Belmont Forum

E-INFRASTRUCTURES & DATA MANAGEMENT
Collaborative Research Action

VULnerability of Populations under Extreme Scenarios

vulpesproject.wix.com/vulpes

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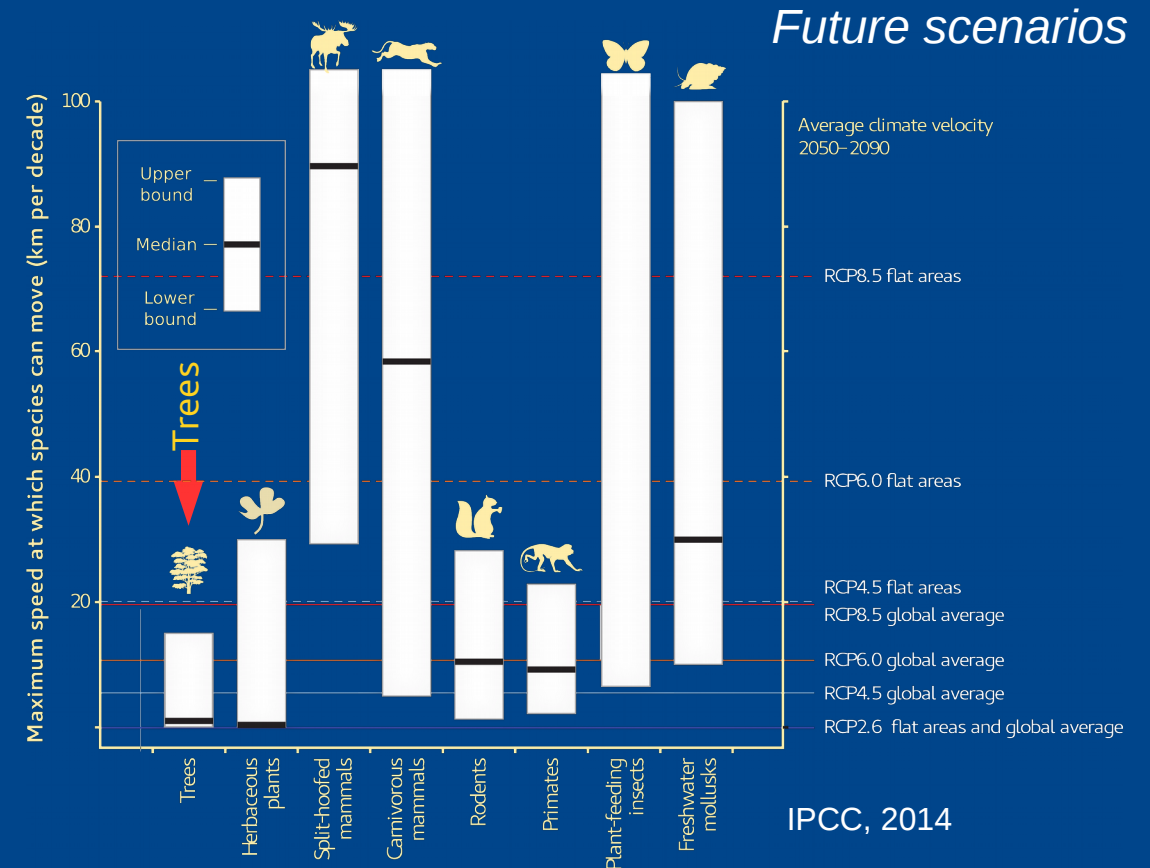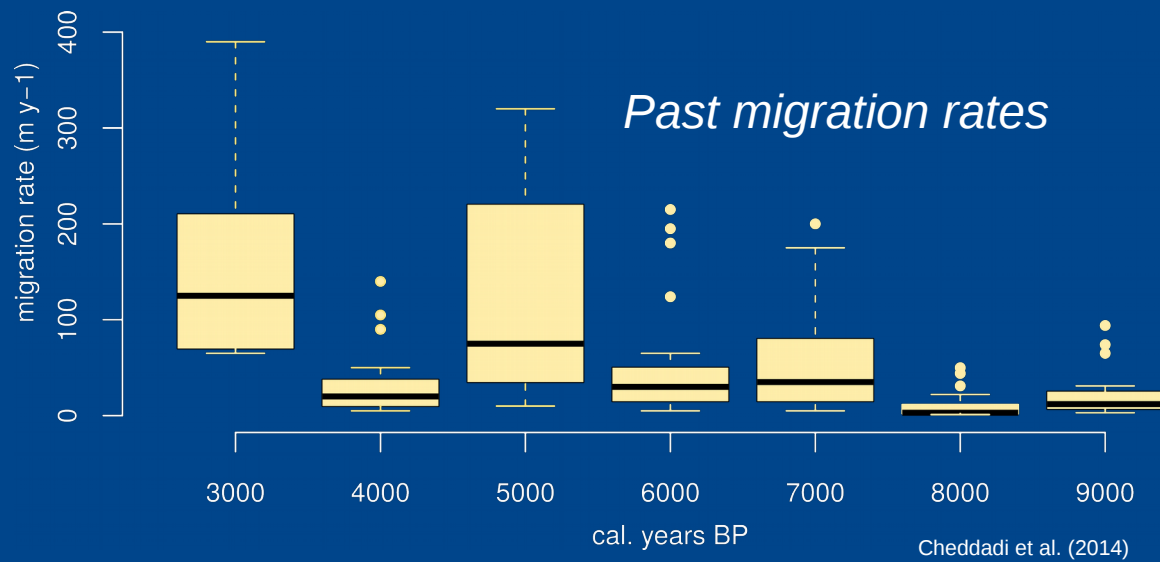
ANR AGENCE NATIONALE DE LA RECHERCHE

BELMONT FORUM

PROJECT DESCRIPTION

STARTED IN MAY 2016

*The past migration rates of plant species were substantially slower (**~1 to 2km per decade**) than the rates that will be needed (**>10km per decade**) to track 21st-century warming*

Past migration rates

Future scenarios

migration rate (m y−1)

400
300
200
100
0

3000   4000   5000   6000   7000   8000   9000

cal. years BP

Cheddadi et al. (2014)

Maximum speed at which species can move (km per decade)

100
80
60
40
20

Upper bound
Median
Lower bound

Trees

Average climate velocity 2050–2090

RCP8.5 flat areas

RCP6.0 flat areas

RCP4.5 flat areas
RCP8.5 global average

RCP6.0 global average
RCP4.5 global average
RCP2.6 flat areas and global average

Trees · Herbaceous plants · Split-hoofed mammals · Carnivorous mammals · Rodents · Primates · Plant-feeding insects · Freshwater mollusks

IPCC, 2014

PROJECT DESCRIPTION

VULPES partners will investigate the potential persistence of mountainous tree species in a few spots within their current range over a period of several thousands of years. Some mountainous spots played the role of microrefugia for many species worldwide over several thousands of years.

VULPES AIMS AT IDENTIFYING THESE MICROREFUGIA FOR THE FUTURE PERSISTENCE OF SEVERAL MOUNTAINOUS TREE SPECIES IN AFRICA, ASIA, AND SOUTH AMERICA AND PROVIDING SOUND INFORMATION TO FOREST MANAGERS AND POLICY MAKERS.

The microrefugia will be identified using fossil proxies, modern and ancient DNA and modelling tools.
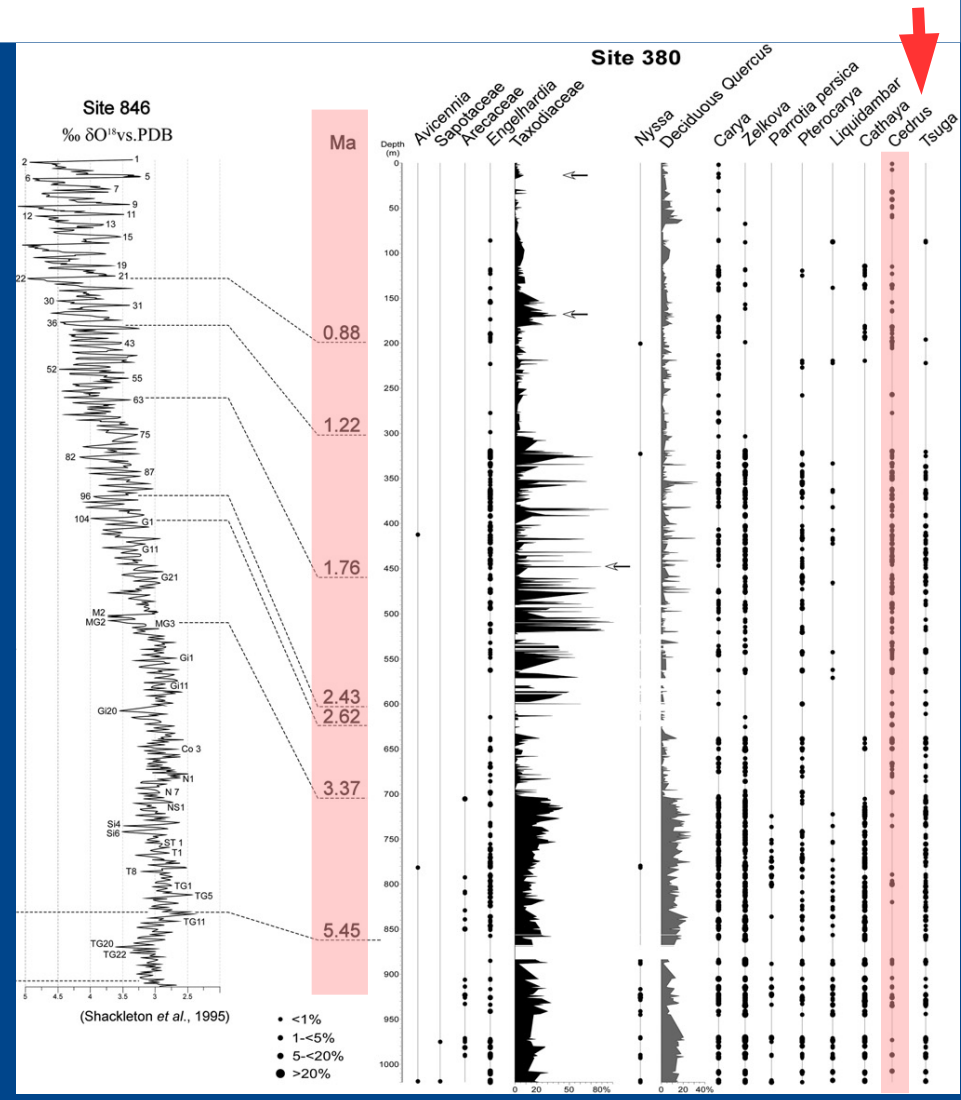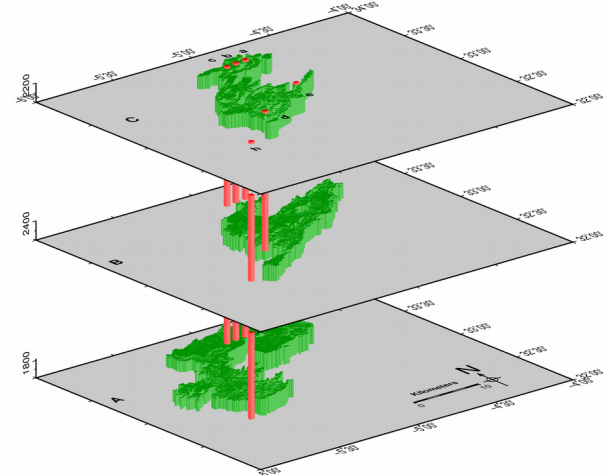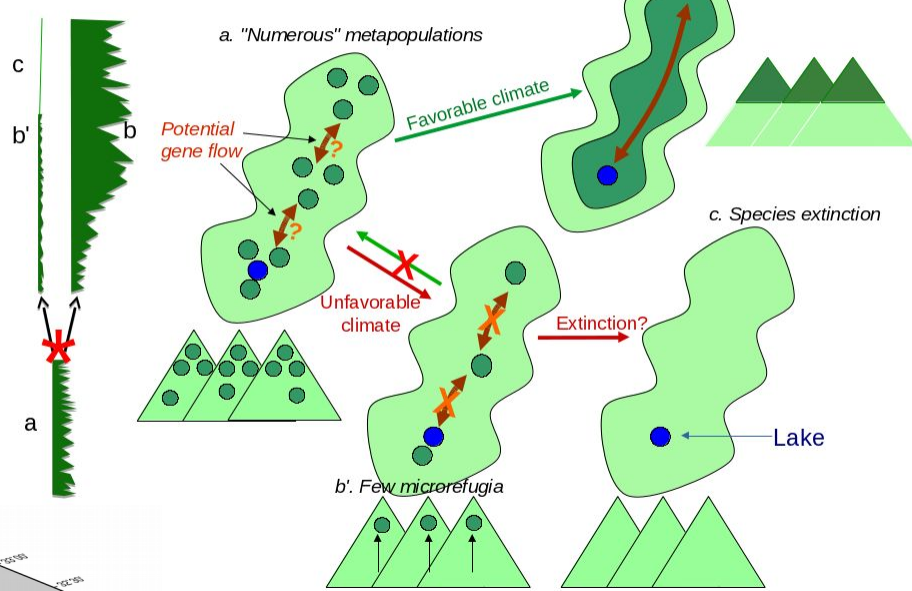
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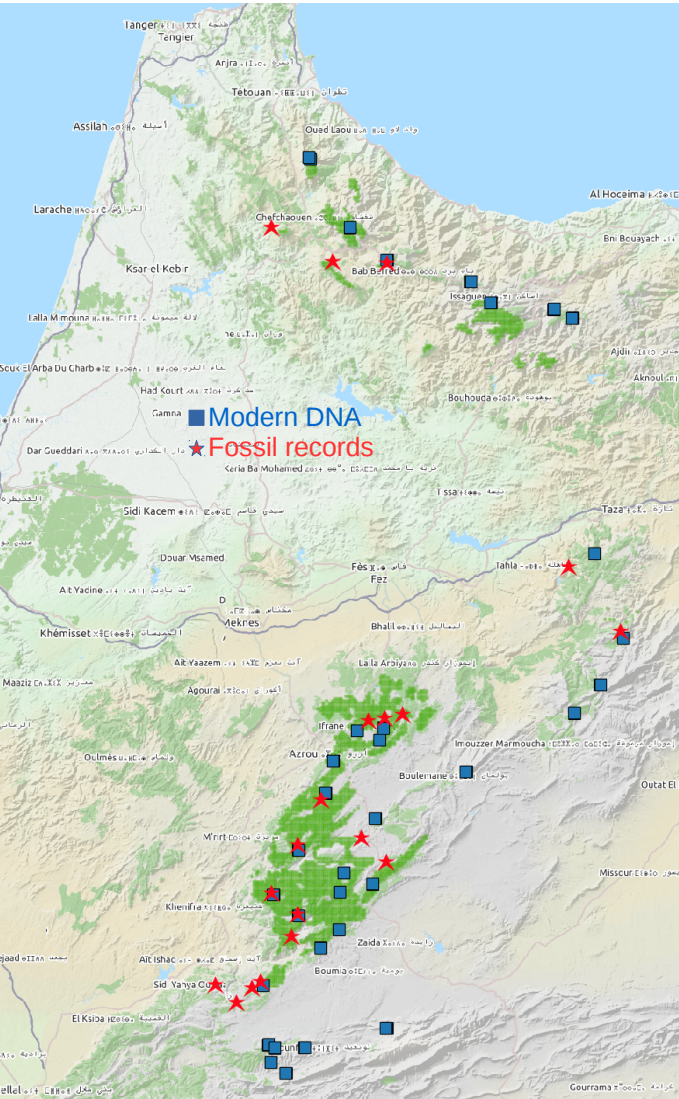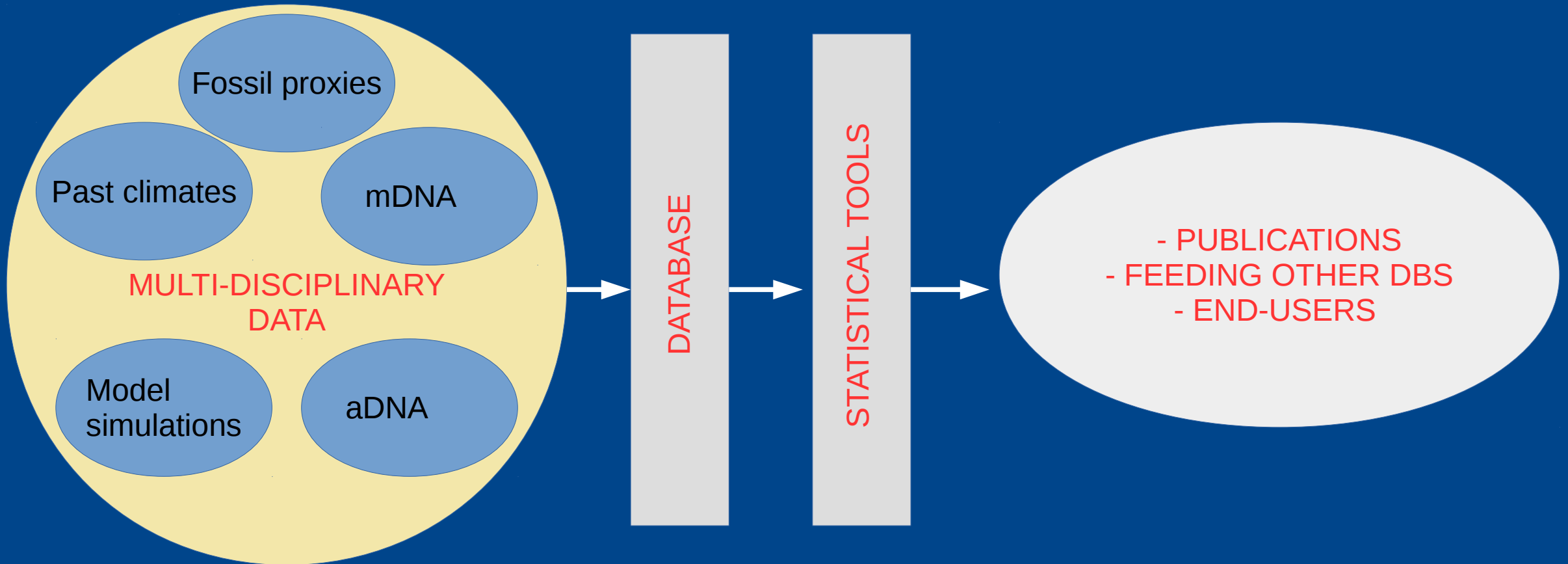

Modern DNA

Fossil bio-indicators ancient DNA

Fossil records

Modern DNA

High resolution modeling

Fossil record from lake

a. "Numerous" metapopulations

b. Wider range

Potential gene flow

Favorable climate

c. Species extinction

Unfavorable climate

Extinction?

b'. Few microrefugia

Lake

E-INFRASTRUCTURES & DATA MANAGEMENT

E-INFRASTRUCTURE AND DATA MANAGEMENT ISSUES

VULPES PROJECT STARTED IN MAY 2016 (7 months)

The hurdles we will (probably) meet will concern:

- the modelling issues: Belgium is not part of the funding consortium but it is a partner ...

- the data handelling: our multi-disciplinary approach will bring very heterogenous datasets (DNA with edge-cutting techniques that will provide a huge amount of data, exteded climate datasets, high resolution simulations, fossil time series ....)

- statistics for both bio- and geo-statistics

EXPECTATIONS FROM E-I&DM CALL

Our project will certainely be valued if:

- we improve the modelling capacity (for performing different hind- and fore-casting simulations, sensitivity tests, downscaling climate datasets to fit/explore our microrefugia etc...)

- we improve our statistical aspects (exchanges with other multi-disciplinary projects which have massive and different datasets?)