

Agrometeorology in Croatia

Visnja Vucetic

vucetic@cirus.dhz.hr

Agrometeorological Department
Meteorological and Hydrological Service

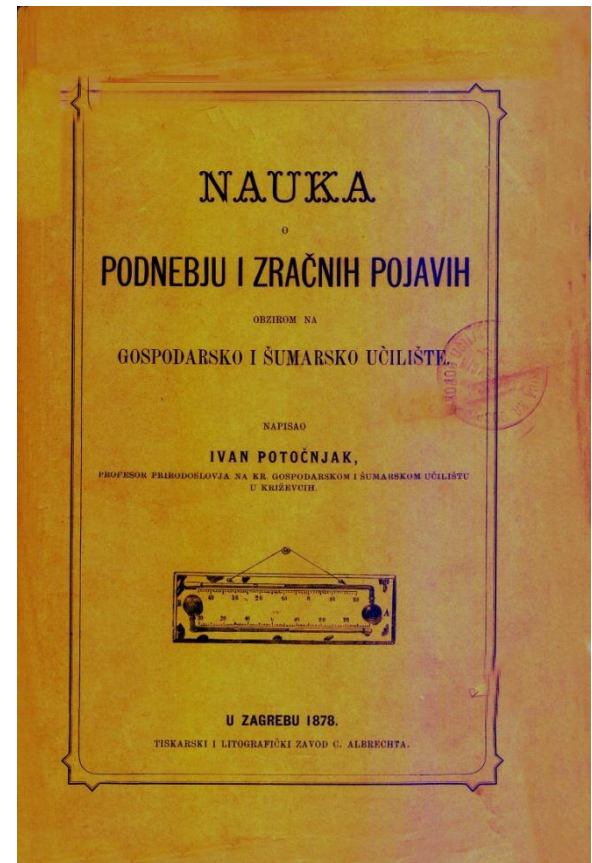


DHMZ

Ljubljana, 9 November 2016

156 years of agrometeorology

- Agrometeorology in Croatia has a long tradition. It started at the Royal Economic and Forestry School in Križevci near Zagreb in 1860.
- Prof Ivan Potočnjak published the first Croatian meteorological and agrometeorological book "Science of Climate and Atmospheric Phenomena" in 1878





65 years of agrometeorology in MHS

Meteorological Research and Development Division

Modelling Dept.

Climatol. Dept.

Agrometeo. Dept.

3 meteorologists
1 agronomist
1 meteo-technician

Weather and Climate Observation Division

Data Controlling Dept.

Observation Dept.

1 phenologist
1 meteo-technician
60 pheno-stations
60 stations with soil temperature

The first pheno-observations since 1864
Since 1951 phenological observations have been systematically organized by MHS International Phenological Garden since 1958

Phenology is a science that observes and studies the development stages of plants and animals.

Scientific research:

Operational tasks:

❖ Agrometeorological, phenological and wildfire researches:

● International projects:

EU COST ES 1106: *"Assessment of European Agriculture Water use and trade under climate change"*

EUMETNET PEP 725: *"The pan European phenological database"*

● National project:

Adaptation and Mitigation of Climate Change on Crop production in Croatia – waiting the results of the competition

AGROMETEOROLOGICAL FORECAST



Agrometeorological forecast

Agrometeorological bulletin
(<http://meteo.hr>)



AGROMETEOROLOŠKA prognoza



Croatia is one of the rare countries in the world which have a regular agrometeorological forecast on TV and radio.

- Radio, agricultural journal since 1990
- TV since 2004
- SMS to bank clients (2008-2010)

Agrometeorological forecast

Zagreb Agrometeogram

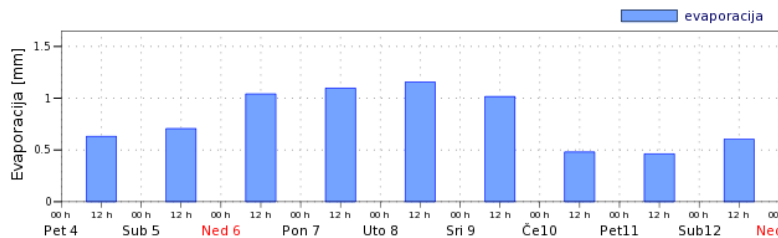
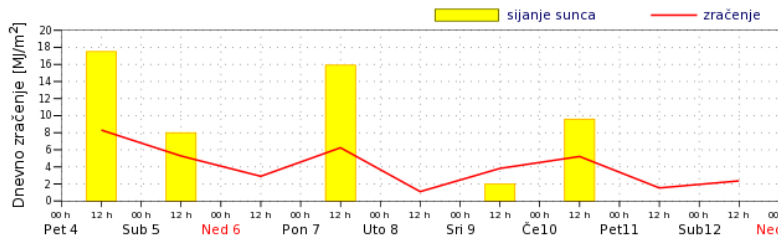
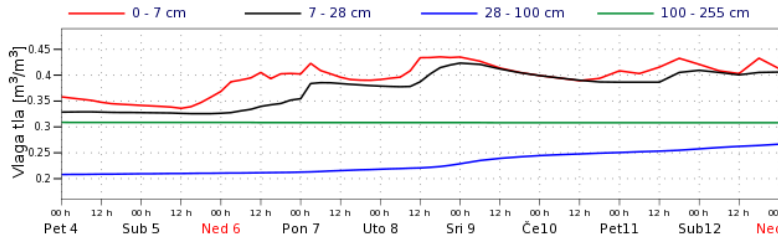
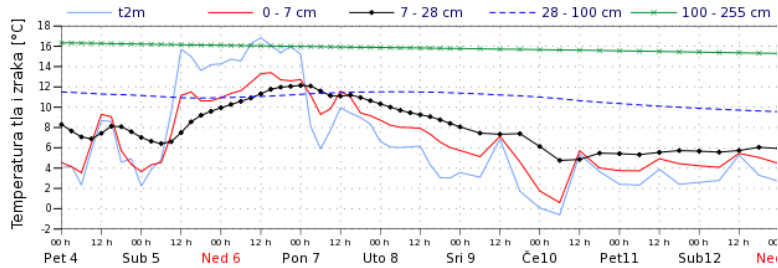
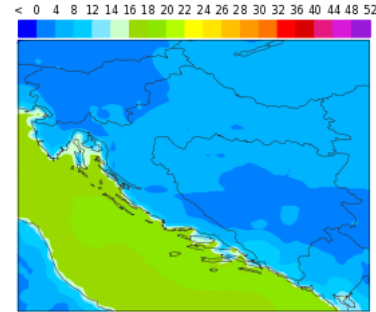
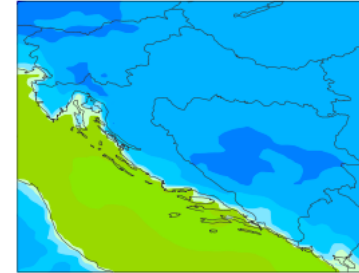
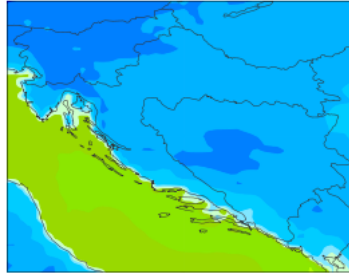
9.11.2016. (Sri) 6 UTC

Soil temperature

12 UTC

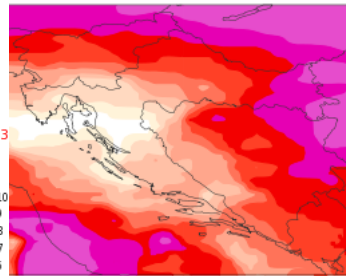
18 UTC

Temperatura tla (°C) dubine 1-7 cm



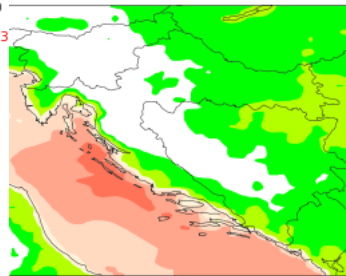
10.11.2016. (Čet)

Dnevno trajanje sijanja sunca (h)



10.11.2016. (Čet)

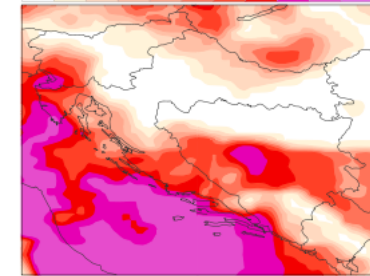
Dnevna evaporacija (mm)



Insolation

12.11.2016. (Sub)

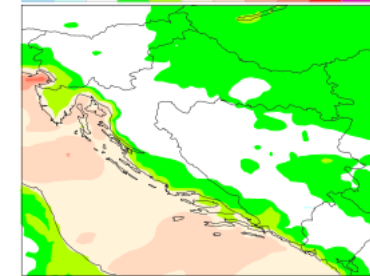
0 0.1 1 2 3 4 5 6 7 8 9 10



Evaporation

12.11.2016. (Sub)

-2 -1 -0.5 0.5 1 2 4 6 8 10 14 20



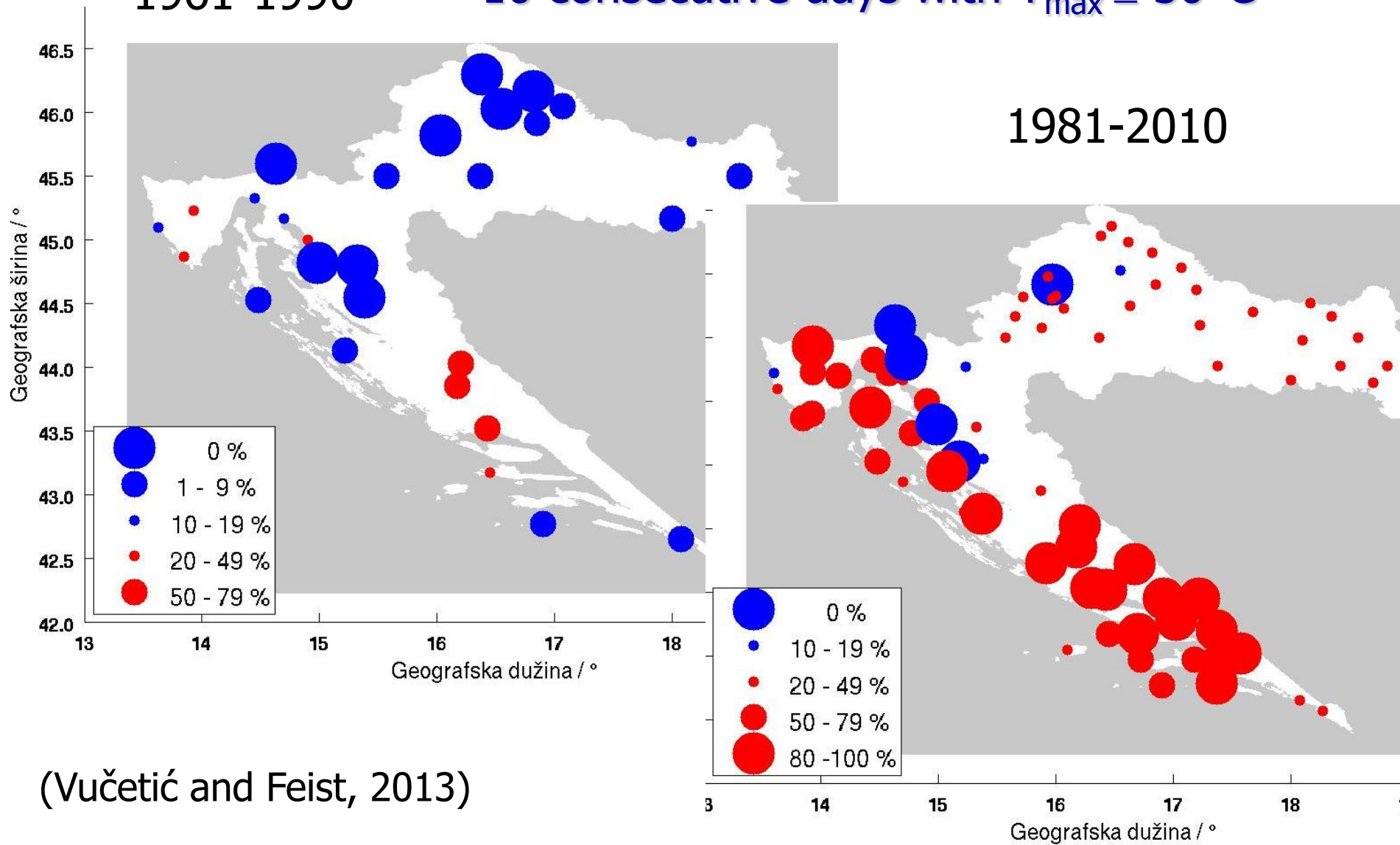
AGROMETEOROLOGICAL RESEARCHES

Heating stress

1961-1990

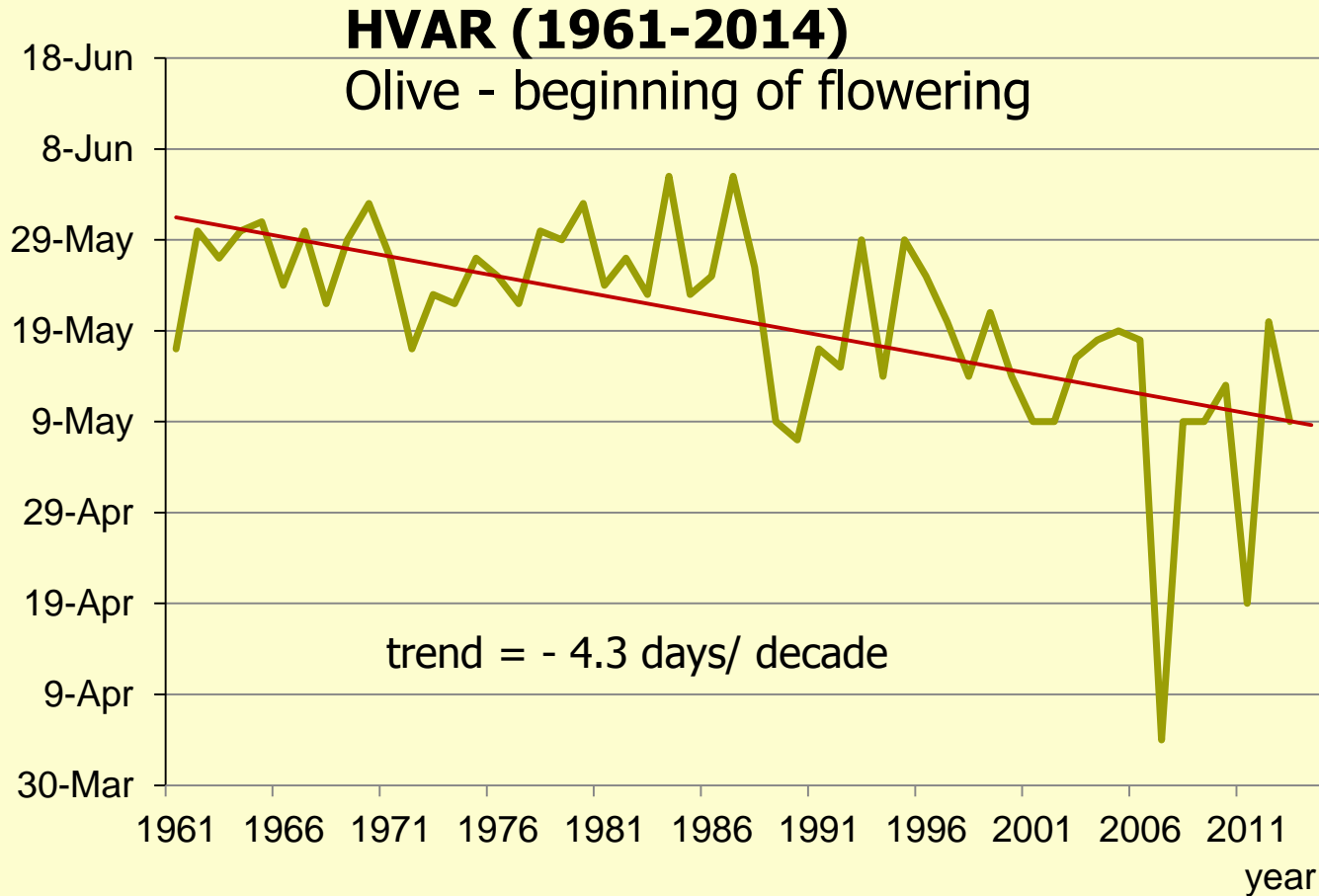
10 consecutive days with $T_{\max} \geq 30^{\circ}\text{C}$

1981-2010



(Vučetić and Feist, 2013)

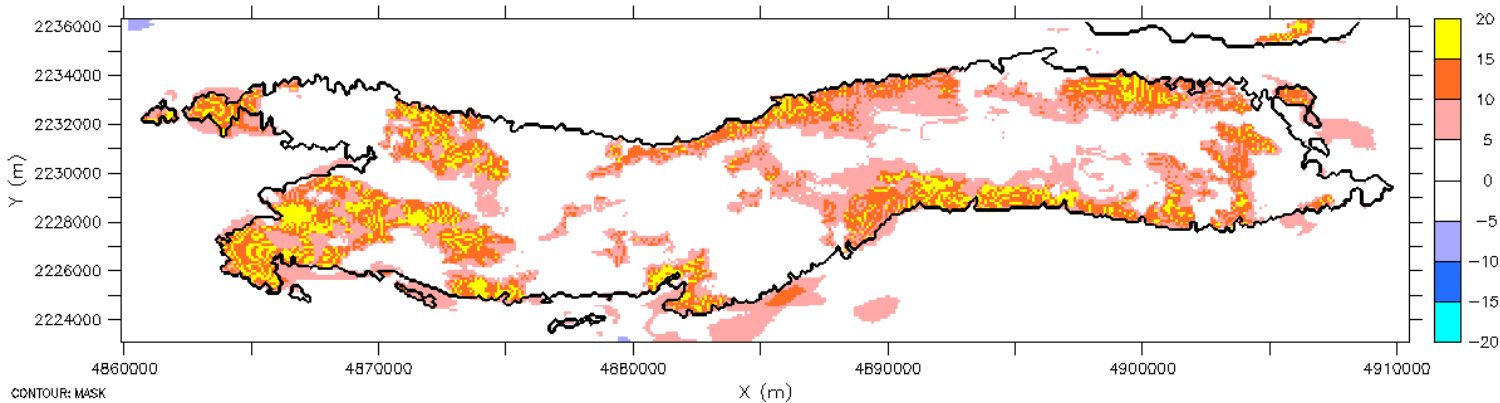
Olive phenology



Earlier beginning of vegetation season in Croatia and phenology is a good indicator for climate change.

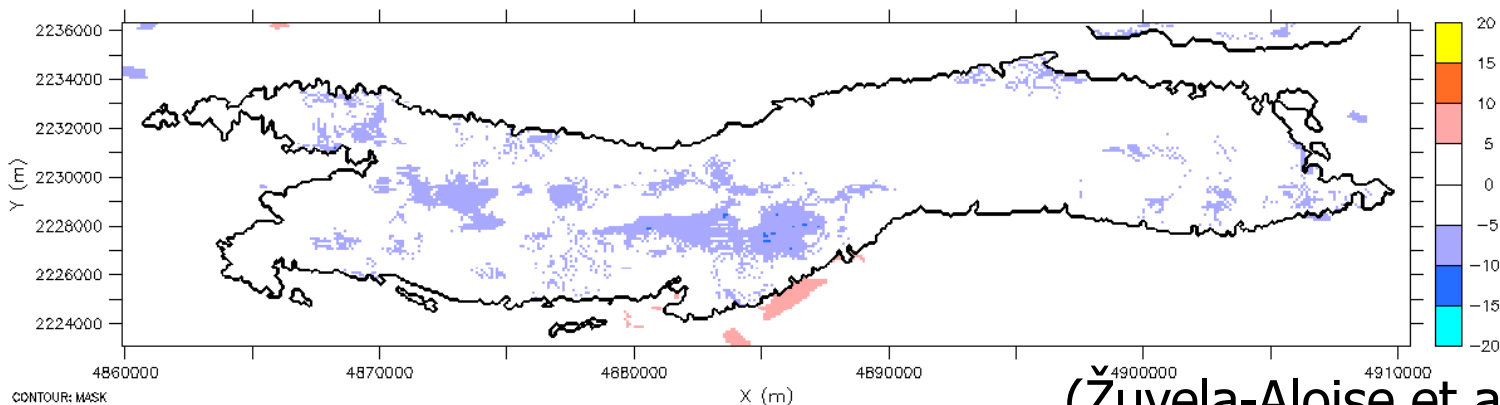
Intensive agriculture

Difference in mean annual summer days if all forest areas are used for agriculture



Olive groves

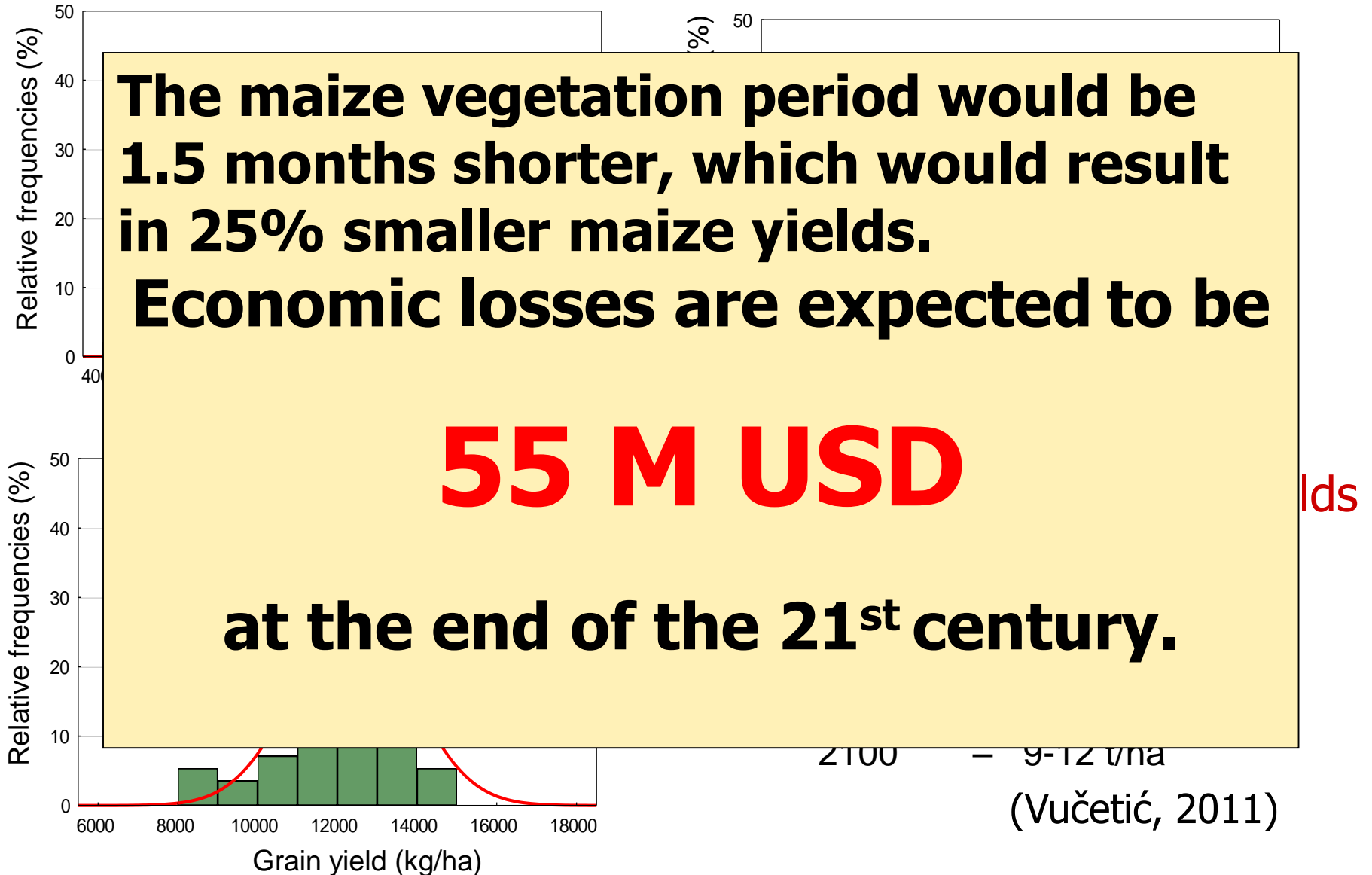
Difference in mean annual summer days if all agricultural areas are planted with olives



Simulated maize yield by DSSAT model

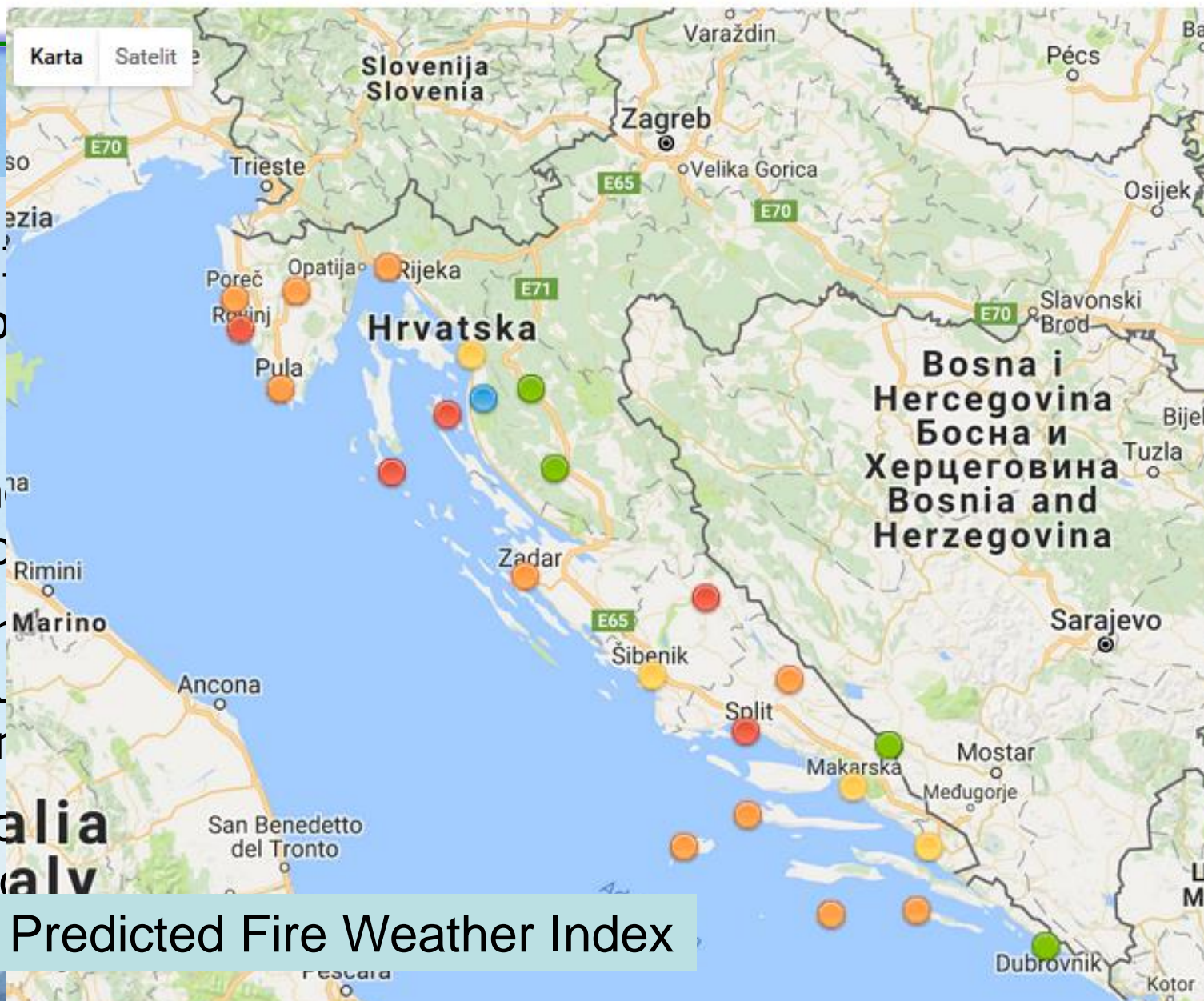
HadCM 2050

HadC 2100





Opasnost od požara: ● vrlo mala ● mala ● umjerena ● velika ● vrlo velika



Since ...
been app
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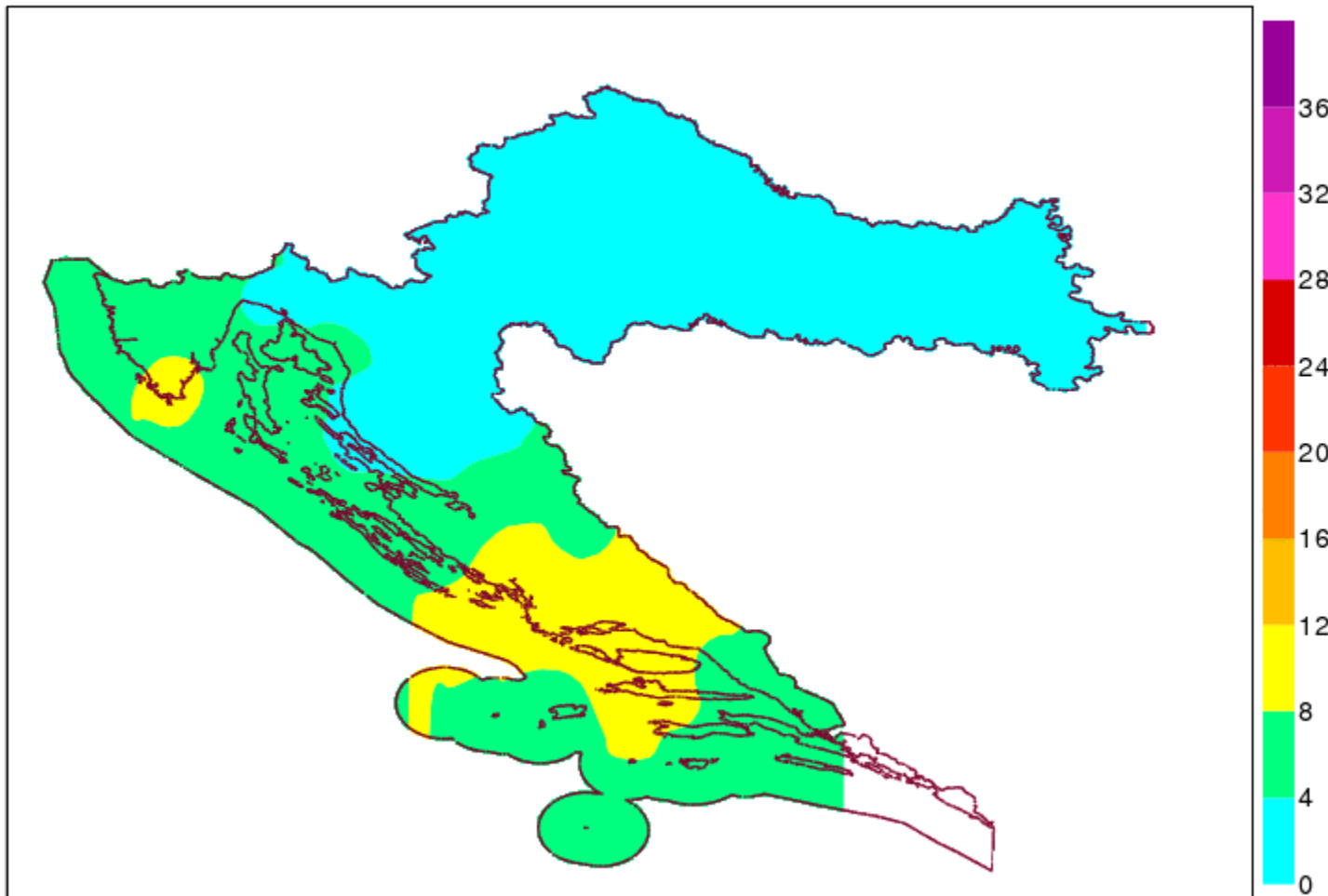
The aalia
the Meteor

Predicted Fire Weather Index

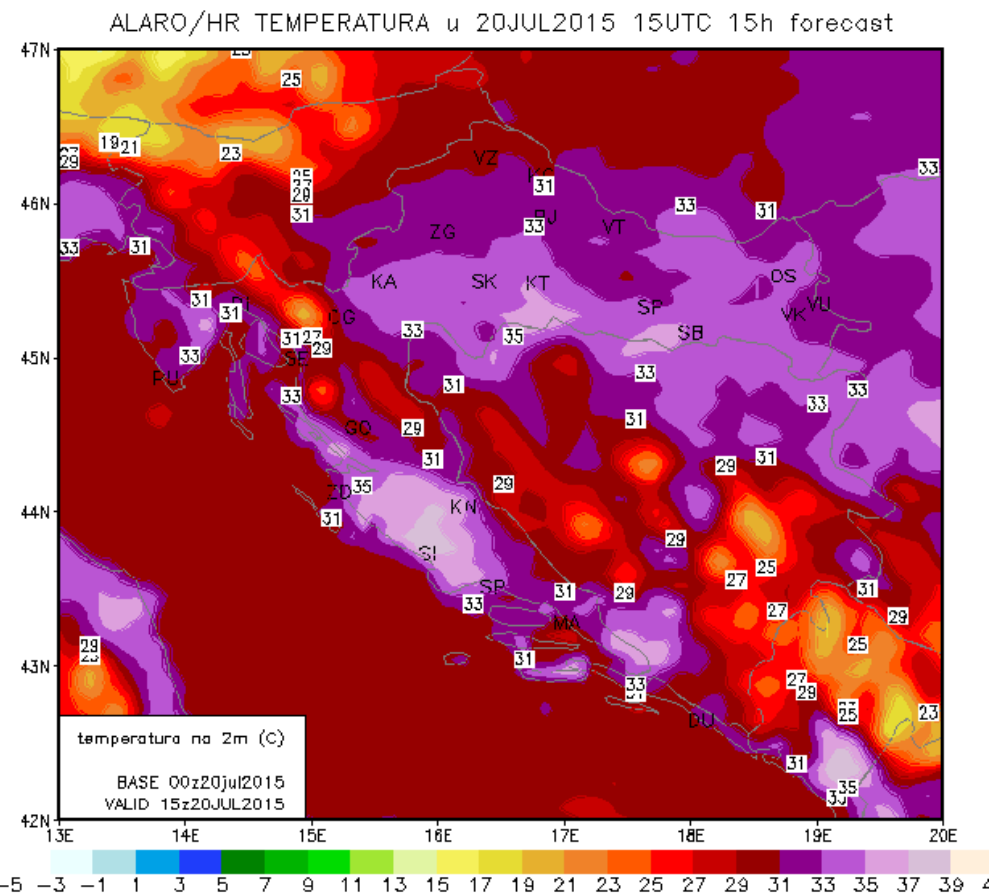
Seasonal Severity Rating (1960-2016)

index for risk assessment of forest fires in period June - September

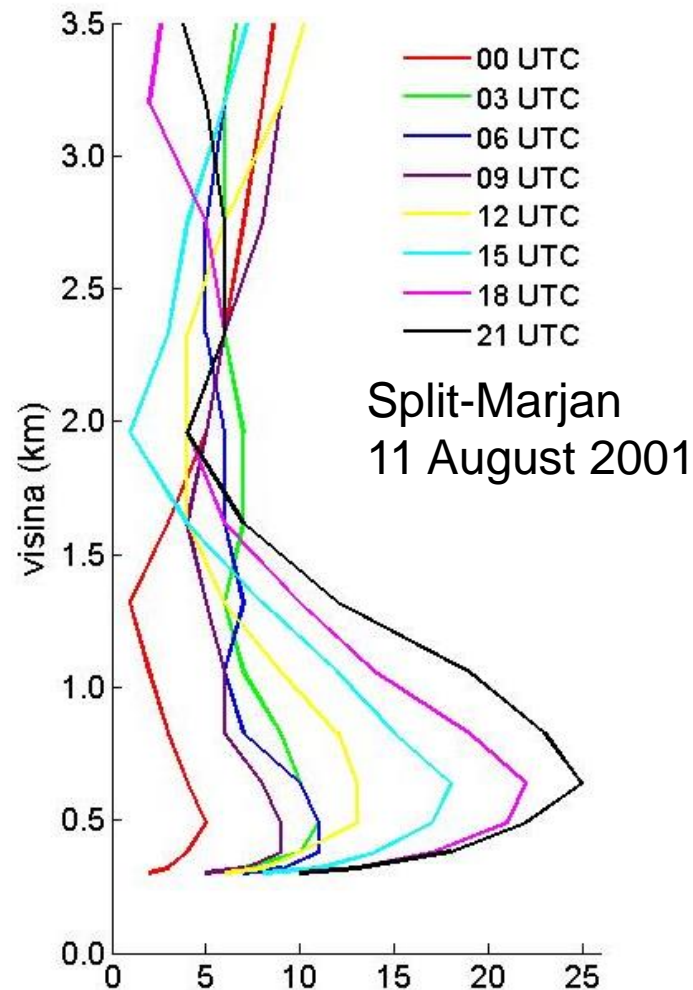
Spreading of high wildfire risk from the middle to the northern Adriatic but also to inland and the eastern part of Croatia



Dry and hot weather



Strog wind



(Omažić and Vučetić, 2016)

(Tomašević and Vučetić, 2011)



**CROATIAN
AGROMETEOROLOGICAL
SOCIETY**



Croatian Agrometeorological Society

<http://www.hagmd.hr>

13 June 2012.

meteorologists, agronomists and foresters





Popularization of agrometeorology

- Main goal is the popularization and promotion of all branches in agriculture and forestry meteorological science.
- 41 seminar, 4 workshops and a round table
- These activities improve the usefulness of agrometeorological information to directly users (farmers, agronomists, foresters, firemen, journalists, policy makers, students etc.)





Animated film "The fire is not a joke"



- One of measures of forest protection against fire is a good education of the youngest.
- The animated film is widely spread in children's lives and it is their most popular medium.
- Thus, animated film was created with motto: "Do not light the fire because the fire is not joking!"

WMO Roving Seminar “Weather, Climate and Farmers”

Farmers are aware of climate change. In order to plan their daily work, the meteorological forecast is of great importance to them. Therefore, many farmers also use TV and radio agrometeorological forecasts, the Internet services and the mobile applications. Our task is to provide adequate agrometeorological information. (<http://www.hagmd.hr>)



Osijek, 4 December 2014

FUTURE PLANS AND NEEDS

Future plans

- ❑ involve the monthly and seasonal forecasts in the crop-weather model
- ❑ apply satellite data and nowcasting for warning purposes in agriculture and in forest protection against fire
- ❑ use GIS in creation of Croatian agroclimatic atlas
- ❑ organize the agrometeorological workshops for different users

Needs

- Lack of human resources. It is difficult to execute projects without prior realistic manpower
- Training of young scientists and PhD study
- Modernization of network of agrometeorological measurements
- Crop database



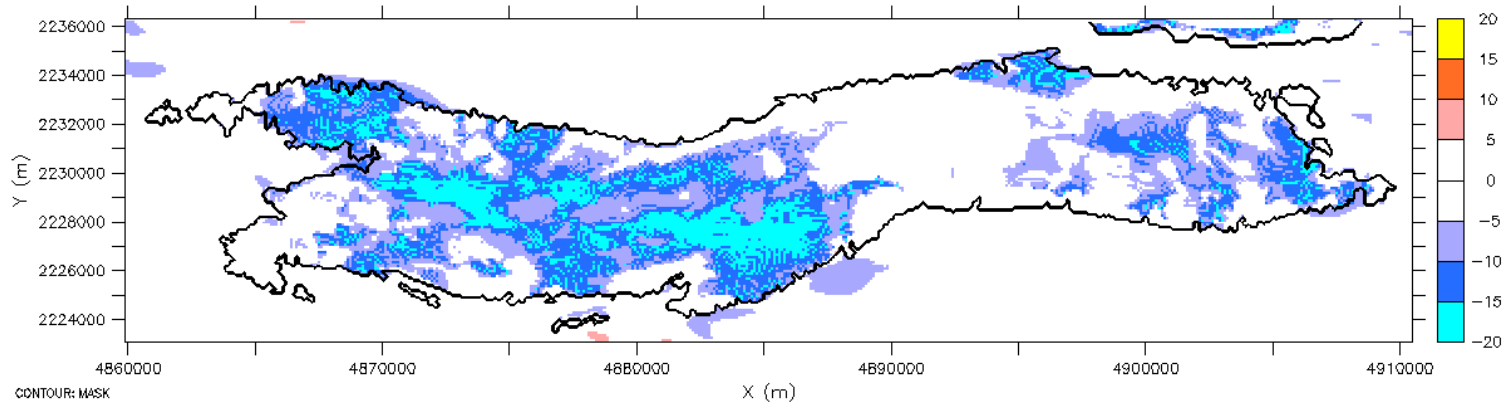
Thank you for your attention



Sensitivity experiments using MUKLIMO_3 model

Forestation

Difference in mean annual summer days if agricultural areas are modified into forest



Forest fire

Difference in mean annual summer days if all forest areas are turned into bare rocks

