Climate change in Latvia and tools for risk assessment

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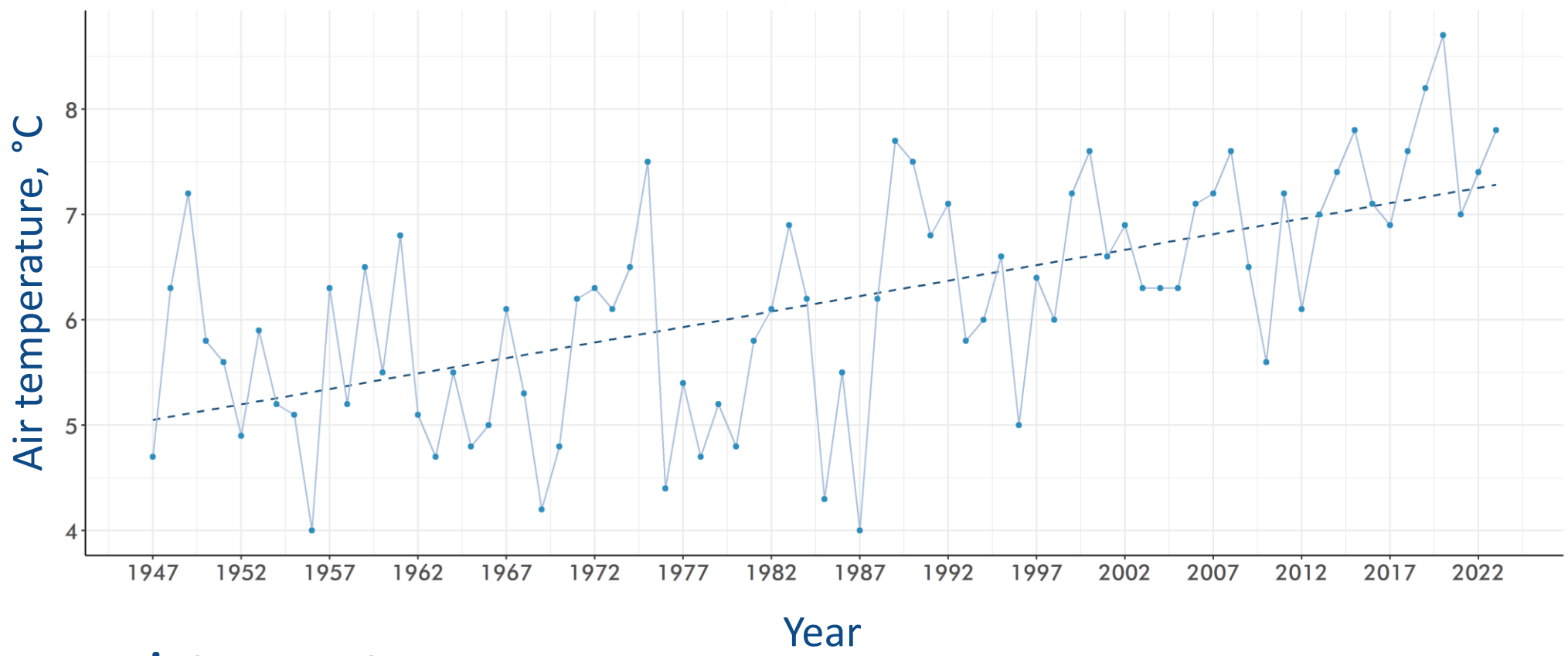
Latvian Environment, Geology and Meteorology Centre

20.05.2025

Average air temperature in Latvia

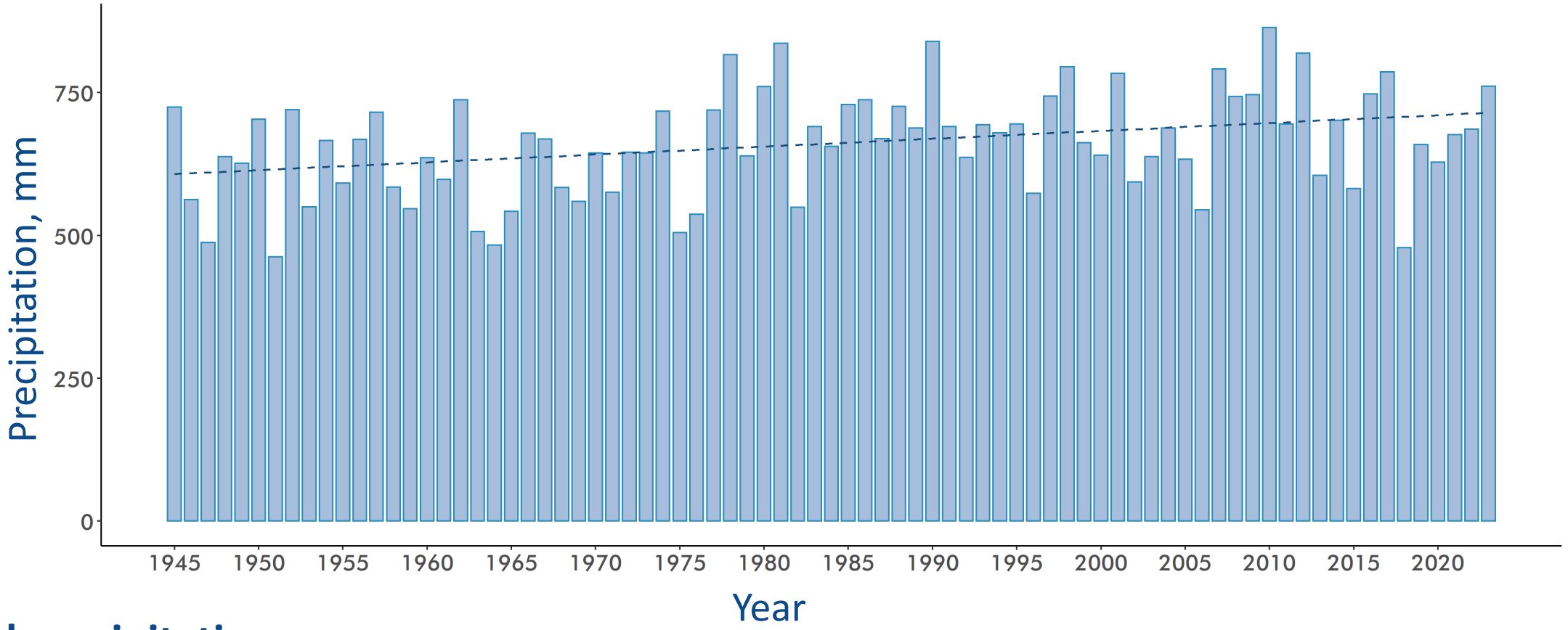


Average air temperature:

- during the climatic reference period (1961-1990): +5.6 °C
- during the period of climatic norms (1991-2020): +6.8 °C

The increase in average air temperature so far is **1.2 °C**

Yearly precipitation amount in Latvia



Total precipitation:

- Reference period (1961-1990): 655 mm
- Climate normal period (1991-2020): 684.5 mm

Current annual precipitation amount **increase is 4.4%**

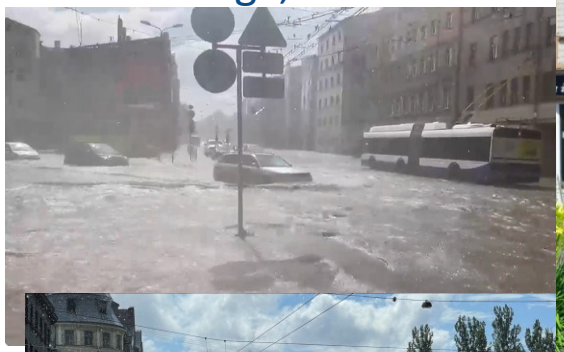
Climate risks in Latvia

Precipitation amount anomaly in 3rd decade of August 2017, near Rēzekne

Dry and hot May, 2018

Flood in Jelgava, 14.06.2022.

Flood in Riga, 10.06.2022.



River flood in Jēkabpils, January, 2023

Extremely dry June, 2018

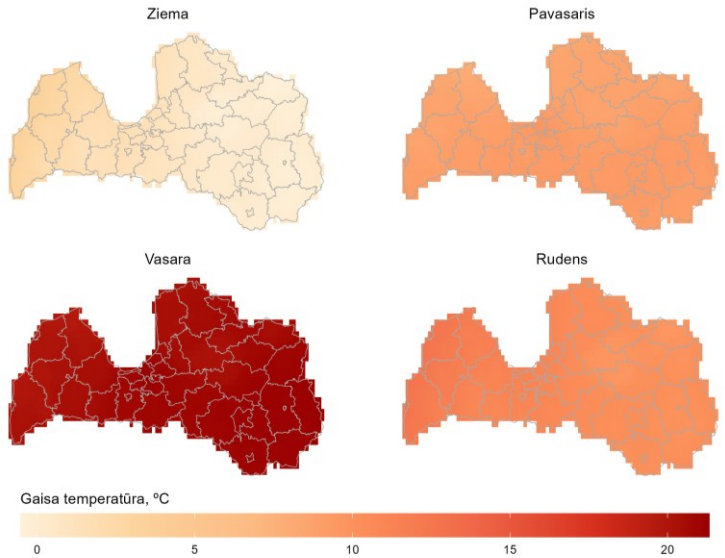
Past and future climate change in Latvia

Average air temperature

The increase of the average air temperature at the end of the 21st century in relation to the reference period (1961–1990):

- minor climate change: +2.8 °C
- medium climate change: +3.7 °C
- significant climate change: +4.9 °C

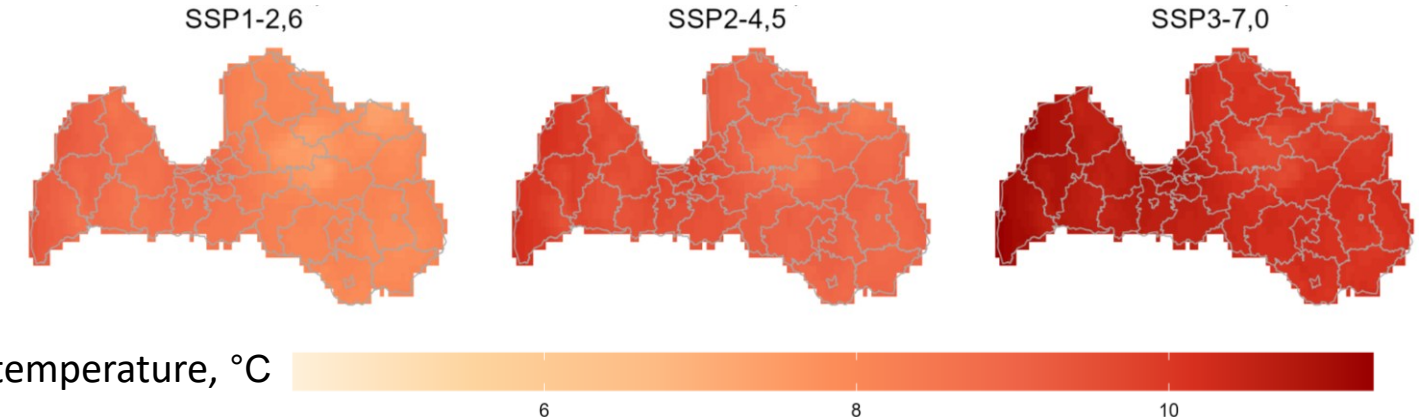
Average values at the end of the 21st century (2071-2100) in significant climate change (SSP3-7.0)



Average air temperature at **the end of the century** in significant climate change (SSP3-7.0):

- **Winter:** 1.2 °C;
- **Spring:** 9.0 °C;
- **Summer:** 20.7 °C;
- **Autumn:** 11.0 °C

Future climate change (2071–2100)



Past and future climate change in Latvia

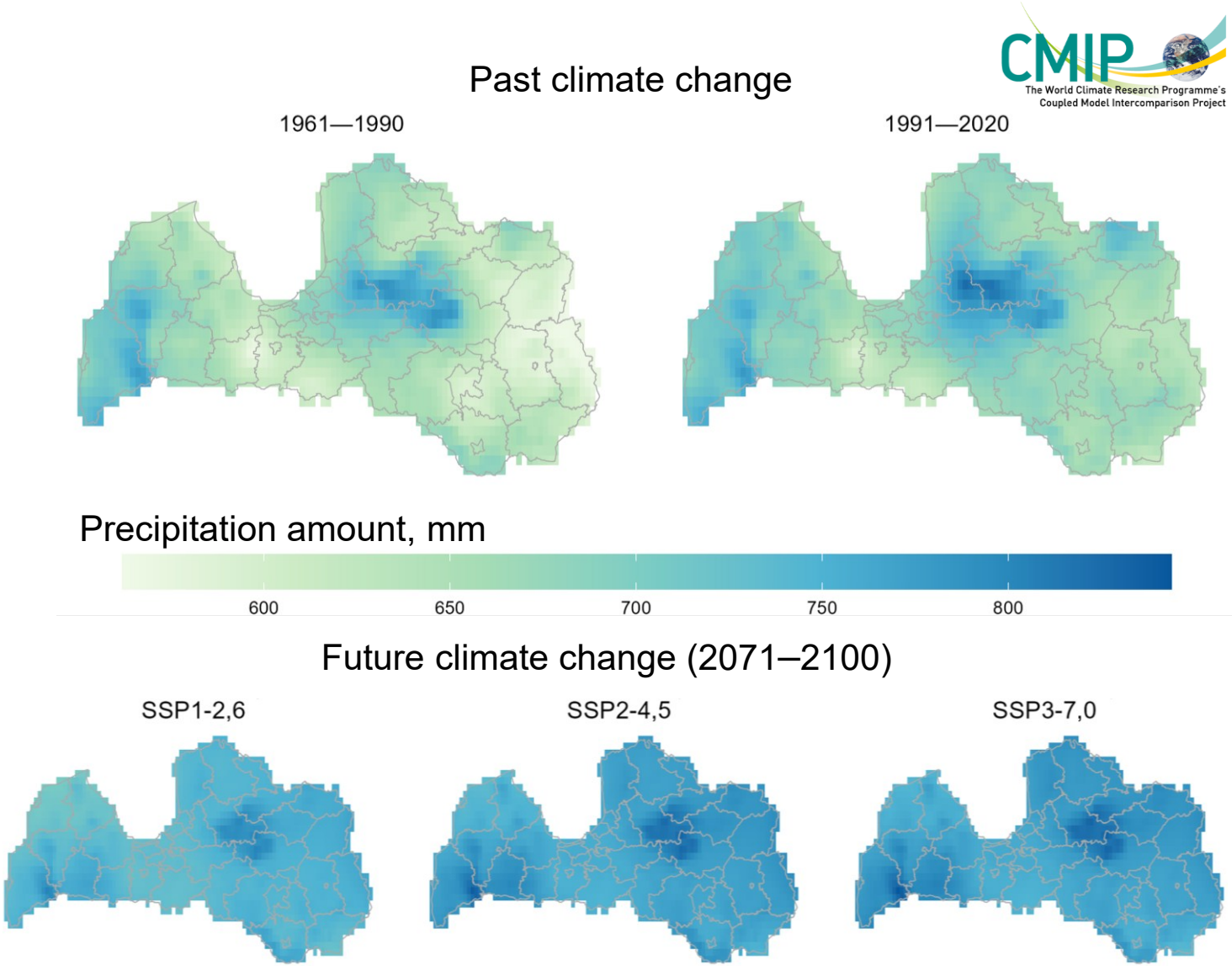
Precipitation amount

Precipitation amount at the end of the century:

- minor climate change: 775.7 mm
- medium climate change: 806.5 mm
- significant climate change: 814.2 mm

The increase of the precipitation amount at the end of the 21st century in relation to the reference period (1961–1990):

- minor climate change: 18%
- medium climate change: 23%
- significant climate change: 24%



Past and future climate change in Latvia

Snow cover (October - April)

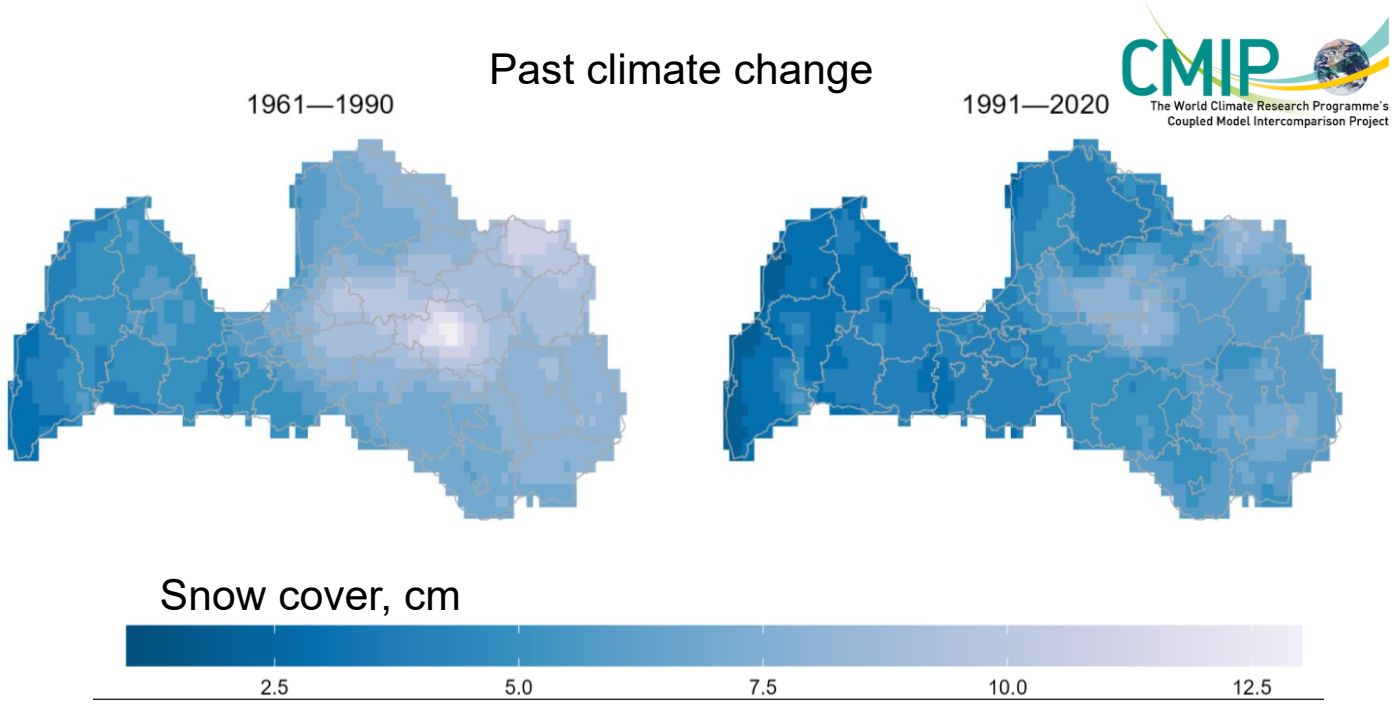
Reference period (1961–1990): 7 cm
Climate normal period (1991–2020): 4 cm
The decline of snow so far is 3 cm

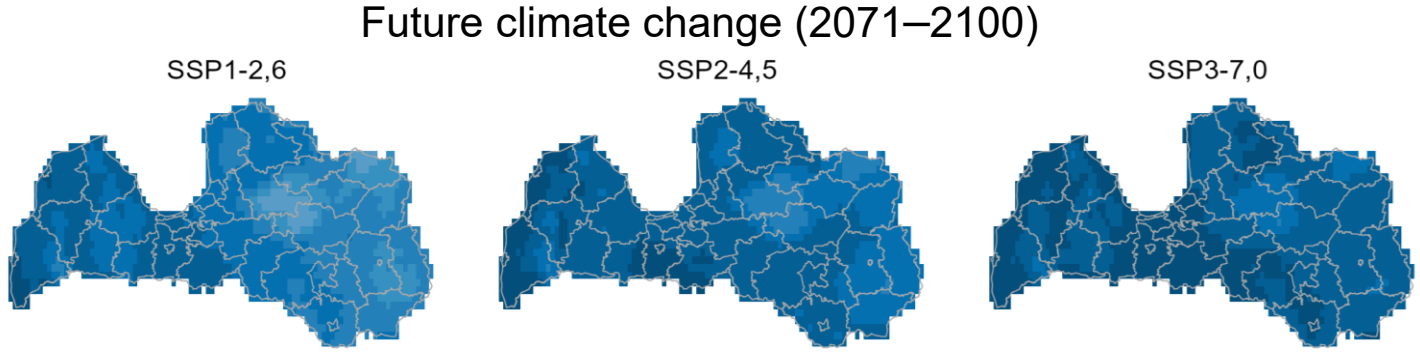
Snow cover
at the end of the century:

- minor climate change: 3 cm
- medium climate change: 2 cm
- significant climate change: 1 cm

Winter (December - Febuary) snow cover at:

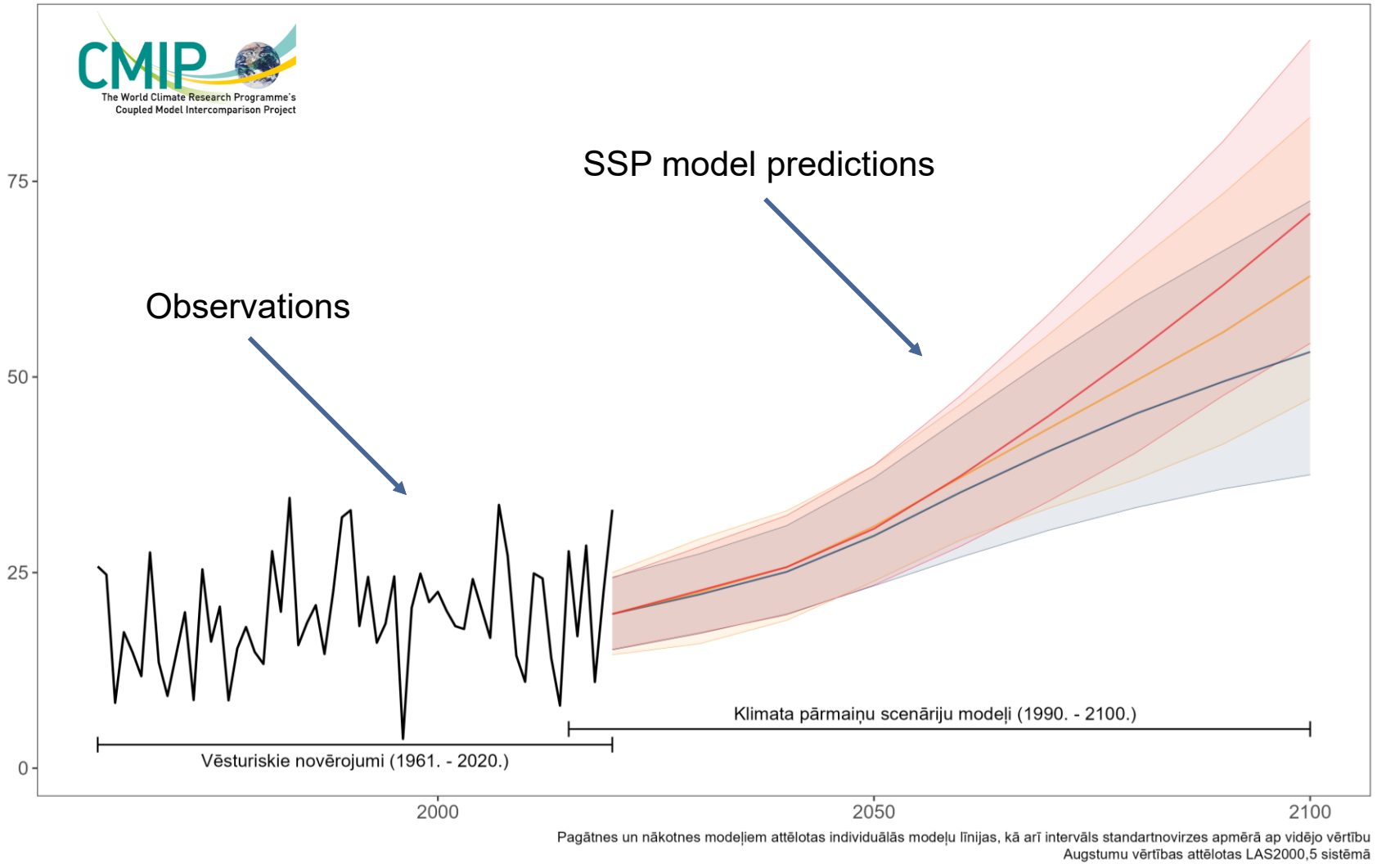
- refference period: 11 cm
- climate normal period: 7 cm
- at the end of the century:
  - minor climate change: 5 cm
  - medium climate change: 3 cm
  - significant climate change: 3 cm



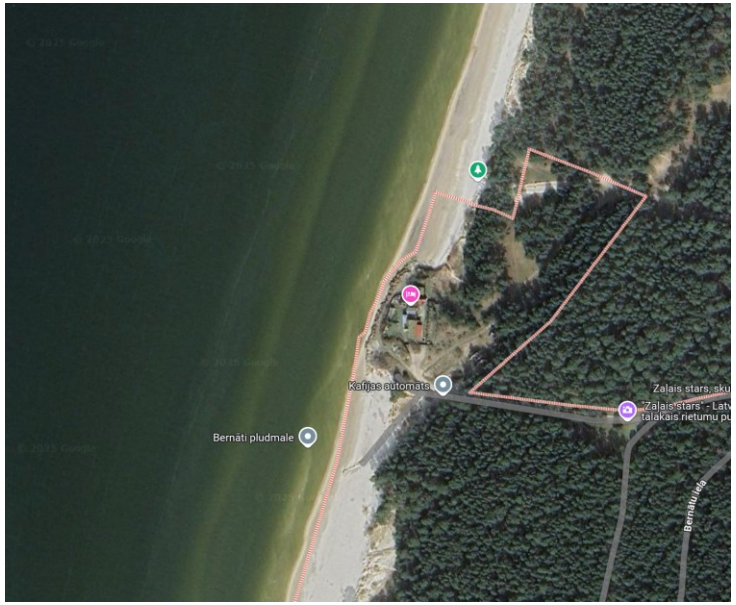


Sea level rise

Average sea level rise in Latvia, cm AMSL



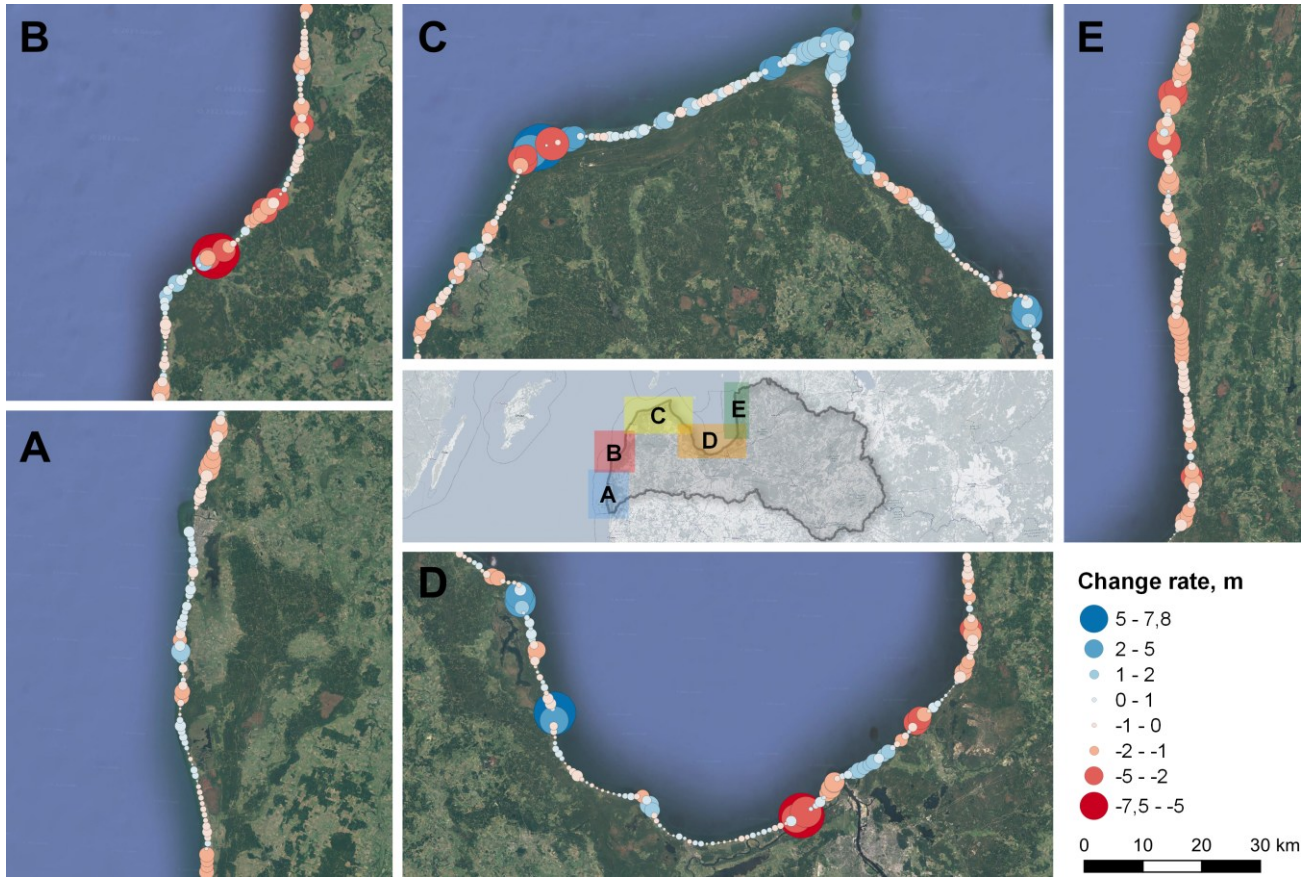
Pagātnes un nākotnes modeļiem attēlotas individuālās modeļu līnijas, kā arī intervāls standartnovirzes apmērā ap vidējo vērtību
Augstumu vērtības attēlotas LAS2000,5 sistēmā



Bernāti, Latvia

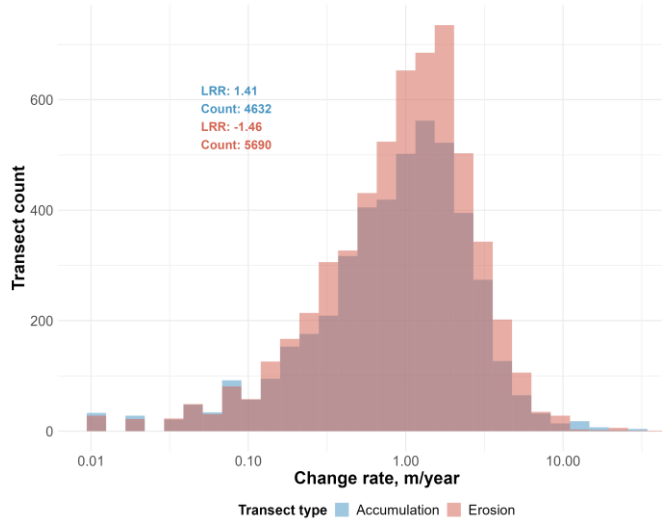
Changes in the coastline of Latvia

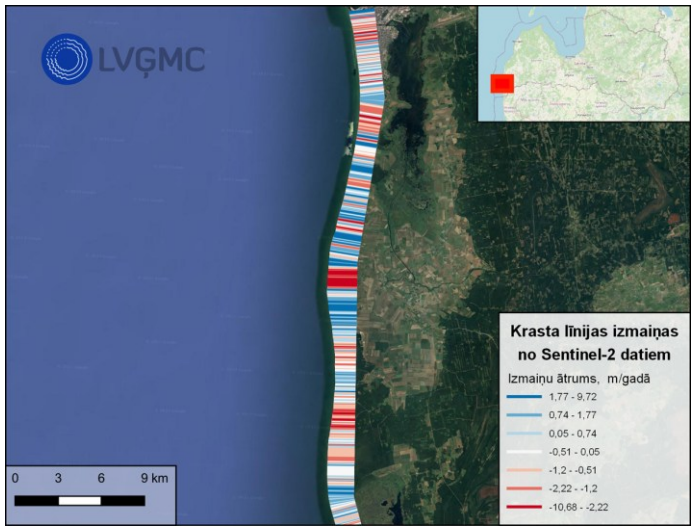
Coastal changes in Latvia calculated by Sentinel-2 satellite data from 2017 till 2023



sentinel-2

Erosion and accumulation amounts in Latvia



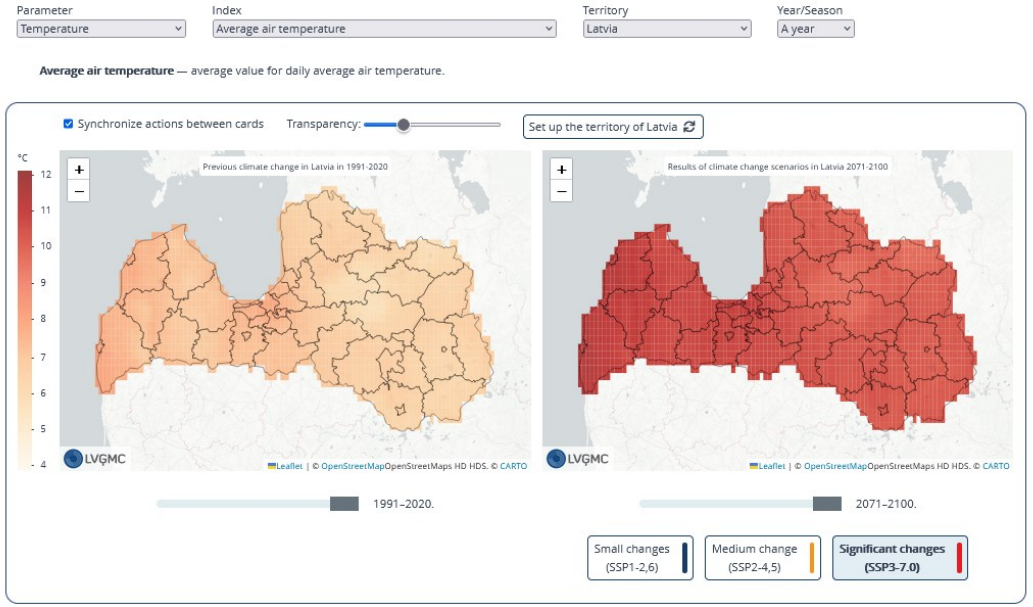


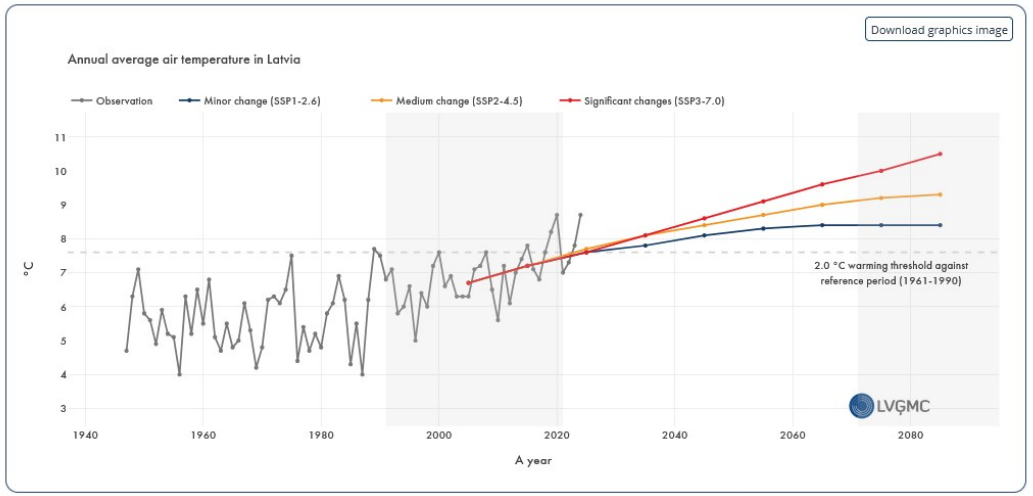
https://klimats.meteo.lv/klimats_latvija/klimata_riks/

Climate change analysis tool

In the Climate change analysis tool, users can find information (in the form of data, descriptions and visualizations) about climate change in Latvia and specific climate change indicators that can help various economic sectors prepare for the upcoming changes:

- mean air temperature;
- maximum air temperature;
- minimum air temperature;
- Daily air temperature amplitude;
- number of frost days;
- number of summer days;
- number of ice days;
- number of tropical nights;
- growing season length;
- warm spell duration index;
- mean snow depth;
- sea level;
- precipitation sum;
- heavy precipitation days;
- very heavy precipitation days;
- highest 1-day precipitation amount;
- highest 5-day precipitation amount;
- mean wind speed;
- calm days;
- stormy days;
- annual coastlines;
- coastal erosion.





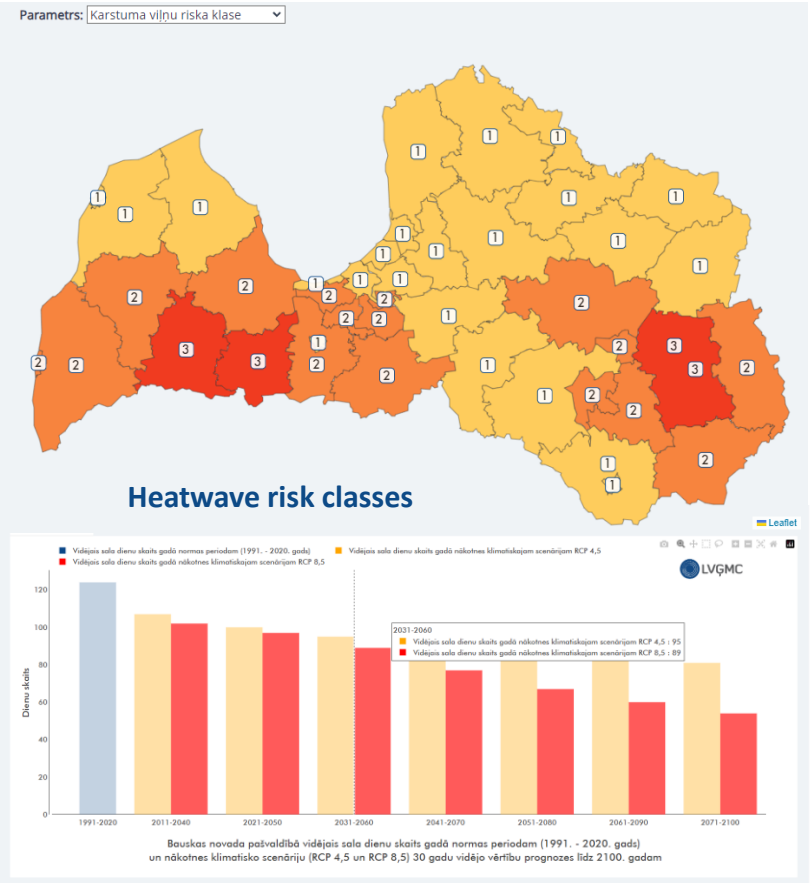
https://klimats.meteo.lv/klimats_latvija/klimata_riks/

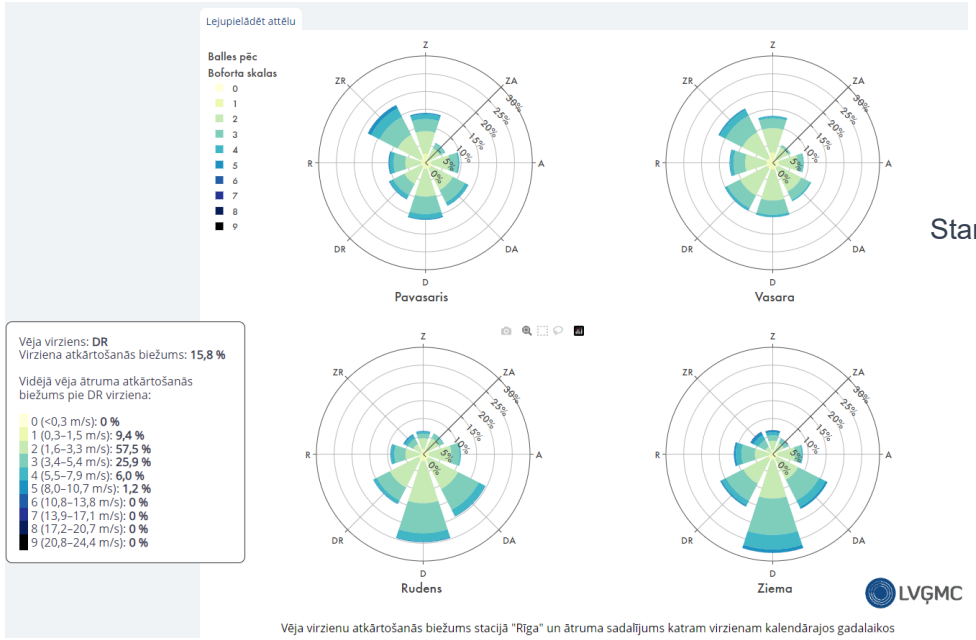
Climate profiles for municipalities – support for municipalities and territorial planners

Six climate change risks among municipalities divided into three risk classes.

By clicking on a municipality/city on the map, information is obtained on:

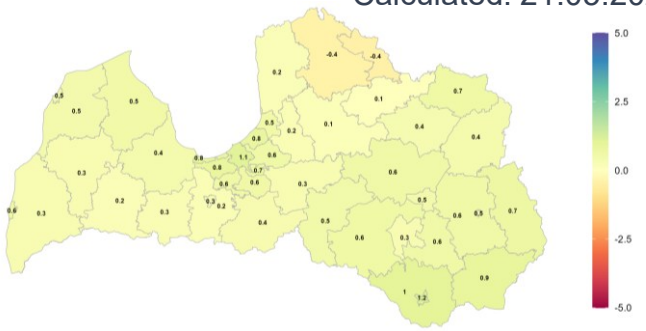
- ✓ Climate indicators of the past year and their comparison with the norm period;
- ✓ Past values of various climate indices;
- ✓ Future values obtained in RCP climate model calculations.





https://klimats.meteo.lv/pasvaldibu_apskati/

One month SPI
Calculated: 21.05.2024.



Standardized Precipitation index (SPI) for Latvian municipalities

SPI vērtība	Skaidrojums
lielāka par 2,0	ekstremāli mitrs
no 1,5 līdz 1,99	ļoti mitrs
no 1,0 līdz 0,49	mēreni mitrs
no -0,99 līdz 0,99	normas robežās
no -1,49 līdz -1,0	mēreni sauss
no -1,99 līdz -1,5	ļoti sauss
mazāka par -2,0	ekstremāli sauss

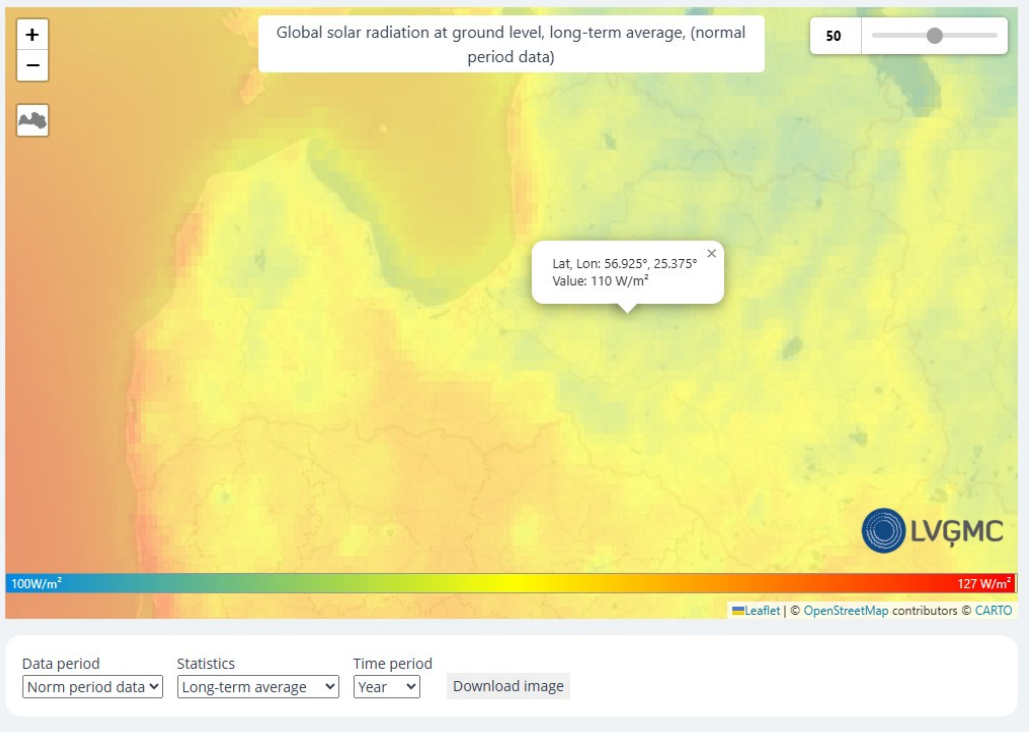
2024. gada maija 2. dekāde

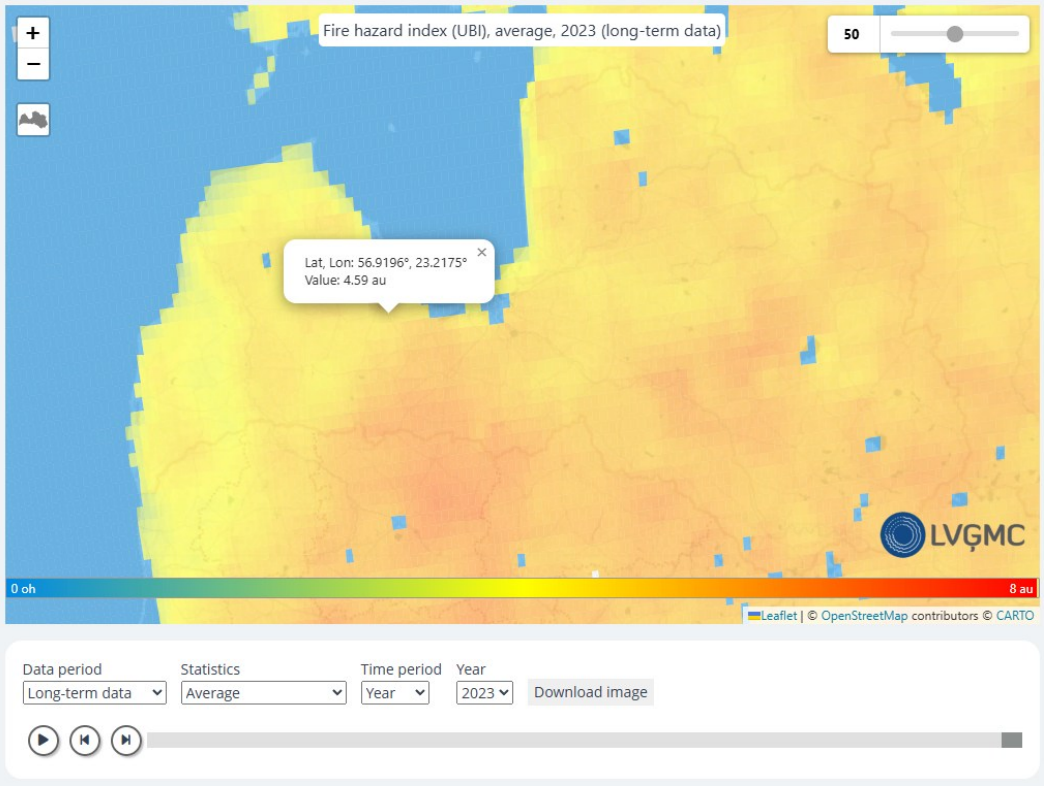
Novads	SPI vienam mēnesim	SPI diviem mēnešiem
Aizkraukles novads	0,55	1,31
Alūksnes novads	0,65	0,92
Augšdaugavas novads	0,95	2,04
Ādažu novads	0,81	0,82
Balvu novads	0,45	0,57
Bauskas novads	0,37	0,31
Cēsu novads	0,15	0,92
Daugavpils	1,16	2,48
Dienvidkurzemes novads	0,34	0,94

Remote sensing data in climate analysis

Monthly and yearly values of:

- Global solar radiation at ground level
- Direct solar radiation on the ground
- Normalized direct solar radiation at ground level
- Ultraviolet radiation index
- Earth's surface temperature
- Longwave absorbed energy
- Duration of sunshine
- Land vegetation cover
- Fire hazard index (UBI)





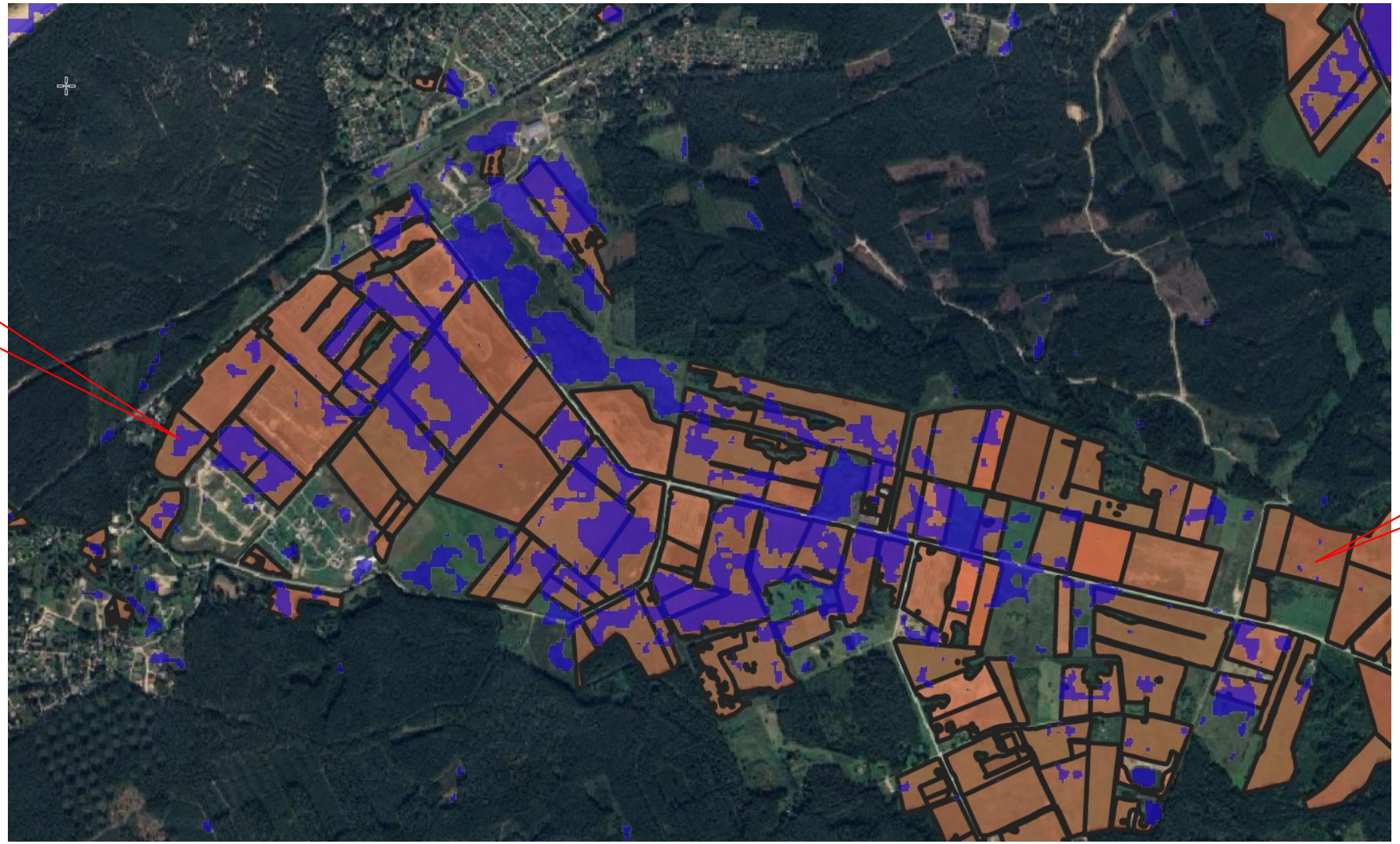
EUMETSAT

EUMETSAT LSA SAF

EUMETSAT CM SAF

https://klimats.meteo.lv/klimats_latvija/satelitu_klimata_atlants/

Use of remote sensing in monitoring flooded areas



January 2, 2023 in Carnikava parish near Garupe

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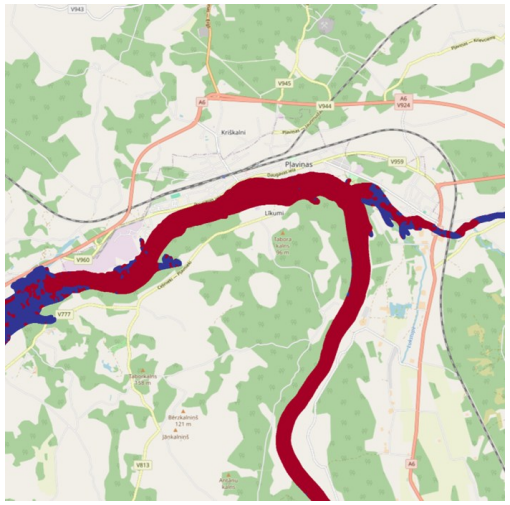
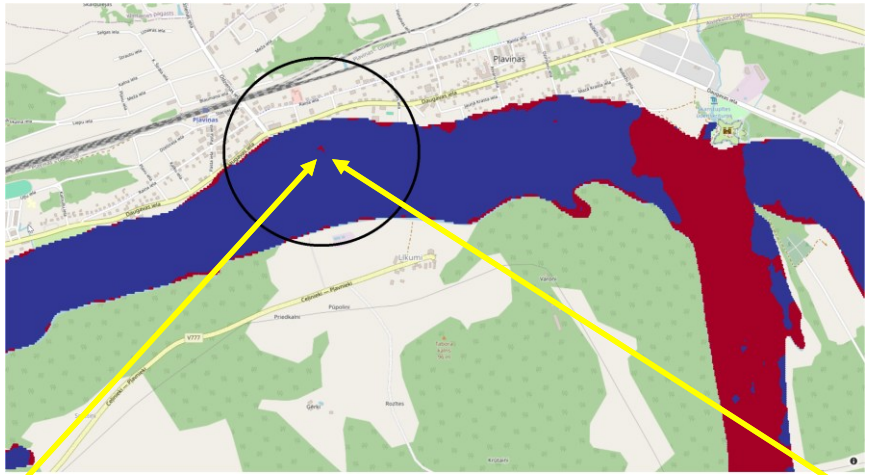
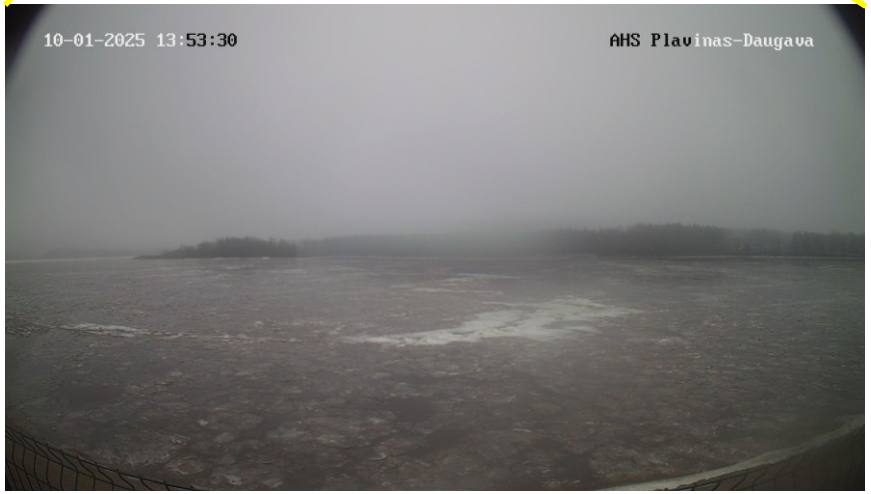
Use of satellite data in monitoring river ice



14.01.2024

16.03.2024





Daugava river near Pļaviņas
14.01.2024 and 16.03.2024

Algorithm classifies ice

Algorithm classifies water

esa
European Space Agency

sentinel-1

Adaptation of economic sectors to climate change

Scope:

Health and well-being area

(Link to a study by experts in the field)

Indicators:

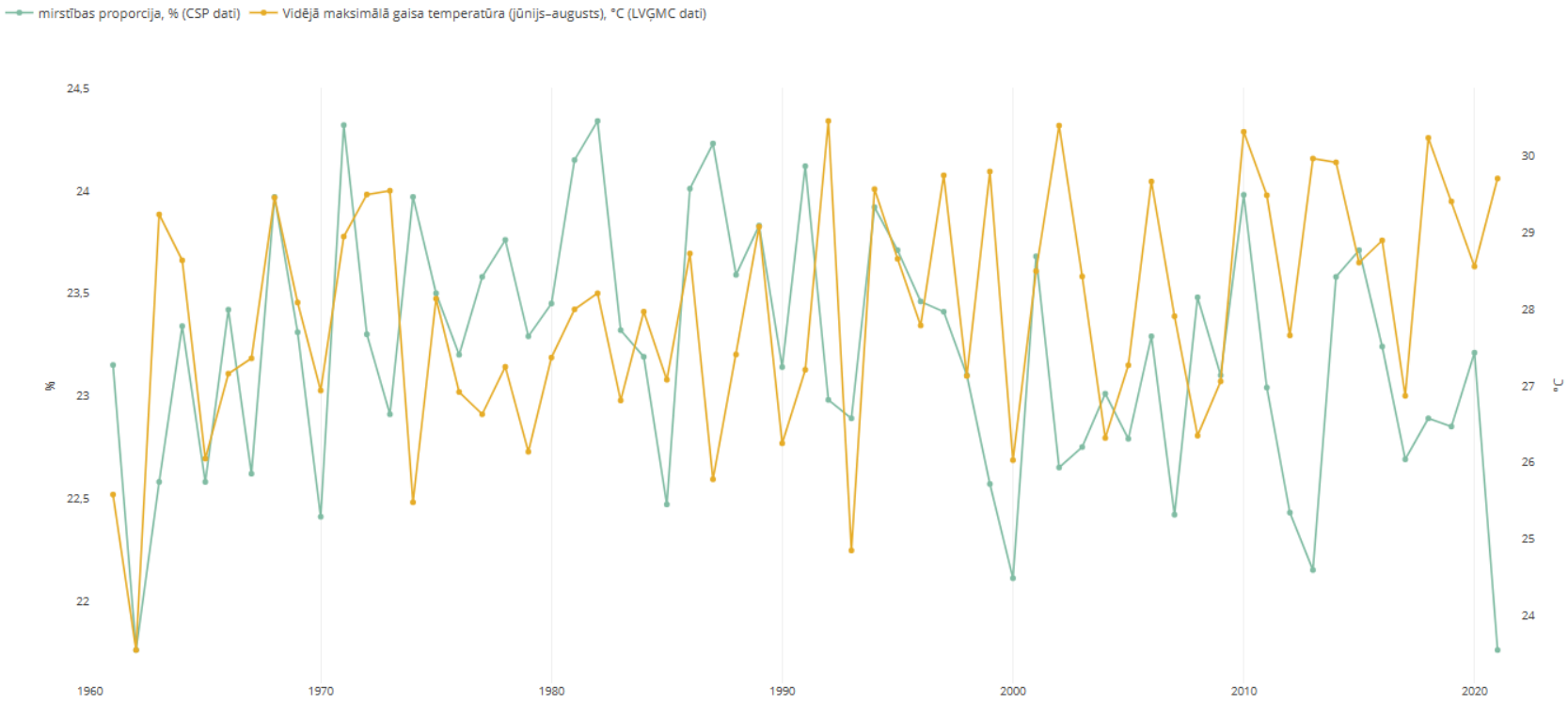
Number of hospitalized patients with diagnoses of sunburn (L55), heat and light exposure (T67) and unspecified fever (R50.9) per 100,000 population | **Total mortality index in the summer months** | Number of human cases of Lyme disease

Hide extra lines

Scope:

Health and well-being area

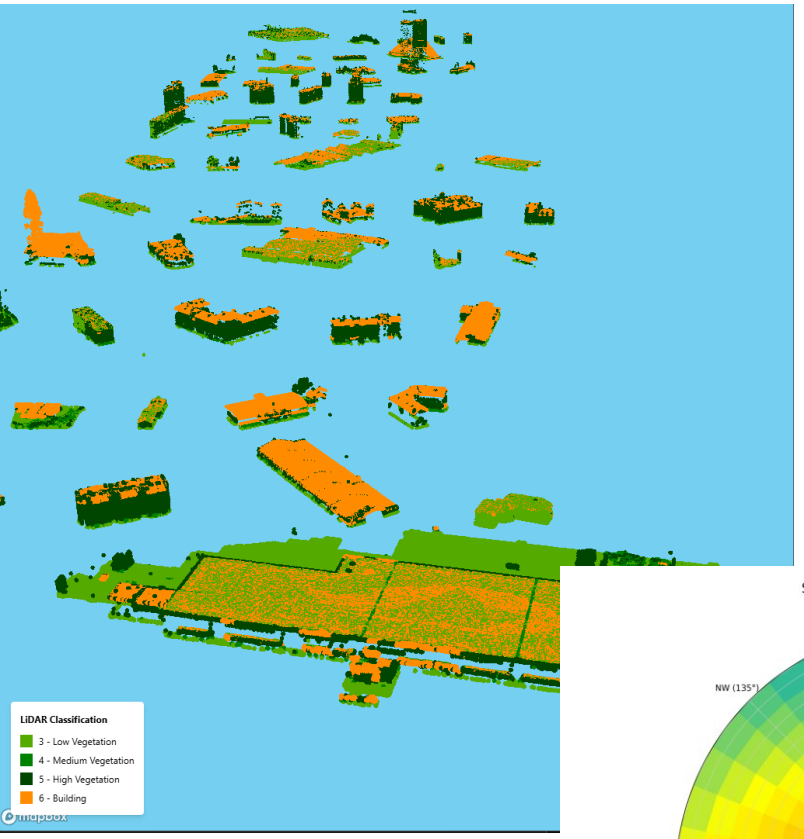
- Biodiversity and ecosystem services area
- Landscape planning and tourism field
- Health and well-being area
- Agriculture and forestry sector
- Civil protection and emergency assistance
- Construction and infrastructure planning

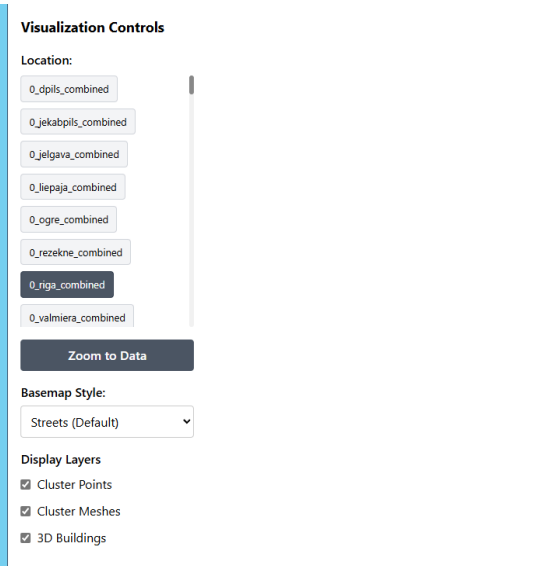


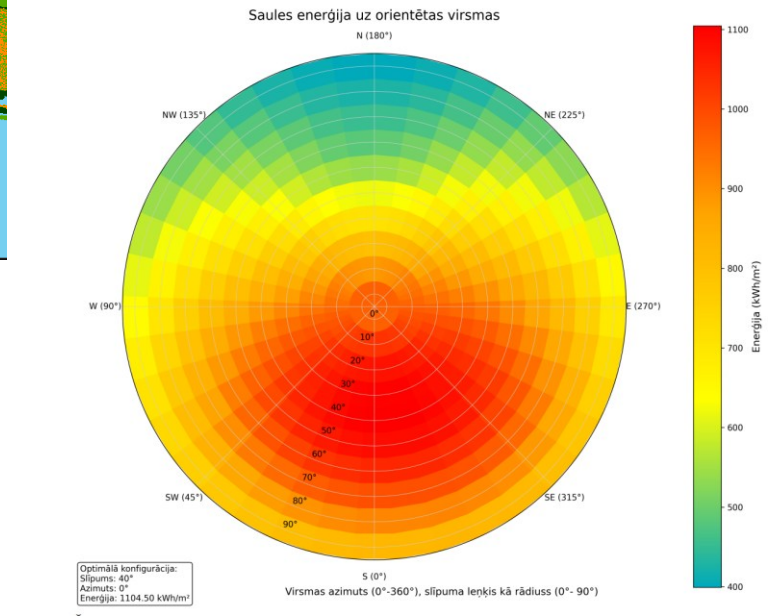
Total mortality index in the summer months

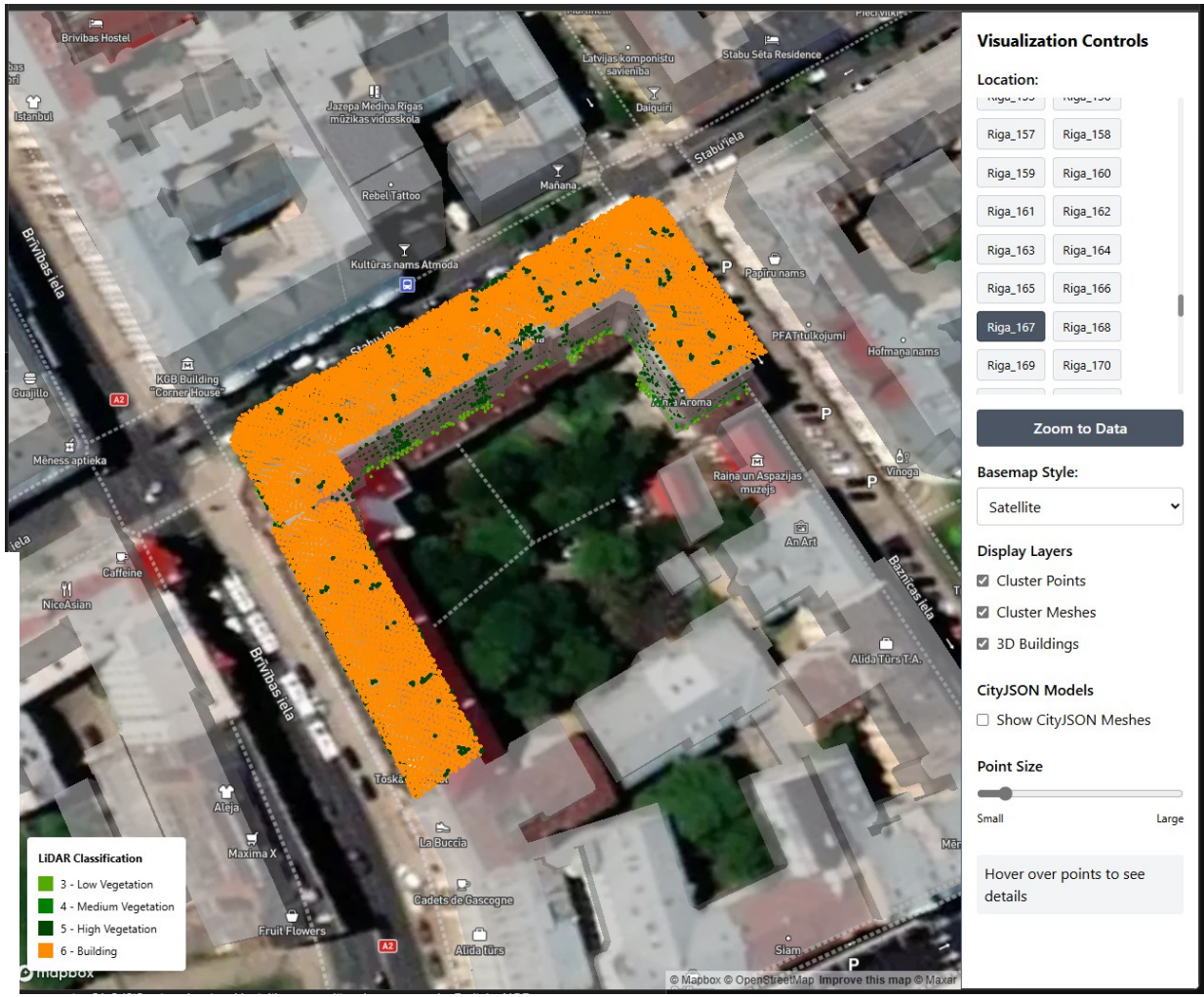
Year	deaths (June–August) (CSB data)	deaths (year) (CSB data)	mortality rate, % (CSB data)	Average maximum air temperature (June–August), °C (LVĢMC data)	Vulnerability
1961	5036	21759	23.15	25.58	3.12
1962	5132	23592	21.76	23.55	2.36
1963	5126	22703	22.58	29.24	3.26
1964	4939	21165	23.34	28.64	3.5
1965	5143	22780	22.58	26.05	2.94
1966	5468	23350	23.42	27.16	3.39
1967	5509	24362	22.62	27.36	3.09
1968	6016	25104	23.97	29.46	3.84
1969	6112	26229	23.31	28.09	3.43
1970	5947	26546	22.41	26.94	2.96
1971	6390	26275	24.32	28.95	3.93
1972	6359	27296	23.3	29.5	3.57
1973	6446	28139	22.91	29.55	3.42
1974	6744	28143	23.97	25.48	3.44
1975	7058	30042	23.5	28.14	3.52
1976	7044	30373	23.2	26.92	3.27
1977	7277	30869	23.58	26.63	3.4
1978	7427	31261	23.76	27.25	3.53
1979	7489	32162	23.29	26.14	3.23

Calculation of solar energy production potential on rooftops in urban areas



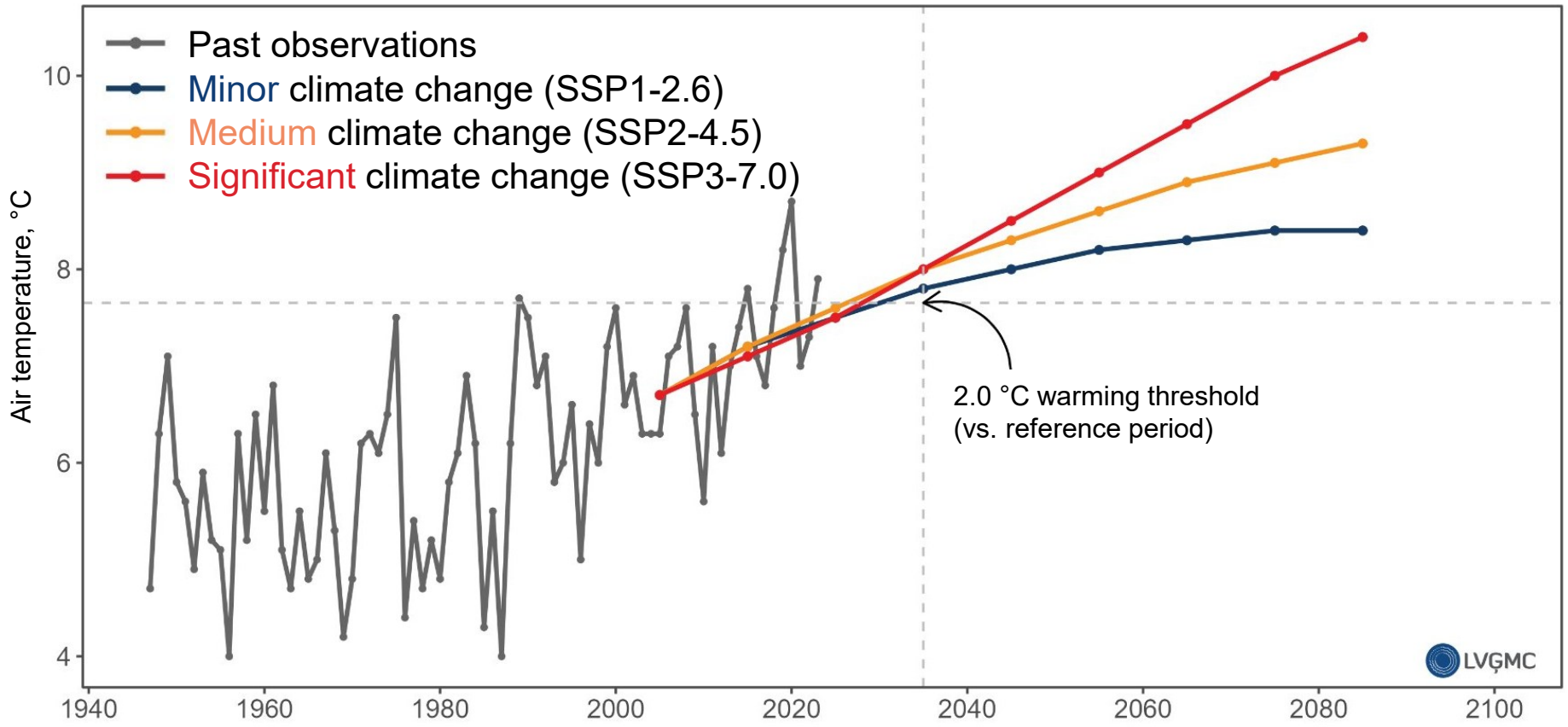






Thank you!

Average air temperature in Latvia



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