The high climatic risk of European wild bees and bumblebees

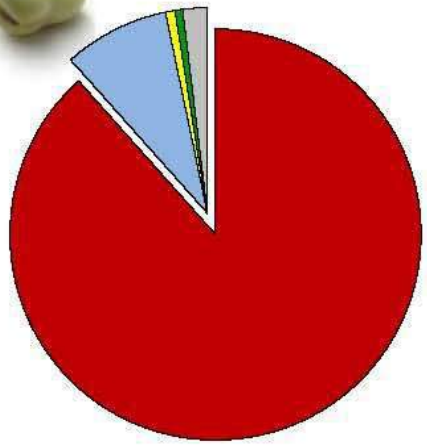
by Pierre **Rasmont**

14.VI.2016
Brussels

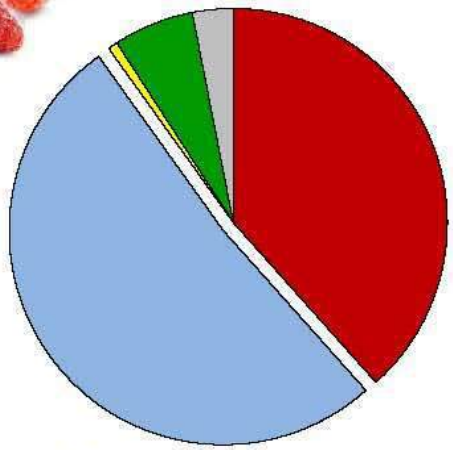
Wild bees and bumblebees: 1965 species in Europe

Each crop is different (UK)

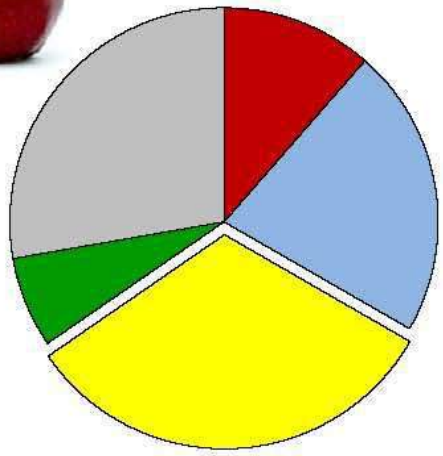
Field beans



Strawberries



Apple



Honeybees

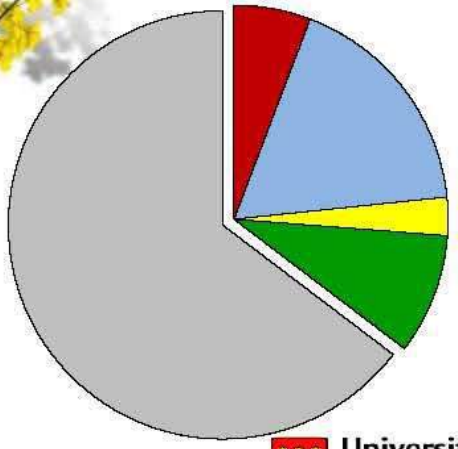
Bumblebees

Solitary bees

Hoverflies

Other insects

Oilseed



Garratt et al. 2014 **Biol. Con.**; Garratt et al. 2014 **JPE**

University of Reading

Each pollinator is different

STEP

Apples

Solitary bees

€10,400/ha

Honey bees

€1,800/ha

Hoverflies

€415/ha

Bumblebees

€4,600/ha

Garratt et al. 2014 **Biol. Con.**

University of Reading

Bumblebees are the only pollinator insects in Boreal and Arctic biomes, e.g. in N. Scandinavia and in N. Russia


Silene acaulis


Hedysarum alpinum


Astragalus alpinus


Pedicularis lapponica


Salix lapponum


Bartsia alpina


Arctostaphylos uva urs

2010-2015

FP7 STEP project

Status and Trends of European Pollinators

16 EC countries, 21 labs

Thanks to this very important project, we gathered 3.2 millions data about European wild bee species

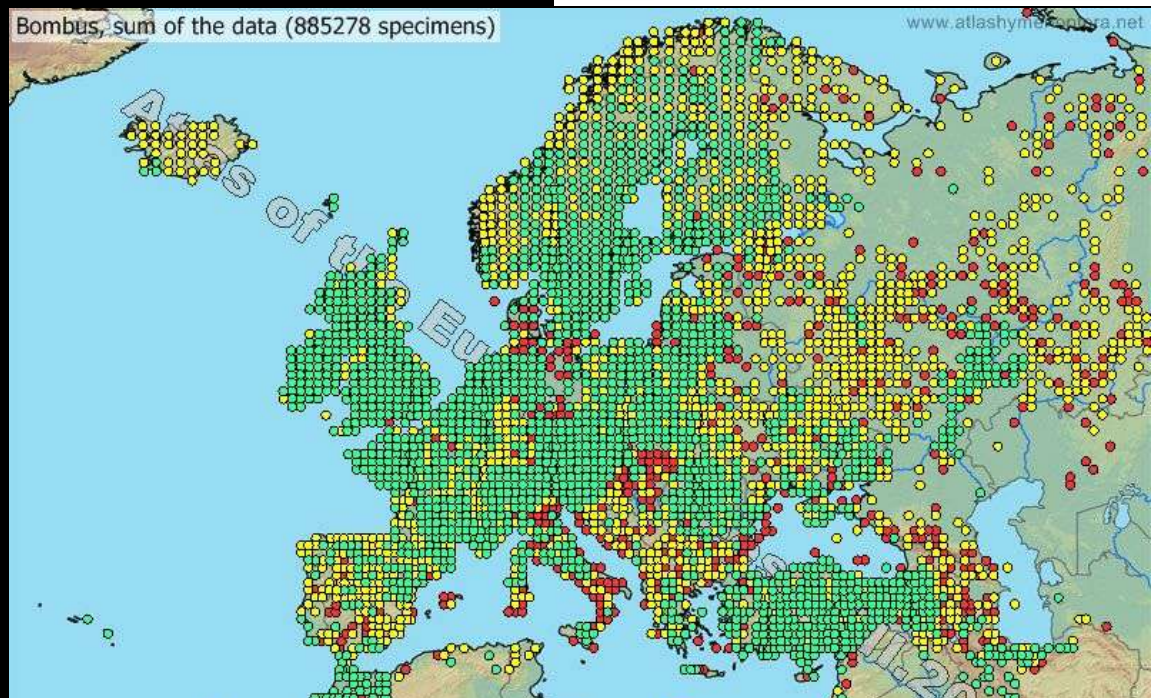
2010-2015

FP7 STEP project

Status and Trends of European Pollinators

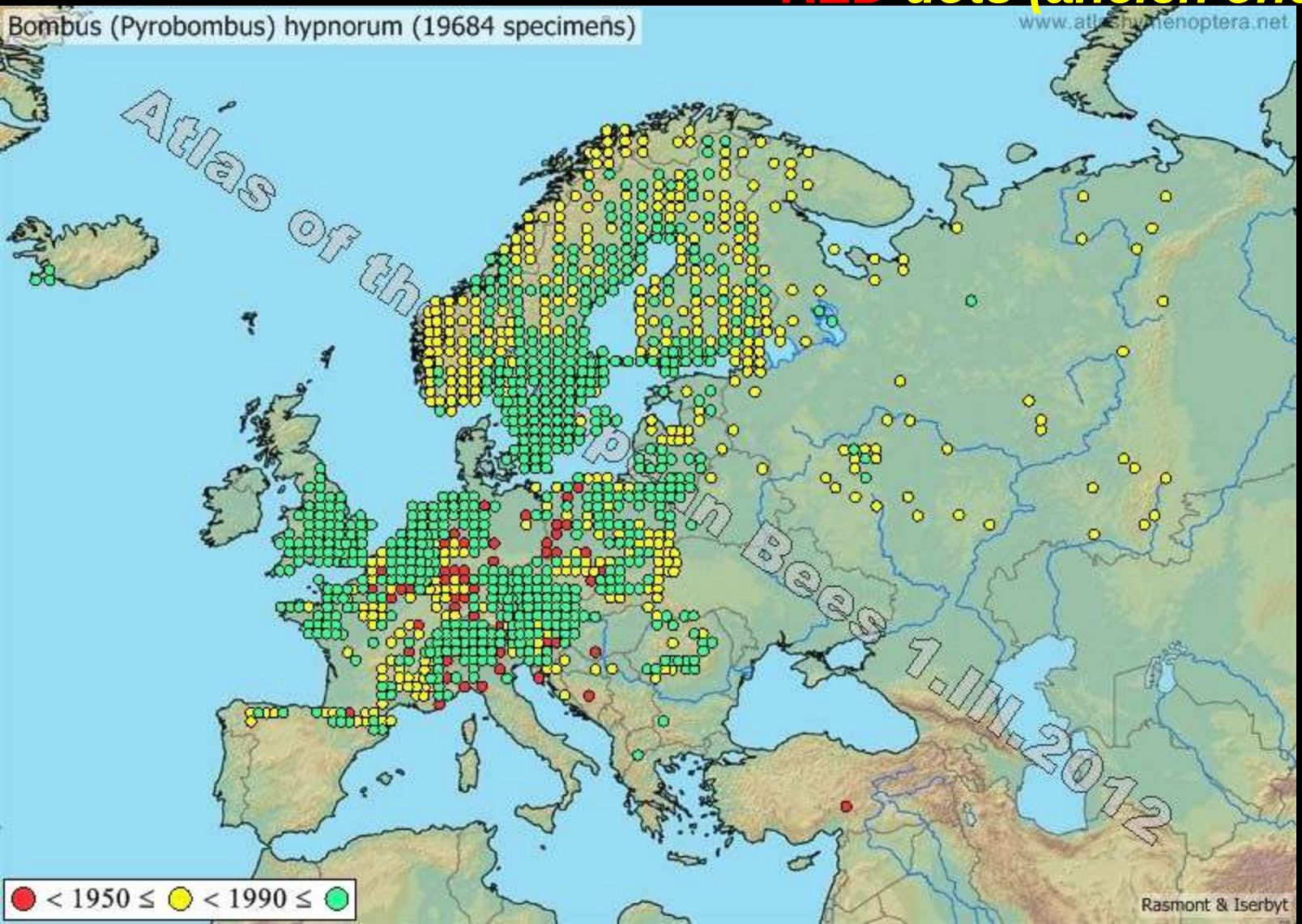
This project allowed so to elaborate full mapping of more than 2000 European species, to produce the first IUCN Red List of European Bees. We have been able to assess the fate of the European wild bees and bumblebees.

2011	1 391 538	data
2013	2 232 396	data
2015	**3 277 936**	**data**

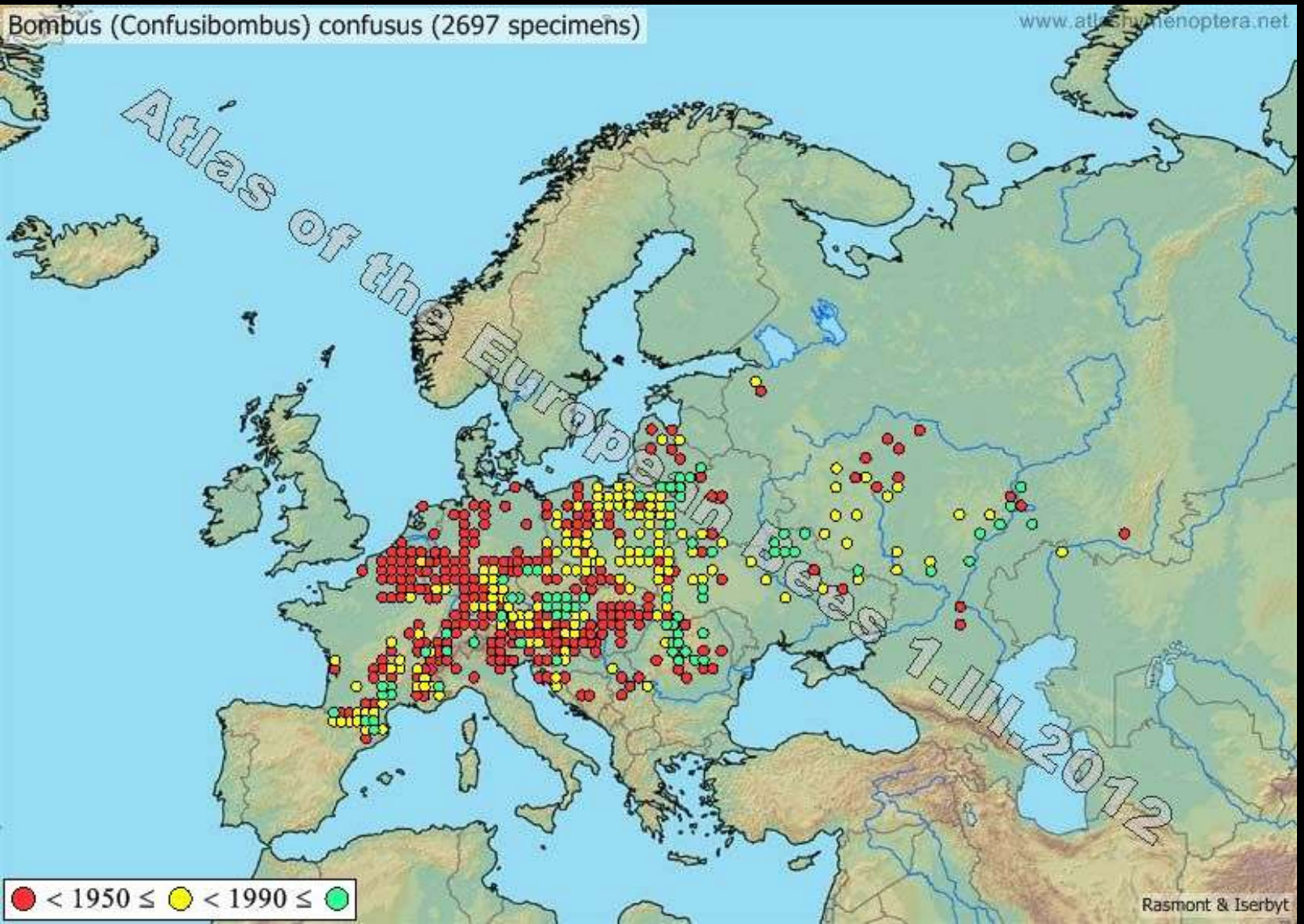


Maps allow to assess the "health" of each species.

This is a species in good health: more GREEN dots (recent observations), than RED dots (ancien ones)



This is a species that is clearly threatened: much more RED dots than GREEN ones.



Redlist of European bees 2015

1965 species

The most diversified groups assessed by IUCN in Europe !

European Red List of Bees

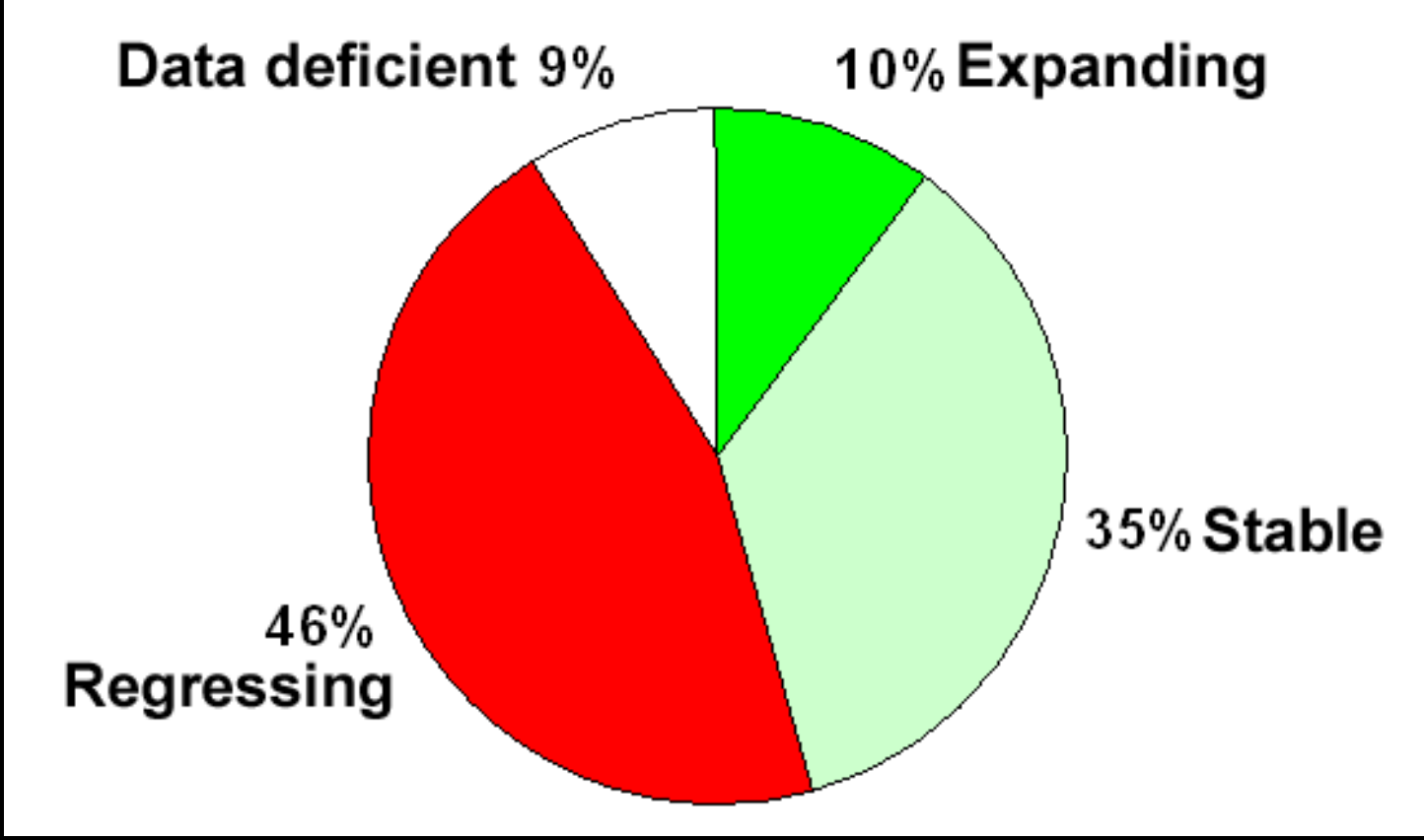
Ana Nieto, Stuart P.M. Roberts, James Kemp, Pierre Rasmont, Michael Kuhlmann, Mariana García Criado, Jacobus C. Biesmeijer, Petr Bogusch, Holger H. Dathe, Pilar De la Rúa, Thibaut De Meulemeester, Manuel Dehon, Alexandre Dewulf, Francisco Javier Ortiz-Sánchez, Patrick Lhomme, Alain Pauly, Simon G. Potts, Christophe Praz, Marino Quaranta, Vladimir G. Radchenko, Erwin Scheuchl, Jan Smit, Jakub Straka, Michael Terzo, Bogdan Tomozii, Jemma Window and Denis Michez

European Commission | IUCN | SSC Species Survival Commission | IUCN SSC Bumblebee Specialist Group | RED LIST | STEP

Redlist of European bees 2015

To summarize the bumblebees situation as assessed in 2015

Redlist European Bees, Genus *Bombus* (Bumblebees)



The surprise is the main role played by <u>climatic factors</u> in this regression process, while we expected factors as pesticides, resources availability or landscape changes

We have now several evidence about climate impact:
- follow-up of selected mountain areas
- measures of heat-stress resistance in heat waves
- indirect impact through wild fires
- modelling of climatic envelope in climate warming
- meta-analysis of data from Europe and N. America
- ...

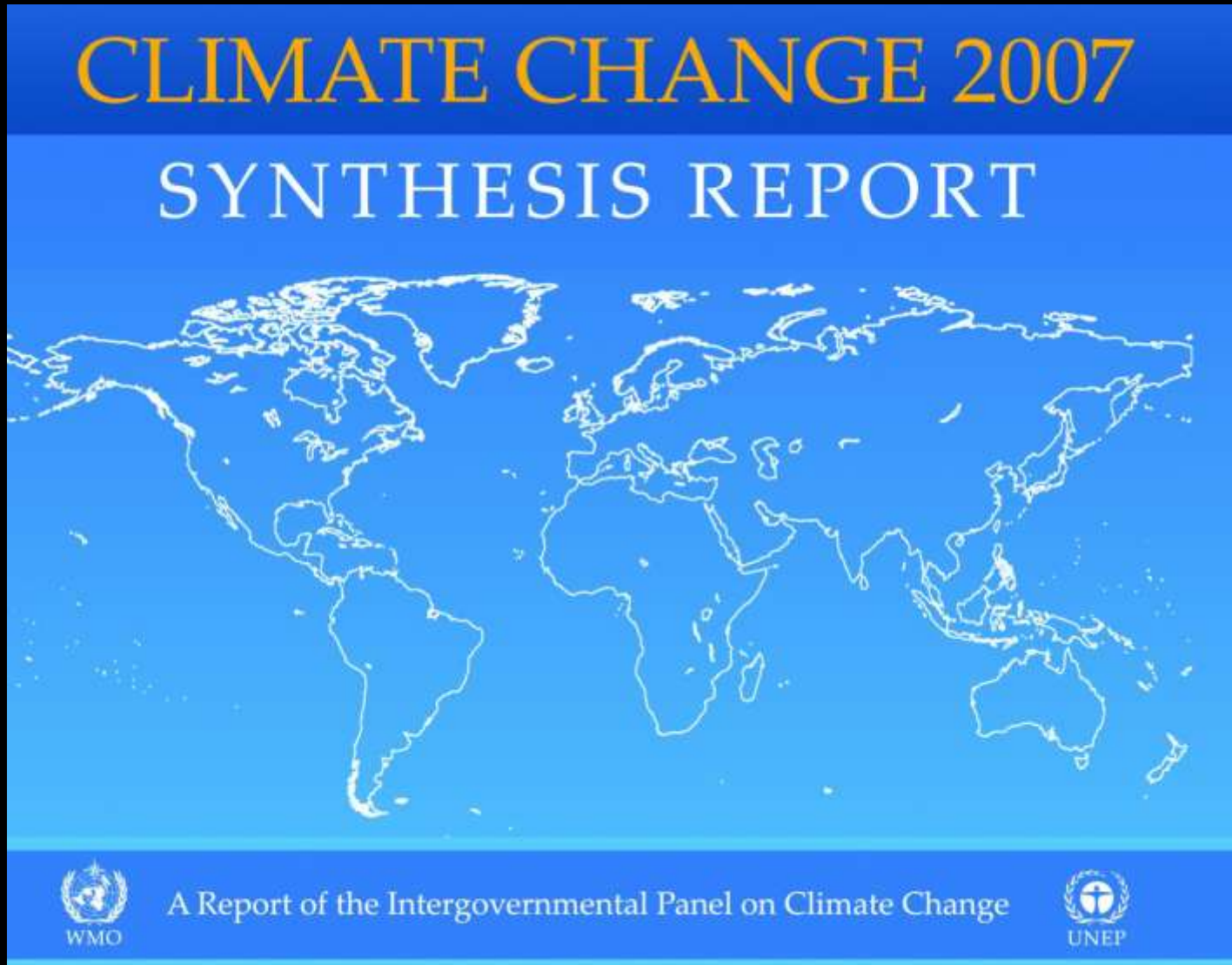
1999 : a cold and wet year, with a high abundance of bumblebees.

Iserbyt & Rasmont, 2012

Bumblebees are 4 times more abundant in cold and wet years

2005 : a hot and dry year, with a very low abundance of bumblebees.

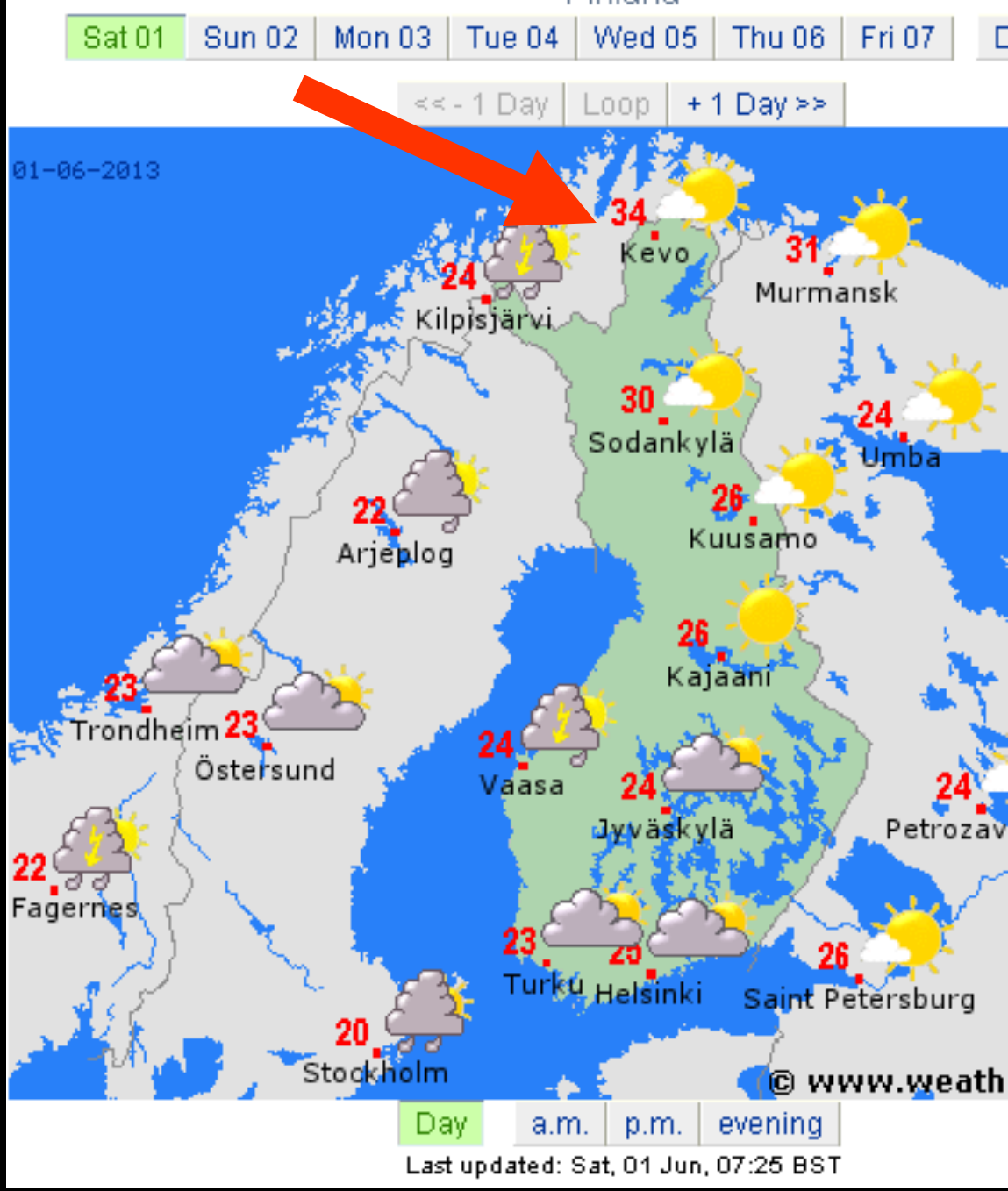
The IPCC estimation for the 20°century : +0.74°C (1906-2005).
This deals with mean temperatures only. ***However, populations appears mostly impacted by extreme events, as*** **heat waves.**



Exemple:

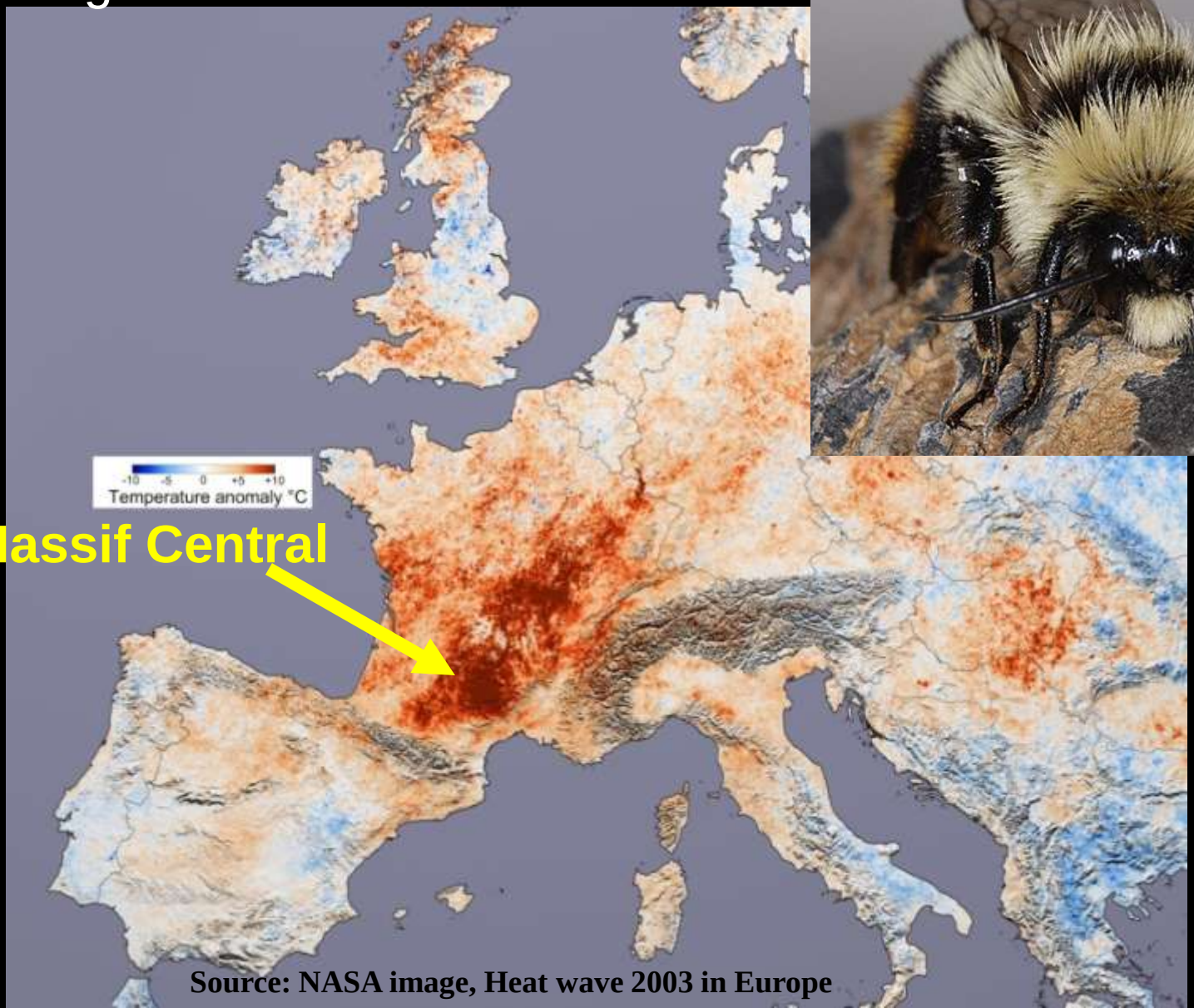
Kevo, Finnish Arctic
May 31 2013,
early spring.

During one full week
the temperature
crossed 30°C
reaching 34°C,
instead of
the normal 14°C
maximum of the
location.



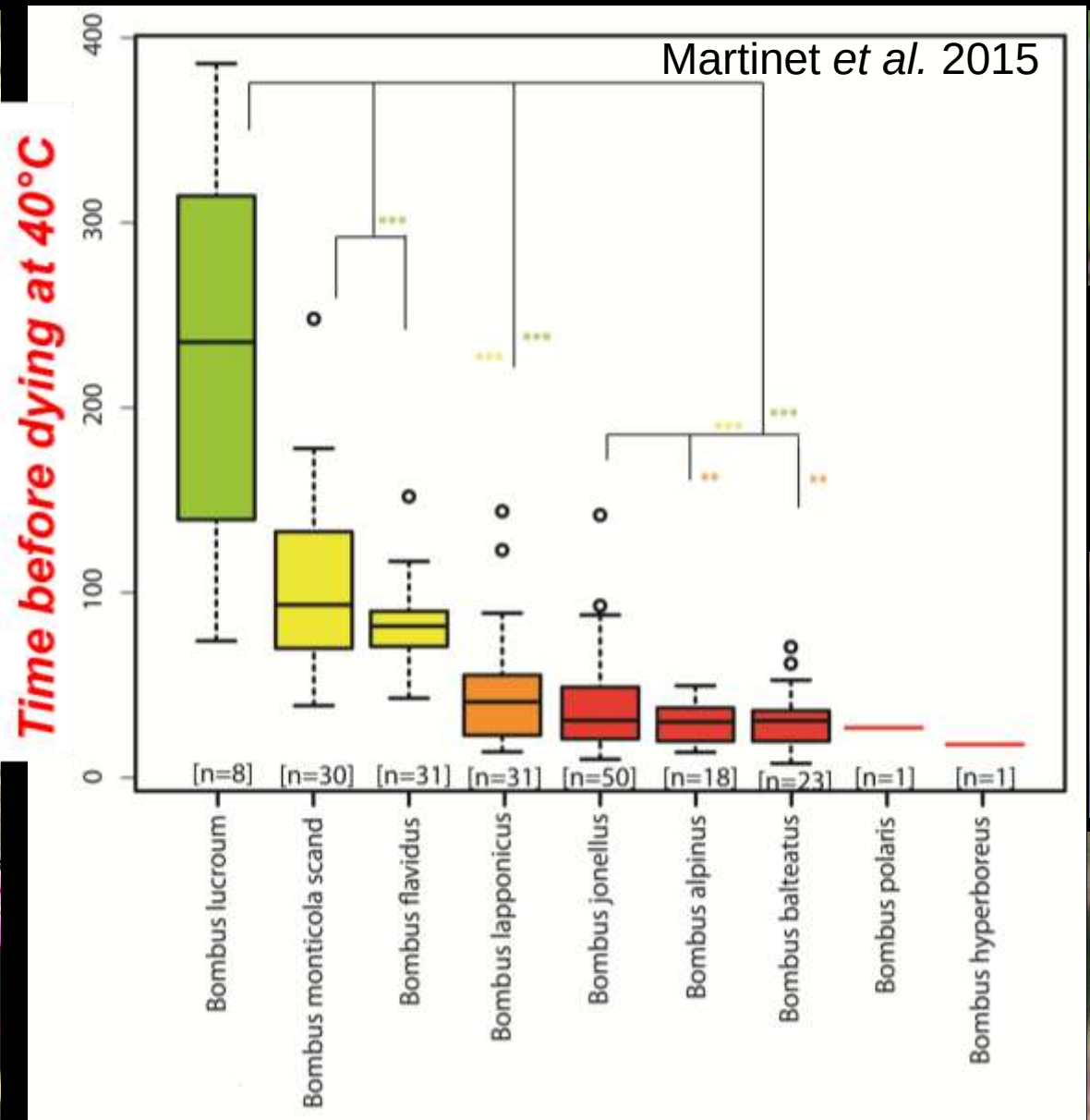
Such event strongly affect vegetation, as in this heathland (Brora, Scotland, 2009)

The very last populations of *Bombus cullumanus* have been extirpated from its last locations in Massif Central during the 2003 heat wave

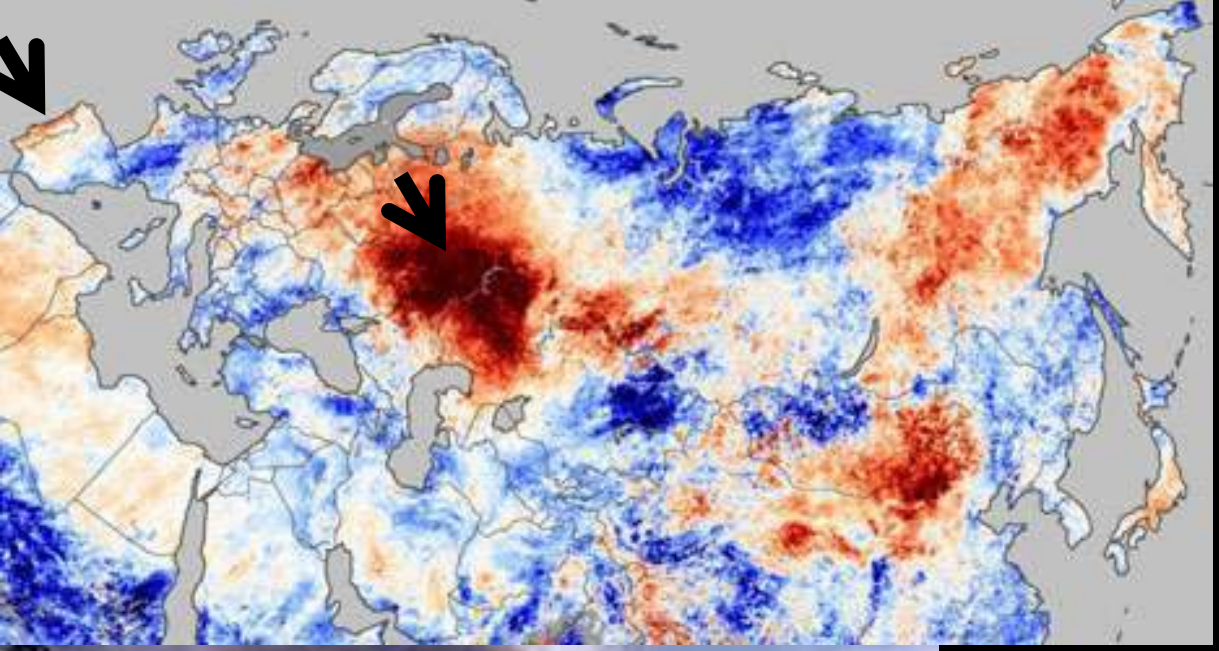


Source: NASA image, Heat wave 2003 in Europe

We measured the Impact of heat stress on bumblee species



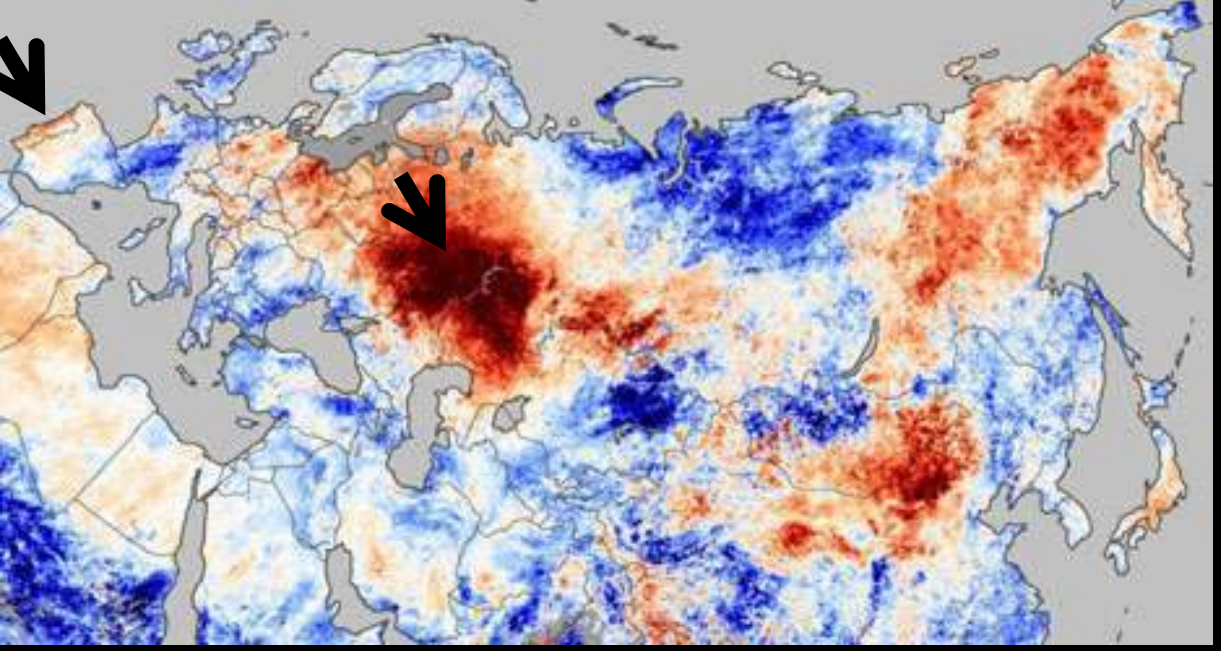
WILD FIRES



Temperature anomalies from July 20—27, 2010, Source: NASA image

Wild fires in Russia and Portugal, 2010

http://jotman.blogspot.be/2010/08/map-of-fire-situation-in-russia.html



WILD FIRES

Temperature anomalies from July 20—27, 2010, Source: NASA image

Wild fires in Russia and Portugal, 2010

Wild fires have been identified as a major risk for a bunch of southern wild bee species. It could also impact boreal ones

Nieto et al. 2015
Lazarina et al. 2016
http://jotman.blogspot.be/2010/08/map-of-fire-situation-in-russia.html