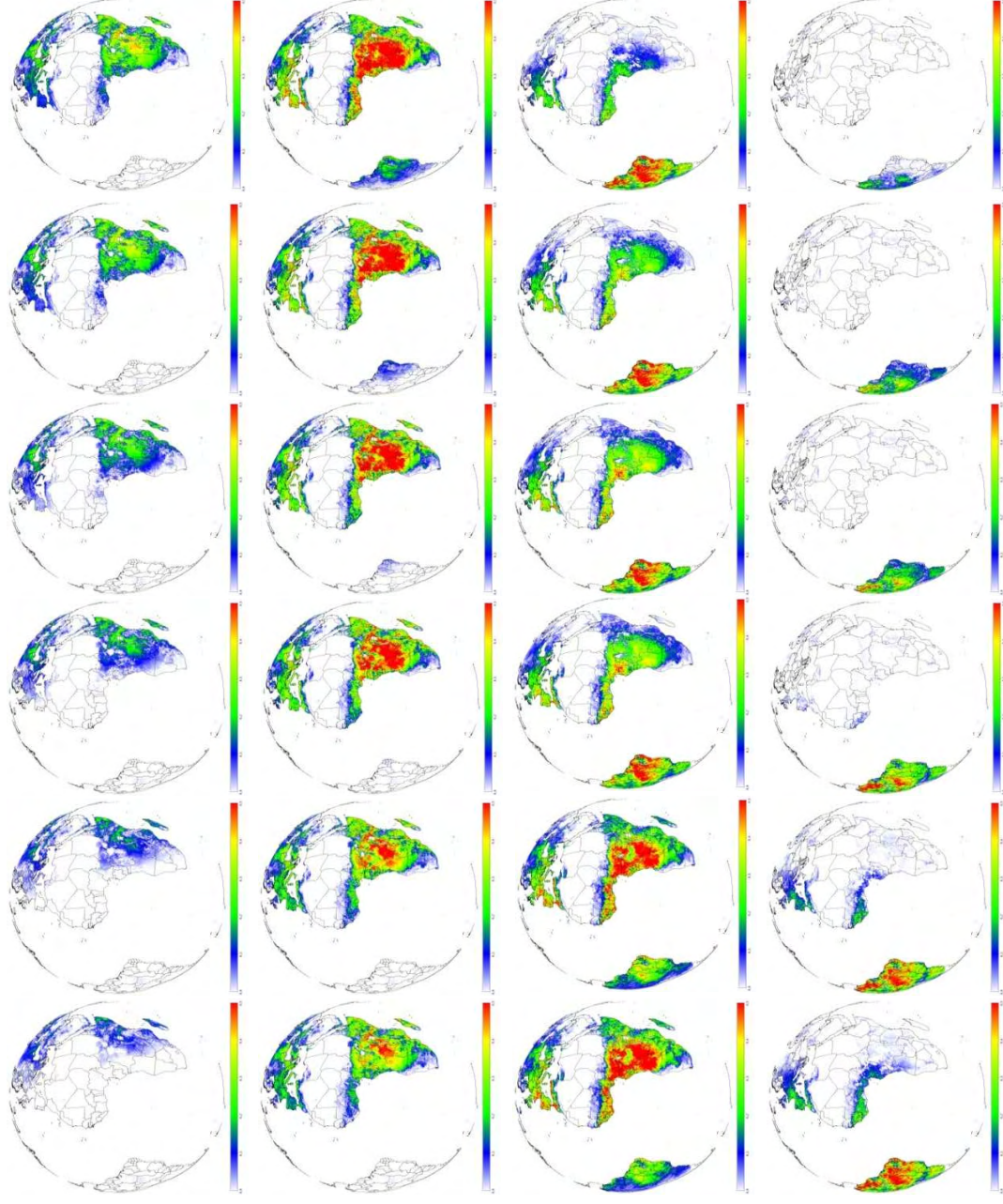


Oct. 2010





Merci



Exemple de valeurs
ET (mm/h) horaires
pour le 28/04/2010