VITiculture and CLImate Change in Croatia (VITCLIC)

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Founded by

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MINISTARSTVO GRADITELJSTVA I PROSTORNOGA UREĐENJA

VITCLIC

Duration:
2 years
Budget:
230 000 EUR

interdisciplinary project

20 collaborators
from 6 institutions
+ 3 new employees

Meteorology/climatology

Agronomy

Economy

Founded in 1861

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Institute of Agriculture and Tourism

VITCLIC

General aim

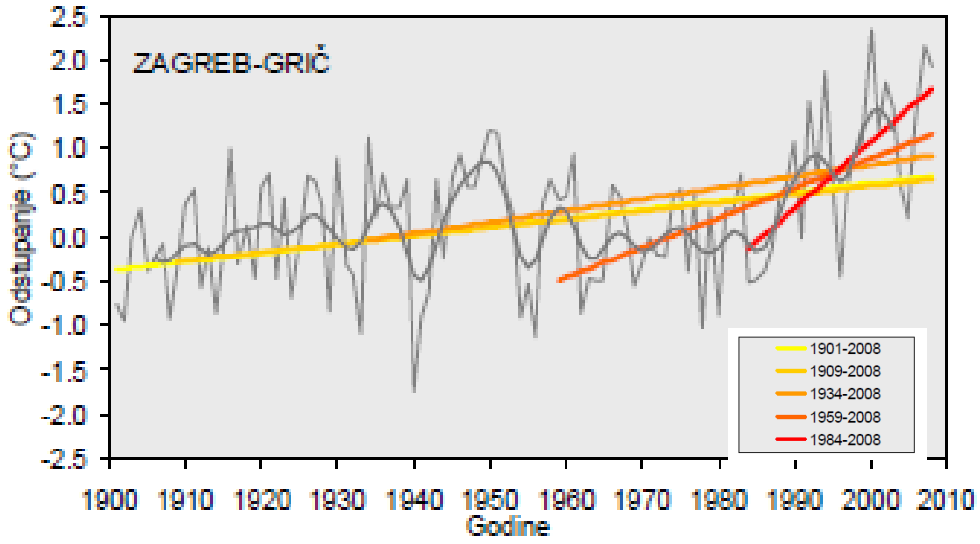
Analysis of the current situation in the wine-growing and making recommendations of specific measures for the adaptation to climate change.

VITCLIC - Why we are doing this?

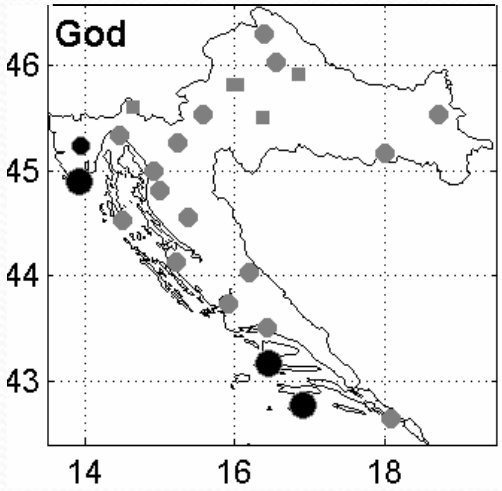
Meteorological /climatological reasons

Over Croatia in the last 25 years (e.g. Zaninović et al., 2009; Cindrić et al., 2016):

- the increasing trend in mean annual air temperature & the measured extreme precipitation from prominent drought to severe flooding has been also observed (2011/2012 vs 2014)
- prevailing increase in mean annual length of drought spells (defined by r <1 mm), which is statistically significant in Istria and on southern islands



Time series of mean annual air temperature, related 11-year binomial moving averages, and trends for 108-, 100-, 75-, 50- and 25-year period.



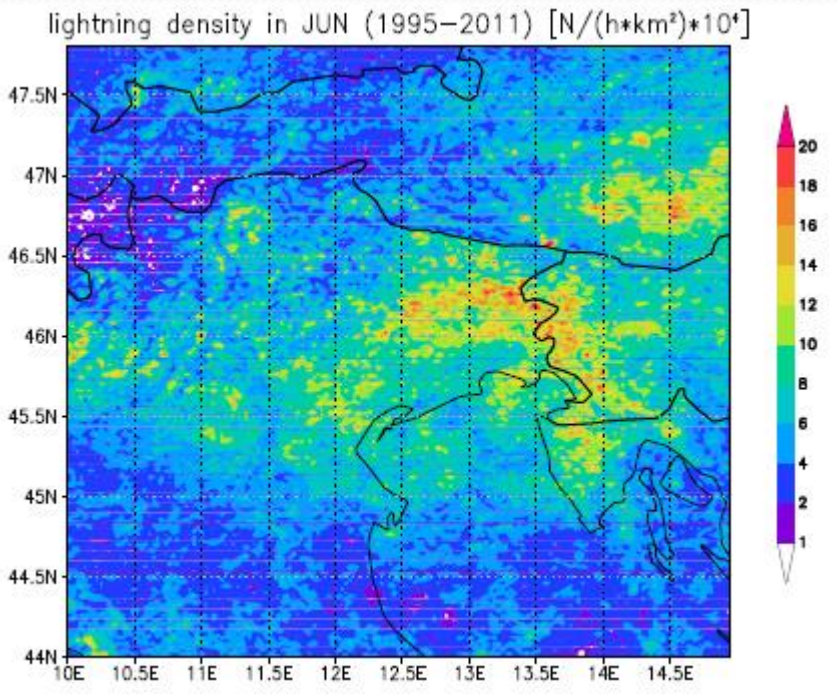
trend of yearly mean dry spells for precipitation threshold of 1 mm; circle = significant positive trend

VITCLIC - Why we are doing this?

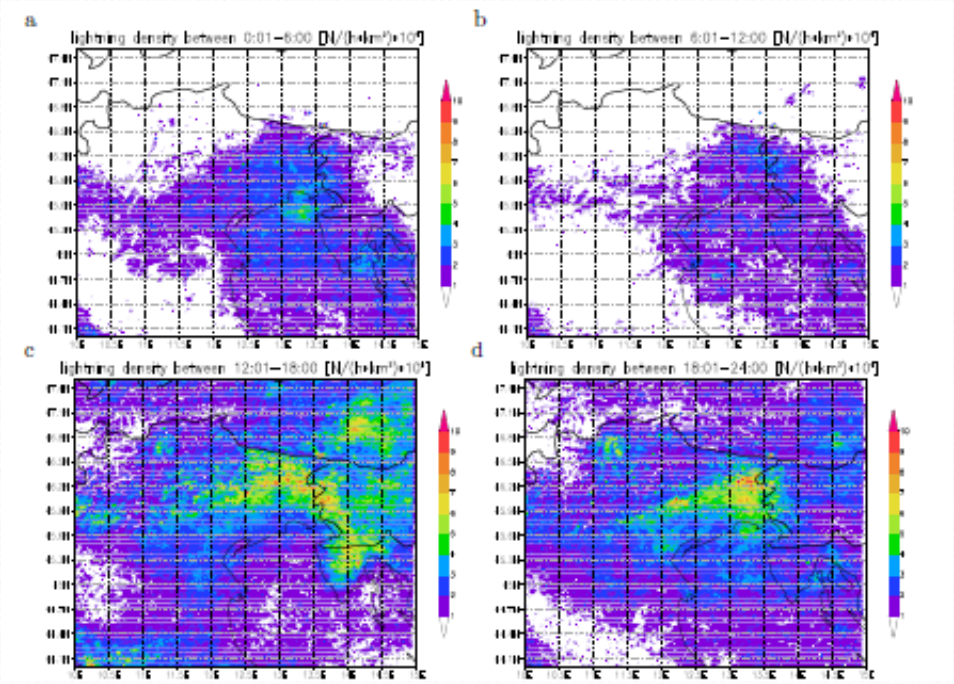
Meteorological /climatological reasons

Temp and precipitation associated with (deep) convection

Feudale et al. (2013)



Monthly C2G lightning spatial distribution for June. The scale is number of lightning per hour per km^2 times a factor of 10^4

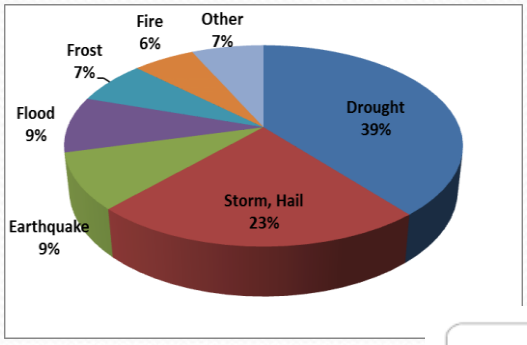


Average hourly C2G lightning spatial distribution for 1995-2011 period; (a) 00-06 UTC, (b) 06-12 UTC, (c) 12-18UTC, (d) 18-24 UTC.

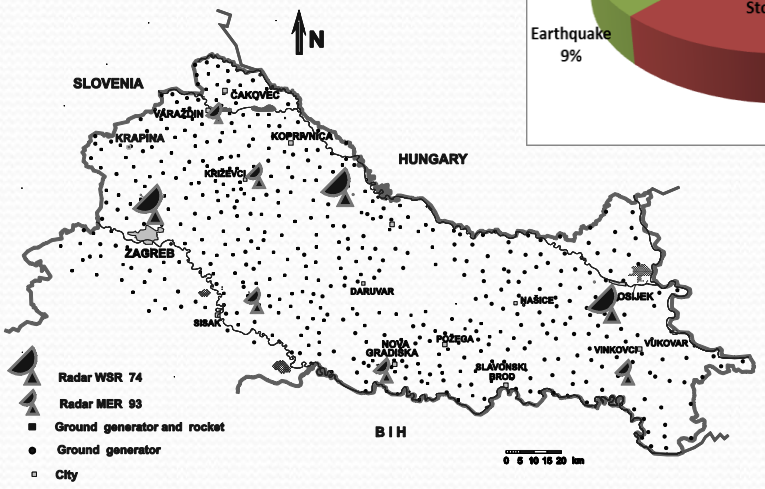
VITCLIC - Why we are doing this?

Meteorological /climatological reasons

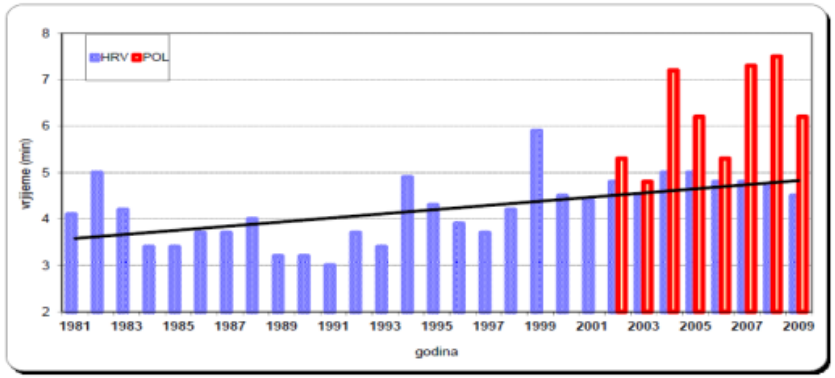
- A trend of increasing average duration of hailfall was also found. data observations (1981-2000)
- from two stations in Istria (western part of Croatia with many vineyards) showed an increase in the frequency of days with hail, which is comparable with those in continental part of Croatia.



Economic losses (%) caused by natural hazards in Croatia, 1981-2010 (Gajić-Čapka et al., 2012).



Schematics of the hail protected lowland of Croatia (26 800 km^2) with hail suppression stations (Počakal, 2012).



Average hailfall duration per year on all hail suppression stations in Croatia (blue, 1981-2015), and on the hailpad polygon (red), (2002-2015) (Počakal, 2012).

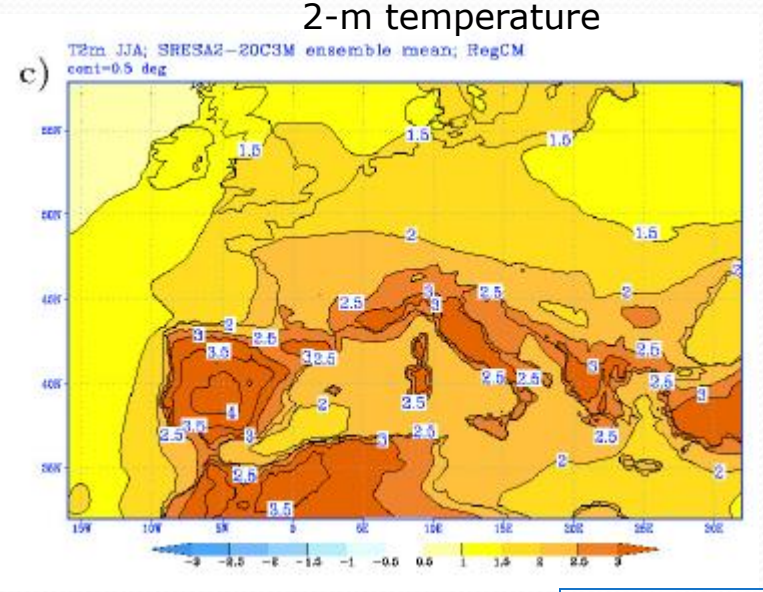
VITCLIC - Why we are doing this?

Meteorological /climatological reasons

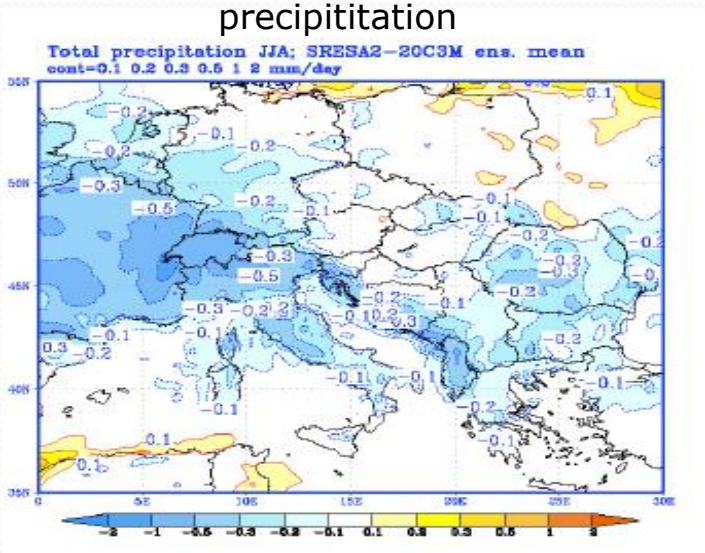
RCMs indicate for Croatia (e.g. Beniston i sur., 2007; Nikulin i sur., 2011; Guettler et al., 2009):

- positive extremes of temperature will increase
- more frequent heat waves
- reducing the total amount of precipitation is expected in most parts of the year, primarily in Croatian coastal area and immediate hinterland

2-m temperature



precipititation



diff. future-present climate
present: 1961-1990
future: 2041-2070
RegCM+EH5OM+A2

VITCLIC - Why we are doing this?

Agronomic reasons

Changes in temperature and precipitation and then often in deep moist convection have a great impact on viticulture, and on phenological characteristics of grape vine

Preliminary research of phenological data indicates that in the period 1981-2009 (compared to 1961-1990), begging of budding, the occurrence of the first leaves and the beginning and end of flowering occur earlier due to temperature increase in the spring (e.g. Čiček, 2011).

Due to climate change, changes in temperature and humidity will affect:

(i) differently all developmental stages of vines in certain wine-growing areas in Croatia (i.e. their phenological characteristics)

(ii) differently on different varieties

(iii) it could be possible to expand cultivation of late ripening cultivars toward north viticulture areas

VITCLIC – What we are going to do?

Specific objectives

(i) making the spatio-temporal distribution of hail occurrences along the coast (especially in Istria) and its critical comparison with the existing ones in lowland of Croatia and determination of weather types classifications which favor hail occurrence over Croatia past and future

(ii) analysis of the economic and financial aspects of the grape and wine production in the Republic of Croatia, in the period of 2004-2014. the provision of meteorological services will be addressed, as well as the financial sources for the provision of meteorological services.

(iii) analysis of the current situation in viticulture; focus on changes in the times of harvest and the basic parameters of quality grapes & link with climate and phenological data for current and future climate

(iv) establishing a monitoring system of phenological phases and grape maturation through reference points. Evaluation of Croatian autochthonous varieties regarding their ability to adapt to observed climate changes.

VITCLIC – How we are going to do?

Methods

(1) Convection & hail

(i) Installation of hailpad as densely as possible within vineyards in Istria -> analysis of the mass and KE of hailstones
(ii) LINET data
(iii) LISCA-radar data
(iv) RCMs – determination of weather types that favor the convection occurrence & testing algorithm for tracking of the cyclone paths

Hailpad consists of a measuring plate and holder

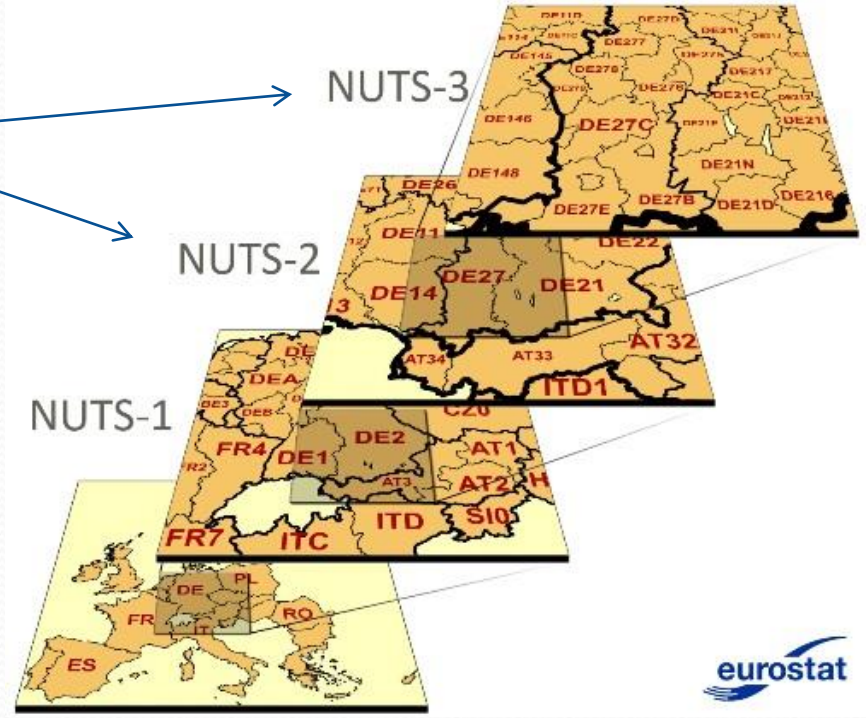
A measuring plate with traces of hailstones

VITCLIC – How we are going to do?

Methods

(2) Economic and financial aspects

(i) existing and new reports of damage to crops nearby hailpads
(ii) analysis of the agricultural insurance (i.e. modalities, market development of the agricultural insurances, comparison of Croatian and European experiences, and possible directions of development of the insurance in Croatia)



Socio-economic analyses of the regions
NUTS 1: major socio-economic regions
NUTS 2: basic regions for the application of regional policies
NUTS 3: small regions for specific diagnoses

In the period 2000-2009, for the lowland of Croatia, 1004 reports of damage to crops nearby hailpads exist

VITCLIC – How we are going to do?

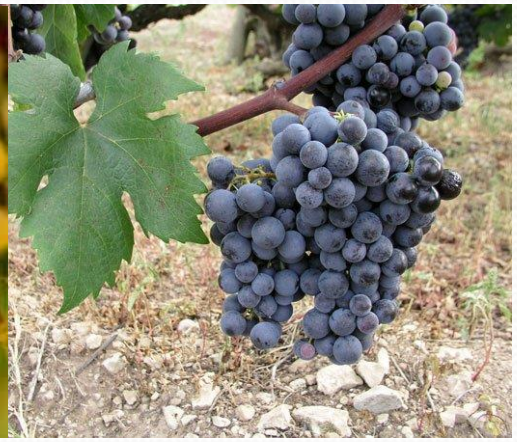
Methods

(3) the impact of climate change on the viticulture

(i) Analysis of the data from the archives (1970s) of wine quality with controlled geographical origin fpr 4 selected cultivars (Graševina, Plavac mali, Chardonnay, Merlot)

(ii) Comparison with agroclimatic indices (e.g. Huglin, Dryness Index, Cool night Index, Growing Degree Days) on the basis of meteorological data (> 82 stations) & RCMs for the current and the future climate (CORDEX-iniciative)

Graševina



Plavac mali

Chardonnay

Merlot

VITCLIC – How we are going to do?

Methods

(4) the vineyard adoption to climate changes

(i) Testing of the effect of canopy management practices of shoot topping and partial leaf removal
(ii) Setting of high-frequency meteorological system (MS)

Expected results:
(i) Leaf removal is generally performed to improve light conditions and airflow in cluster microclimate in aim to improve grape ripening and quality.
(ii) Changes in the chemical composition of grapes are expected as a response of grapevine to changed light and temperature regime in the cluster zone

VITCLIC – How we are going to do?

Methods

location: Zagreb-Faculty of Agriculture

(4) the vineyard adoption to climate changes

Rh/T Probe

Kipp&Zonnen CUV5

MS system placed at 2 position with and without leaf removal

- **Gill WindMaster Pro ➔ 20 Hz**
- Campbell Scientific CR3000 data logger

VITCLIC

Today: just signed a contract

Start: 03 April 2017

Start: 02 April 2019

We don’t have web site yet

Thank you for your attention!