Impact des feux aux hautes latitudes de l'hémisphère Nord

-- Etudes au LMD --

CLIMSLIP:

Task 2: Boreal sources of trace gases and aerosols

- D2.5: Implementation of improved fire parameterization in LMDz- INCA and evaluation of the trace gas distributions using satellite (IASI) and aircraft data (Partner 5, Month 15)

Task 6: Aerosol and ozone plume processing

- D6.1: Initial conditions for Lagrangian calculations of Arctic chemical and aerosols (simulations of WRF-Chem or LMDz- INCA) (Partner 5,1, month 6)

Task 7: Regional and global modelling

- D7.1: Initial conditions for Polar-WRF and calculations of Arctic chemical and aerosols previously optimized emission scenarios and simulations of LMDZ-INCA model. (Partner 5, month 6)
- D7.2: Simulations of the Arctic atmosphere composition for gases (CH_4, CO, O_3, NOx, ..) and aerosols using LMDZ-INCA based on available inventories and optimized scenarios (for methane), contribution to POLMIP (Partners 5,1, month 6)
- D7.4: Evaluation of model simulations of trace gases by comparisons to satellite observations (IASI) available in situ measurements (POLARCAT and YAK campaigns), (surface networks, ozonesondes, MOZAIC aircraft observations) (Partner 5, month 15)
- D7.5: Global simulation using LMDz-INCA source attribution tracers to quantify pollutant contributions to Arctic (Partner 5, month 15)

➔ Analyse et validation des simulations.

Impact des feux aux hautes latitudes de l'hémisphère Nord

-- Etudes au LMD --

PICS coopération Russie:

Quantifying the impact of the summer 2010 fires in Russia on regional air quality using regional modeling with in situ and satellite obs.

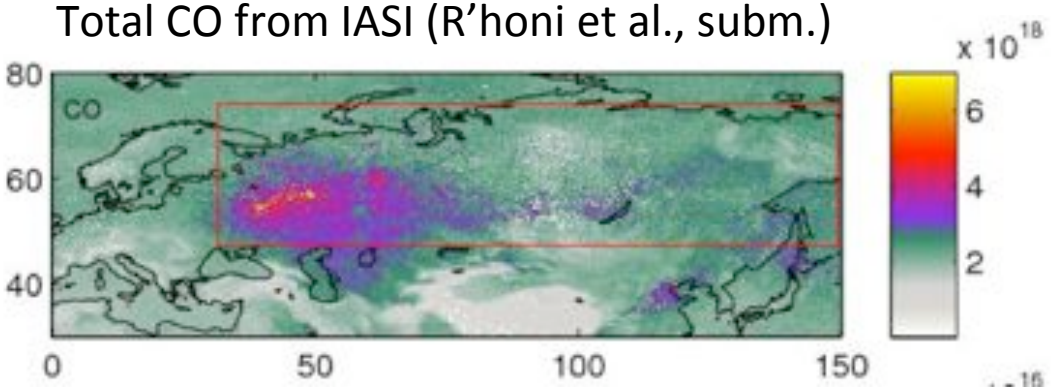
Russian partners from the A.M. Obukhov Institute of Atmospheric Physics RAS, Moscow ➔ Observations, analyse liens avec conditions météo

French partners from LMD/IPSL: S. Turquety, D. Khvorostyanov, L. Menut, S. Stromatas, H. LeTreut

➔ Simulations of regional air quality with **CHIMERE + comps obs in situ, satellites**

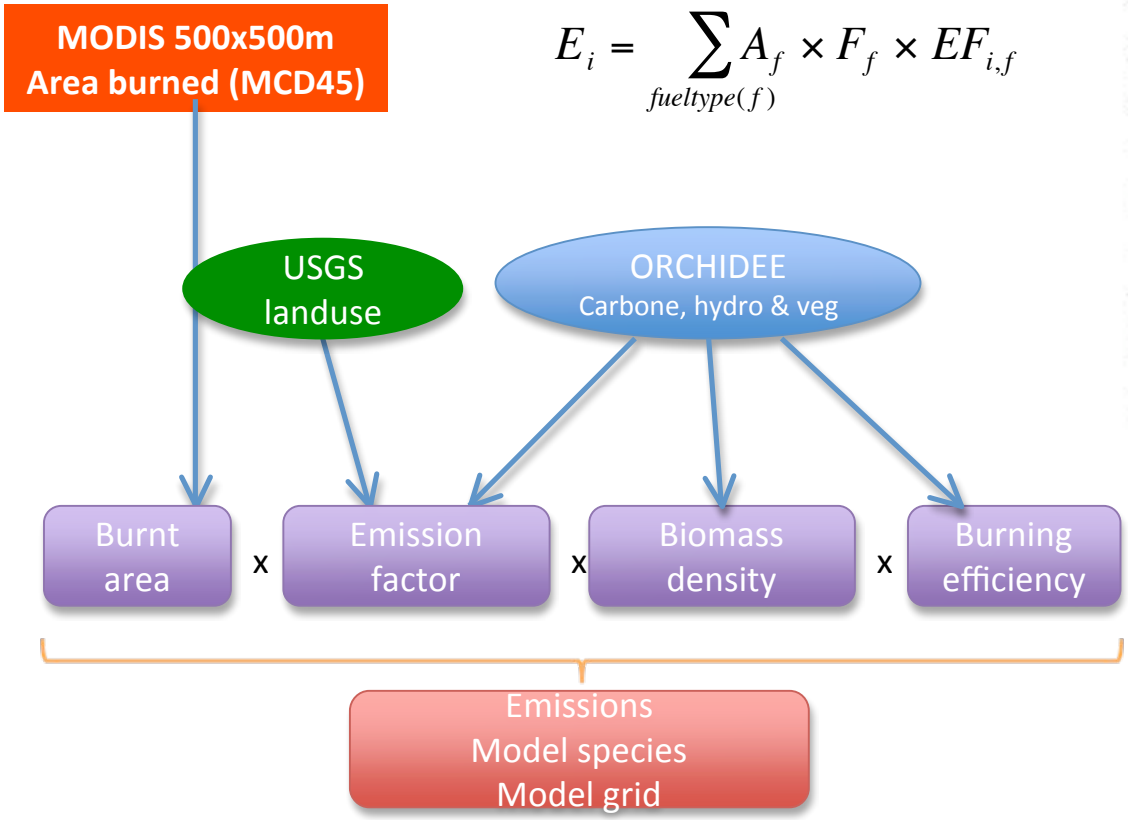
=> Setup modèle pour la Russie, analyse 2010

Total CO from IASI (R'honi et al., subm.)

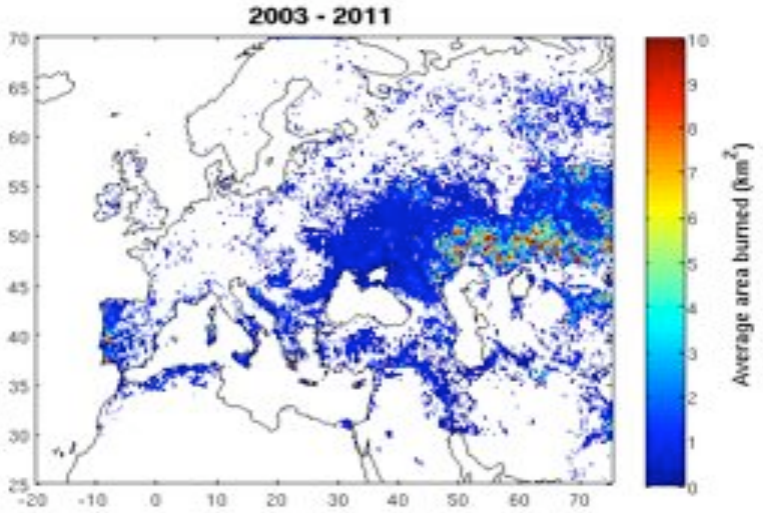


Inventaire régional des émissions par les feux de végétation

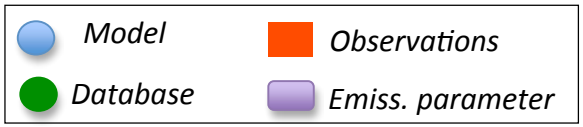
Approche générale



$$E_i = \sum_{fueltype(f)} A_f \times F_f \times EF_{i,f}$$



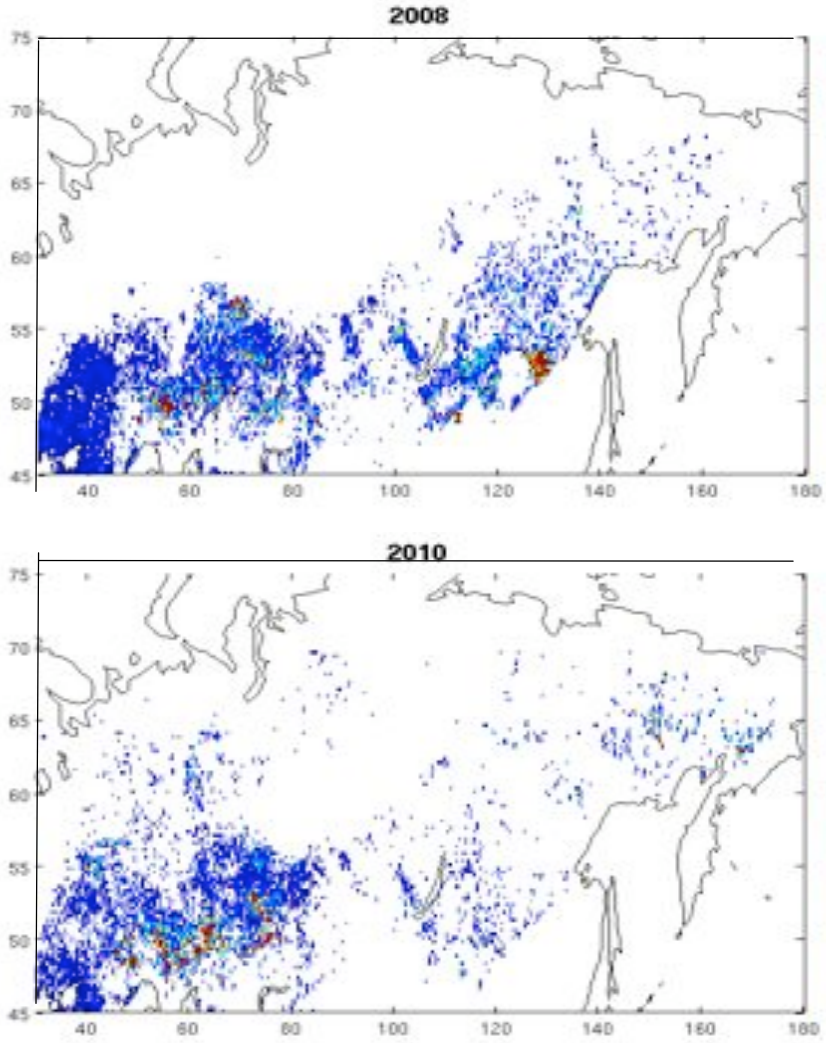
Estimation a priori des émissions pour toutes les espèces gazeuses et particulaires pour lesquelles on dispose de facteurs d'émission.

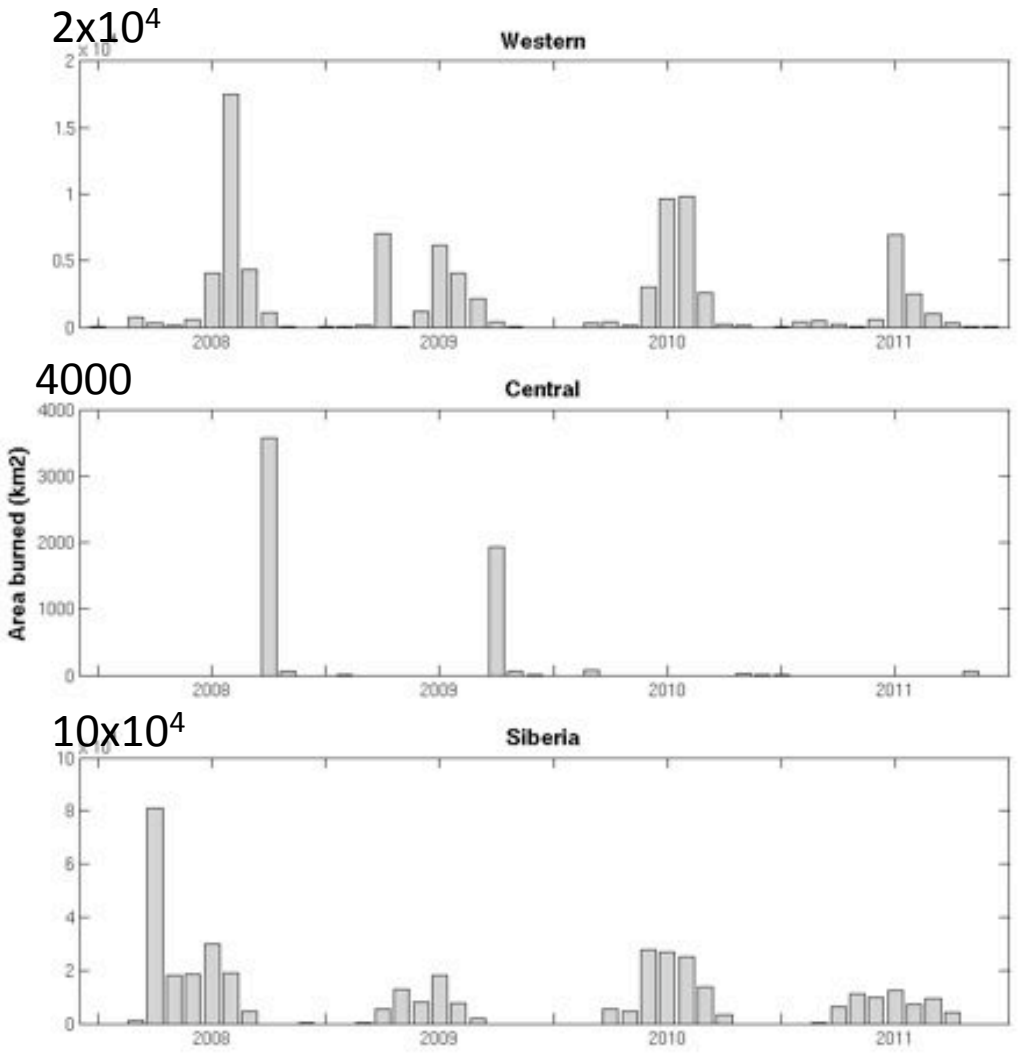


(www.lmd.polytechnique.fr/apiflame)

Adaptation aux feux Russes & comparaisons

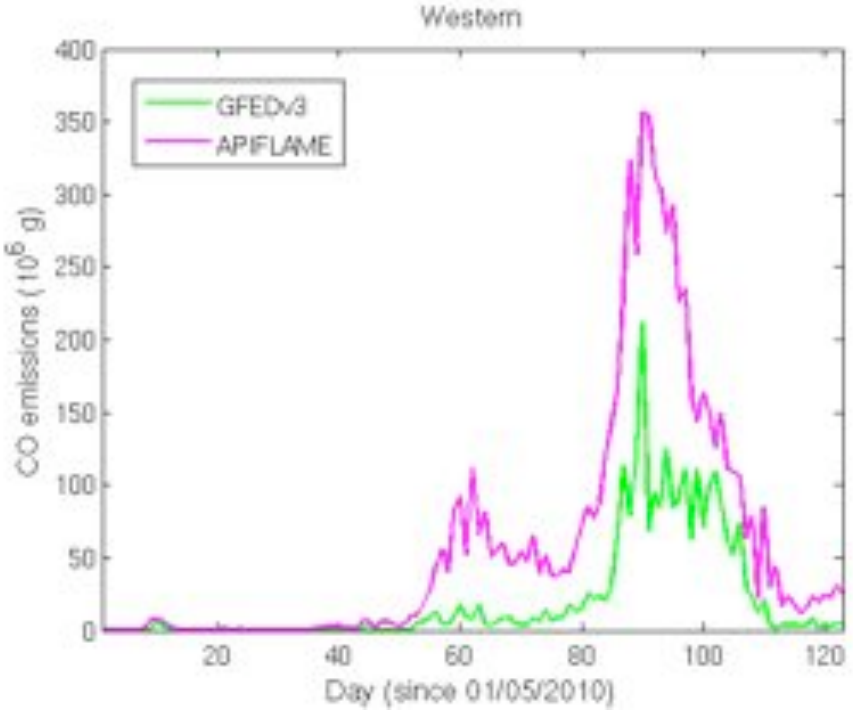
MODIS AB (MCD64) @ 0.25°x0.25°

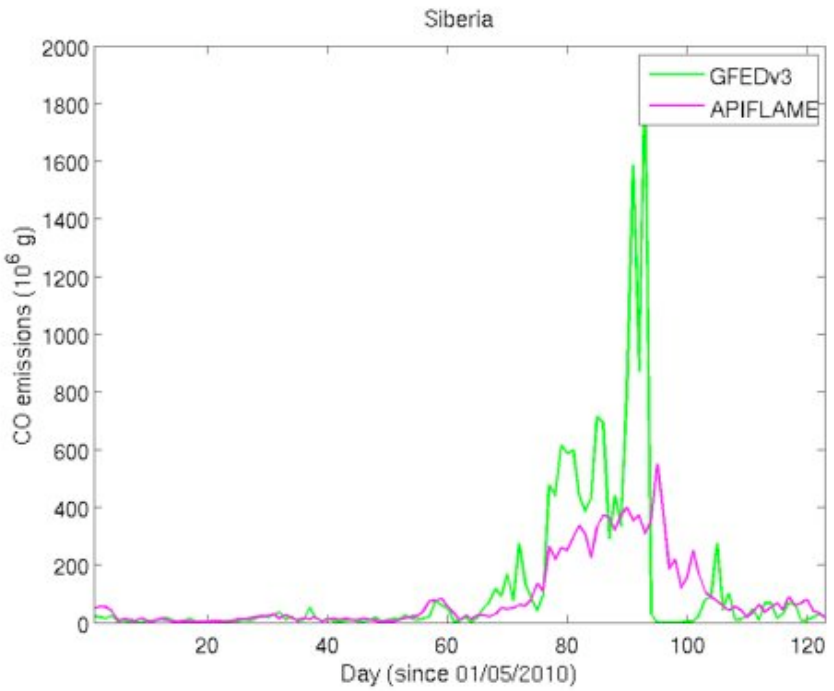




Adaptation aux feux Russes & comparaisons **préliminaires**

Comparison to widely used GFED inventory (Van der Werf et al.)





Total CO July-August: 26.2 Tg; 6.7Tg in Western part.

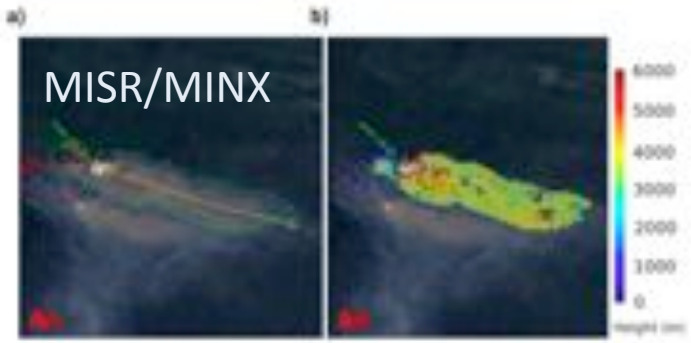
Top-down estimates based on satellite observations:

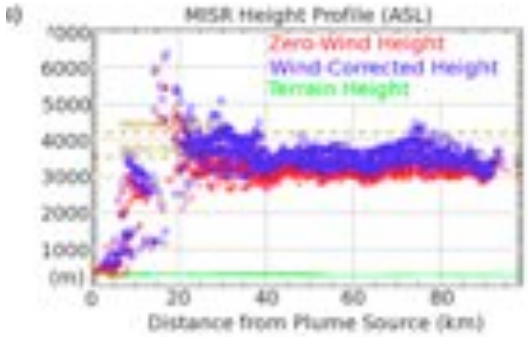
- Yurganov et al. => 34-40 Tg CO
- R'Honi et al. => 18-33 Tg CO

Contrainte de l'altitude d'injection

Observation de l'altitude des panaches

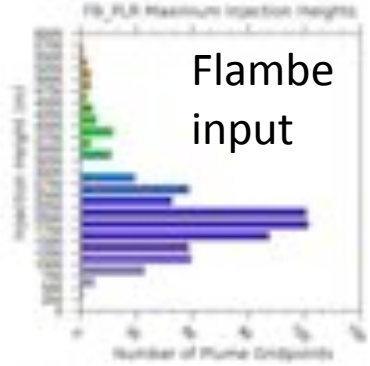
Sessions et al., ACP, 2011

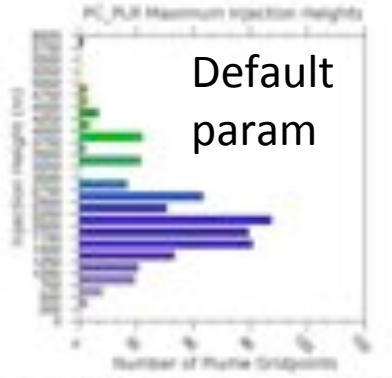




Simus WRF-Chem

(1D plume rise by Freitas et al)





Obs. panaches
Canada + Sib.

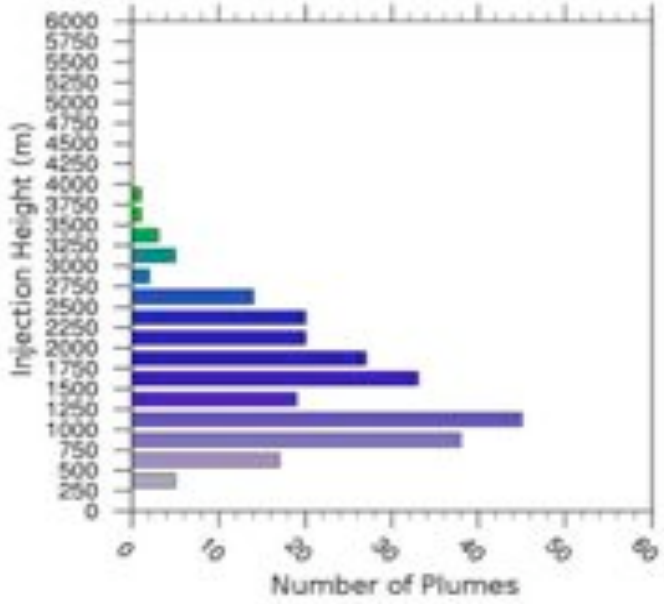
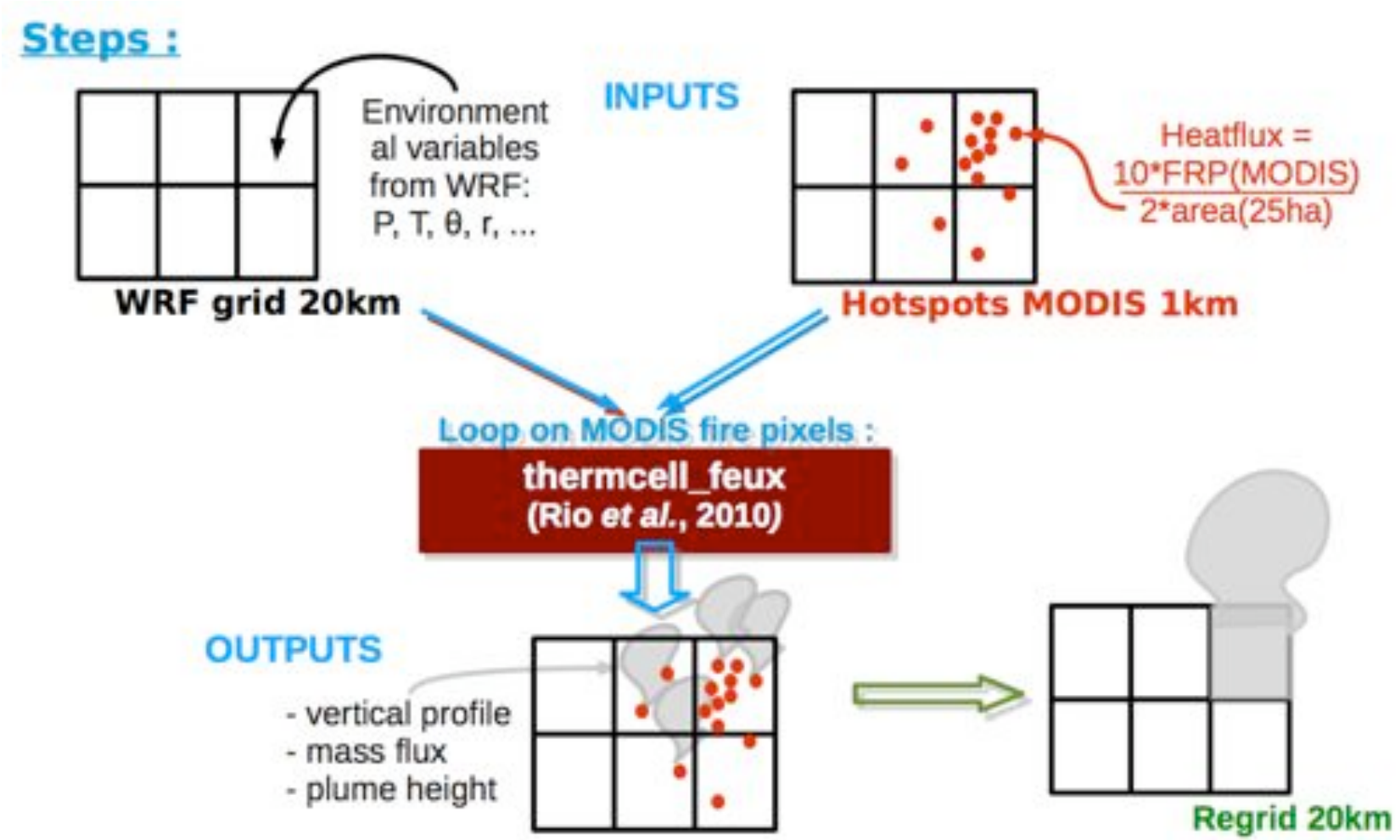


Fig. 5. Distribution of WRF-Chem maximum injection heights over Siberia and Canada during the entire ten day simulation period for (a) FB-PLR and (b) FC-PLR biomass burning emissions. (c) MISR plume height distribution for the same period. Note the difference in scale between (c) and (a–b).

Contrainte de l'altitude d'injection

Modélisation de la pyroconvection au LMD

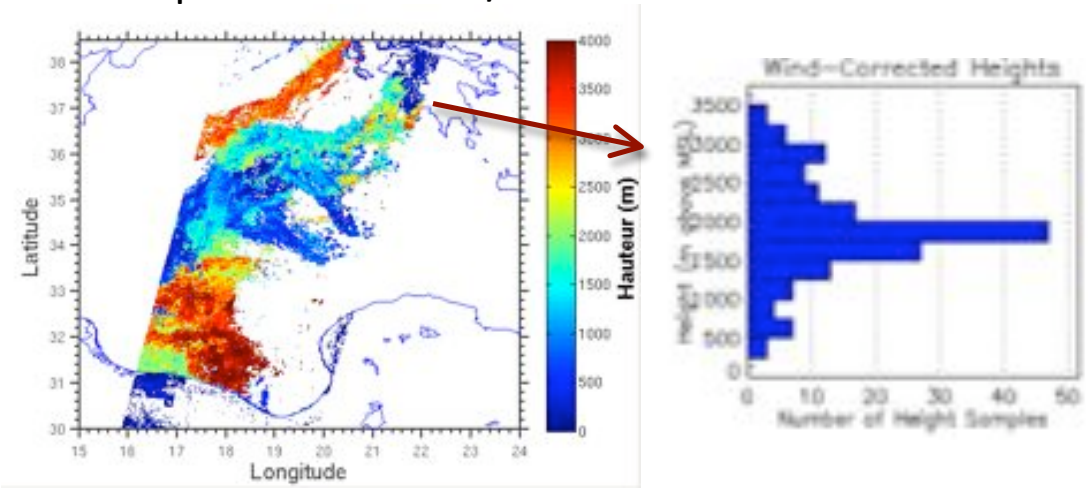
Adaptation code Rio et al (ACP, 2011)



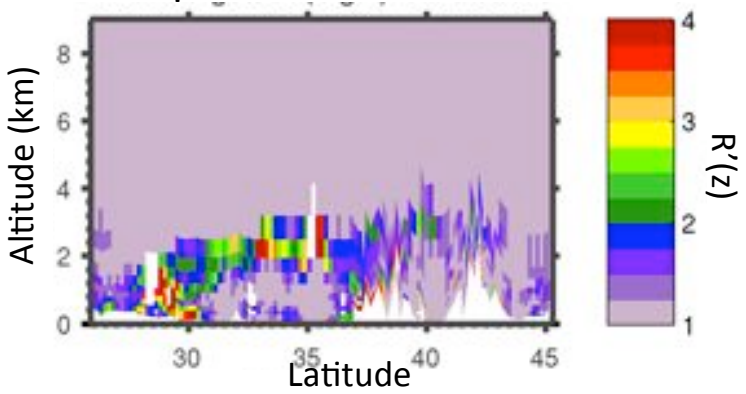
Contrainte de l'altitude d'injection: travaux sur la Méditerranée

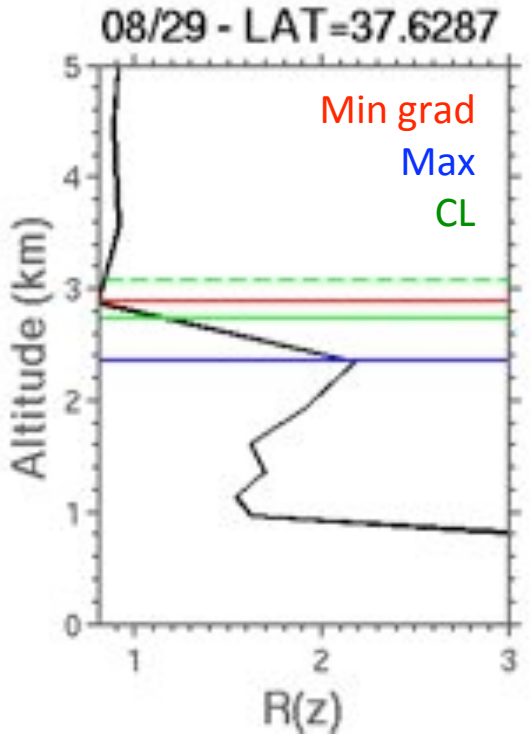
(Géraldine Réa, thèse LMD)

Exemple obs MISR 08/2007



Exemple obs CALIOP 08/2007





Comparaison pyroconv 1D vs obs
Événement feux Grèce(1 jour, moyenne régionale)

	Modèle (24 pts)	L2 MISR (13 pts)
moyenne (m)	2766,8	2379,5
médiane (m)	2580,4	2232
std (m)	799	1373,3

Travail prévu – modélisation LMDz-INCA

Post-doc en cours de recrutement!

1. Simulation 2008 + traceurs CO pour POLMIP (déc-janv)

2. Comparaisons IASI CO (project POLMIP Jennie, Sarah Monks) (janv-fev)

3. Simulations 1D altitude d'injection et comps MISR,CALIOP (janv-fev)
   - Etudes de sensibilité pour décider de la méthode

4. Implémentation code pyroconvection dans LMDz-INCA (fev-mars)

1. Simulations LMDz-INCA & études de sensibilité (2008)
   - Injection CLA, pyroconv online/offline, obs, etc. (…)
   - Résolution simulations

2. Comparaisons observations IASI, MODIS, CALIOP + campagnes obs