

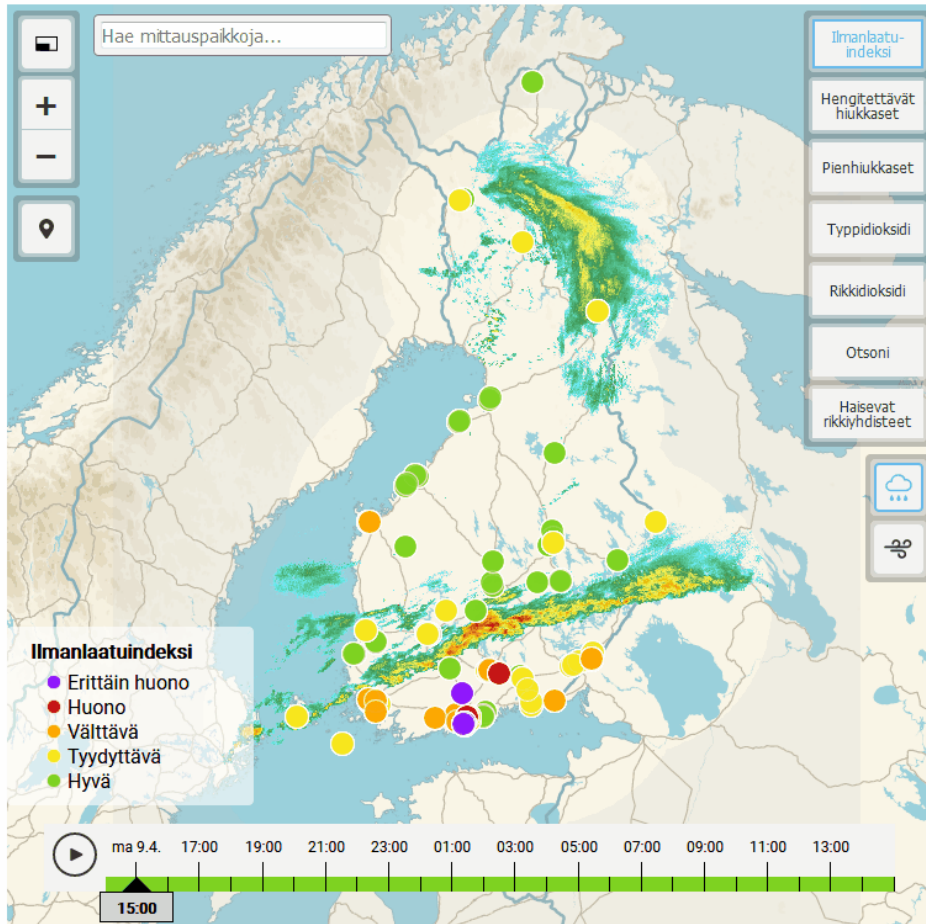


# Air Quality Index - AQI

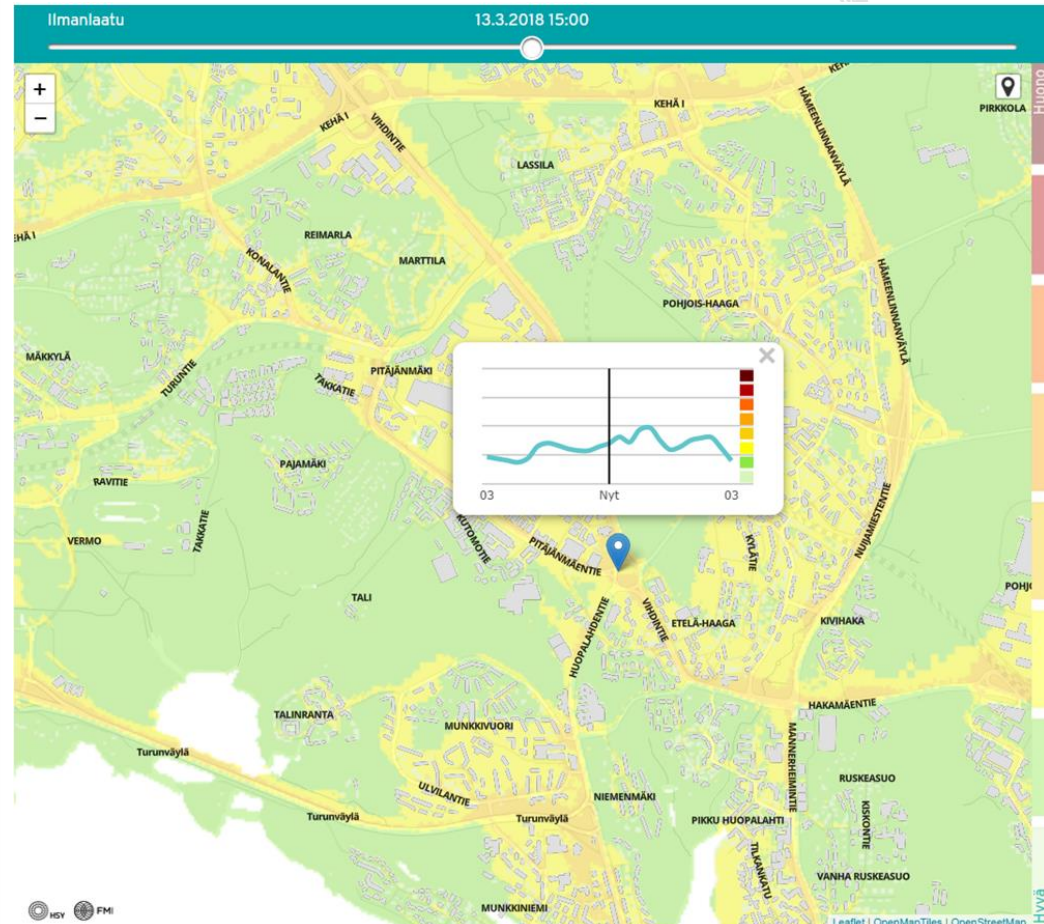
Harri Pietarila, Director of Expert Services, [harri.pietarila@fmi.fi](mailto:harri.pietarila@fmi.fi)

## Finnish Air Quality Portal and AQI

Ilmanlaatu Suomessa



## Helsinki Air Quality forecast and AQI



# FMI – Air Quality Expert Organisation

- Public Services

Support to national and local authorities in developing and implementing AQ legislation

Air Quality Monitoring

National Reference Laboratory

Informing public (national AQ portal, reporting)

National assessments

Forecasting and warning

- Air Quality Research

- Air Quality Laboratories

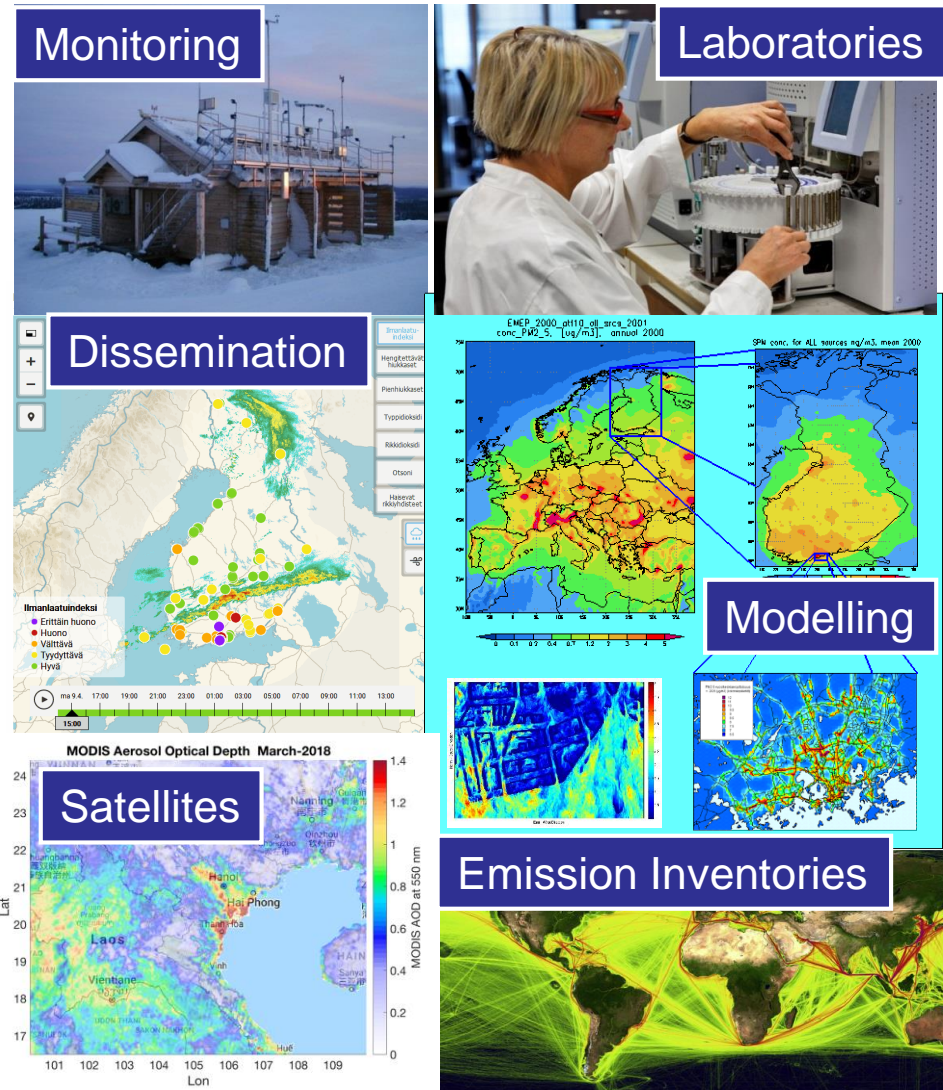
- Consulting Services

- International cooperation and projects

- Over 70 air quality experts



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
FINNISH METEOROLOGICAL INSTITUTE





# Why AQI?

- Easier communication of air pollutant levels
  - Websites
  - Newspaper
  - Smartphone apps
- Easy to understand Colour scheme
- Easy to implementation in smartphones
- Combination with health messages
- Advisories to the citizens
- Comparability between different locations
- Combine with modelling & forecasting



# EU AQI calculation

- Necessary data:
  - Traffic stations: NO<sub>2</sub>, PM (PM<sub>10</sub> and / or PM<sub>2.5</sub>)
  - Other stations: NO<sub>2</sub>, O<sub>3</sub> and PM (PM<sub>10</sub> and / or PM<sub>2.5</sub>)
- No index if above upper band limit
- 6 bands
- PM<sub>10</sub> and PM<sub>2.5</sub> based on 24-hour running means
- Maximum of all pollutants used
- For accumulated days: maximum for each day
- Associated with health messages
- Based on up-to-date (UTD), non-validated data for:
  - PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub>
- Sent to EEA every hour by Member States, delays vary between 2 and 5 hours





# NEW EU AQI – band thresholds and related health messages

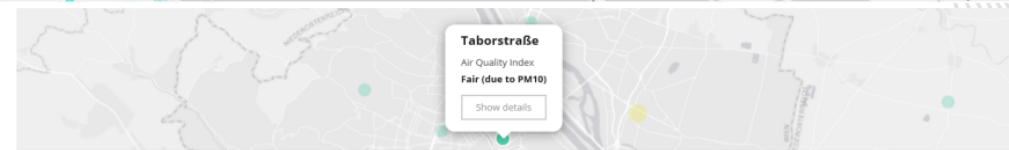
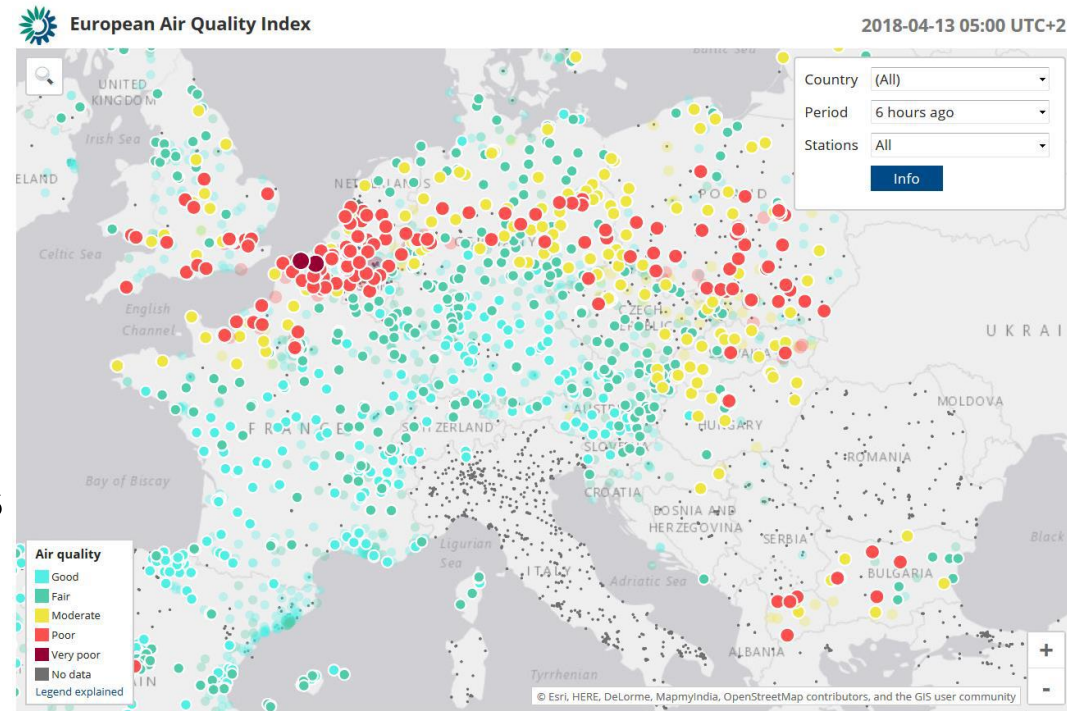
(based on pollutant concentrations in  $\mu\text{g}/\text{m}^3$ )

	Good	Fair	Moderate	Poor	Very poor	Extremely poor
Particles less than $2.5 \mu\text{m}$ ( $\text{PM}_{2.5}$ )	0-10	10-20	20-25	25-50	50-75	75-800
Particles less than $10 \mu\text{m}$ ( $\text{PM}_{10}$ )	0-20	20-40	40-50	50-100	100-150	150-1200
Nitrogen dioxide ( $\text{NO}_2$ )	0-40	40-90	90-120	120-230	230-340	340-1000
Ozone ( $\text{O}_3$ )	0-50	50-100	100-130	130-240	240-380	380-800
Sulphur dioxide ( $\text{SO}_2$ )	0-100	100-200	200-350	350-500	500-750	750-1250

AQ index	General population	Sensitive populations
Good	The air quality is good. Enjoy your usual outdoor activities.	The air quality is good. Enjoy your usual outdoor activities.
Fair	Enjoy your usual outdoor activities	Enjoy your usual outdoor activities
Moderate	Enjoy your usual outdoor activities	Consider reducing intense outdoor activities, if you experience symptoms.
Poor	Consider reducing intense activities outdoors, if you experience symptoms such as sore eyes, a cough or sore throat	Consider reducing physical activities, particularly outdoors, especially if you experience symptoms.
Very poor	Consider reducing intense activities outdoors, if you experience symptoms such as sore eyes, a cough or sore throat	Reduce physical activities, particularly outdoors, especially if you experience symptoms.
Extremely poor	Reduce physical activities outdoors.	Avoid physical activities outdoors.

# EU AQI

- AQI for individual stations
  - metadata for each station
  - pie charts for past 100 days
  - times series
- Possibility to select:
  - individual countries / all countries
  - all stations / traffic / non-traffic
  - 0 – 47 hours time lag
- AQI for individual stations
  - AQI
  - which pollutants triggers AQI
  - Country, Location
  - Classification (Background / Traffic / Industrial), Area (remote / regional / suburban / urban)
  - AQI past 100 days, current concentrations



**Taborstraße (AT90TAB)**

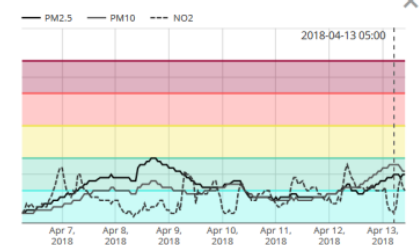
Air Quality Index: Fair (due to PM10)  
Date: 2018-04-13 05:00 UTC+2

Country: Austria  
Location: Wien  
Classification: Traffic  
Area: Urban

Pollutant Concentration (µg/m3)

PM2.5	14.5
PM10	32
NO2	13.7

Country fact sheet Austria [↗](#)  
Organization website [↗](#)





# US AQI

- Daily AQ data, hourly updates
- Calculated for 5 pollutants
  - O<sub>3</sub>
  - PM<sub>2.5</sub>, PM<sub>10</sub>
  - CO
  - SO<sub>2</sub>
  - NO<sub>2</sub>
- Current AQI
- Forecast (today, tomorrow)
- Maps, tables
- Calculated for each pollutant, highest value = AQI
- AQI range from 0 to 500
- 6 bands
- clear relation to health concerns
- implemented in 2004!

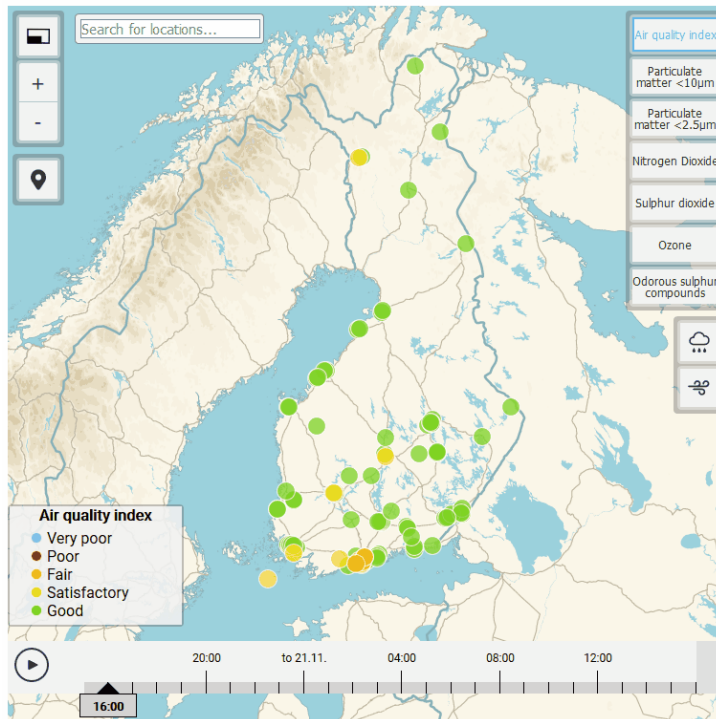
AQI	O <sub>3</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub>	PM <sub>10</sub>	CO	SO <sub>2</sub>	NO <sub>2</sub>	
	µg/m <sup>3</sup>		µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	
	[8 h]	[1 h]	[24 h]	[24 h]	[8 h]	[1 h]	[1 h]	
Good	0-50	0-108		0-12	0-54	0-5	0-93	0-101
Moderate	51-100	110-140		12-35	55-154	5-11	96-200	103-191
Unhealthy (sensitive groups)	101-150	142-170	249-327	36-55	155-254	11-14	203-493	193-688
Unhealthy	151-200	172-210	329-407	56-150	255-354	15-18	496-810	690-1241
Very Unhealthy	201-300	212-399	409-806	151-250	355-424	18-35	813-1609	1243-2388
Hazardous	301-500		808-1205	251-500	425-604	36-59	1612-2675	2390-3918

Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good (0-50)		It's a great day to be active outside.
Moderate (51-100)	Some people who may be unusually sensitive to particle pollution.	<b>Unusually sensitive people:</b> Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier. <b>Everyone else:</b> It's a good day to be active outside.
Unhealthy for Sensitive Groups (101-150)	Sensitive groups include <b>people with heart or lung disease, older adults, children and teenagers.</b>	<b>Sensitive groups:</b> Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. <b>People with asthma</b> should follow their asthma action plans and keep quick relief medicine handy. <b>If you have heart disease:</b> Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.
Unhealthy (151-200)	<b>Everyone</b>	<b>Sensitive groups:</b> Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling. <b>Everyone else:</b> Reduce prolonged or heavy exertion. Take more breaks during outdoor activities.
Very Unhealthy (201-300)	<b>Everyone</b>	<b>Sensitive groups:</b> Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better. <b>Everyone else:</b> Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.
Hazardous (301-500)	<b>Everyone</b>	<b>Everyone:</b> Avoid all physical activity outdoors. <b>Sensitive groups:</b> Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.

# Finnish National Air Quality web pages

[ilmatieteenlaitos.fi/ilmanlaatu](http://ilmatieteenlaitos.fi/ilmanlaatu)  
[en.ilmatieteenlaitos.fi/air-quality](http://en.ilmatieteenlaitos.fi/air-quality)

Air quality now



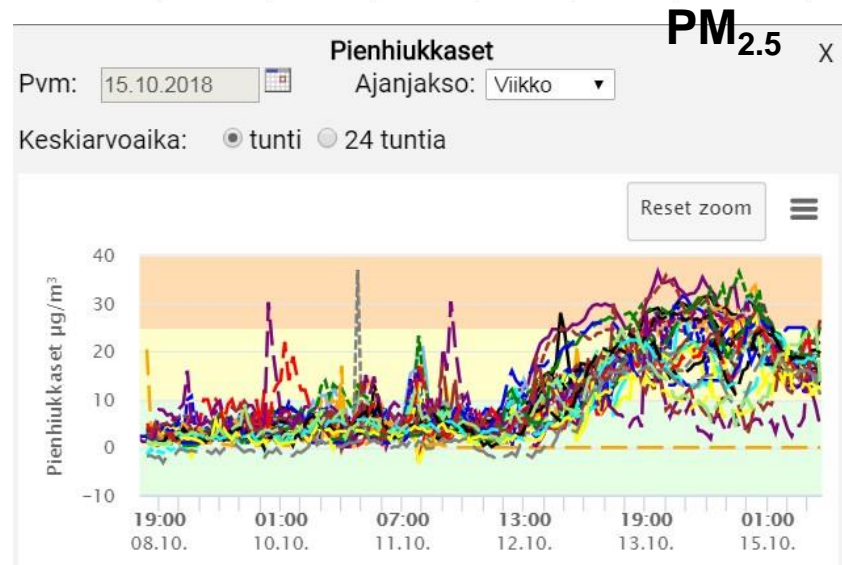
Hourly and daily time series of pollutants at selected sites can be downloaded (up to a month)

Finnish AQI since 2007

- five classes, seven (six) pollutants
- only hourly values are used
- no numeric index values are given

Index values of the different compounds (sub-indices), concentration micrograms per cubic meter air ( $\mu\text{g}/\text{m}^3$ )

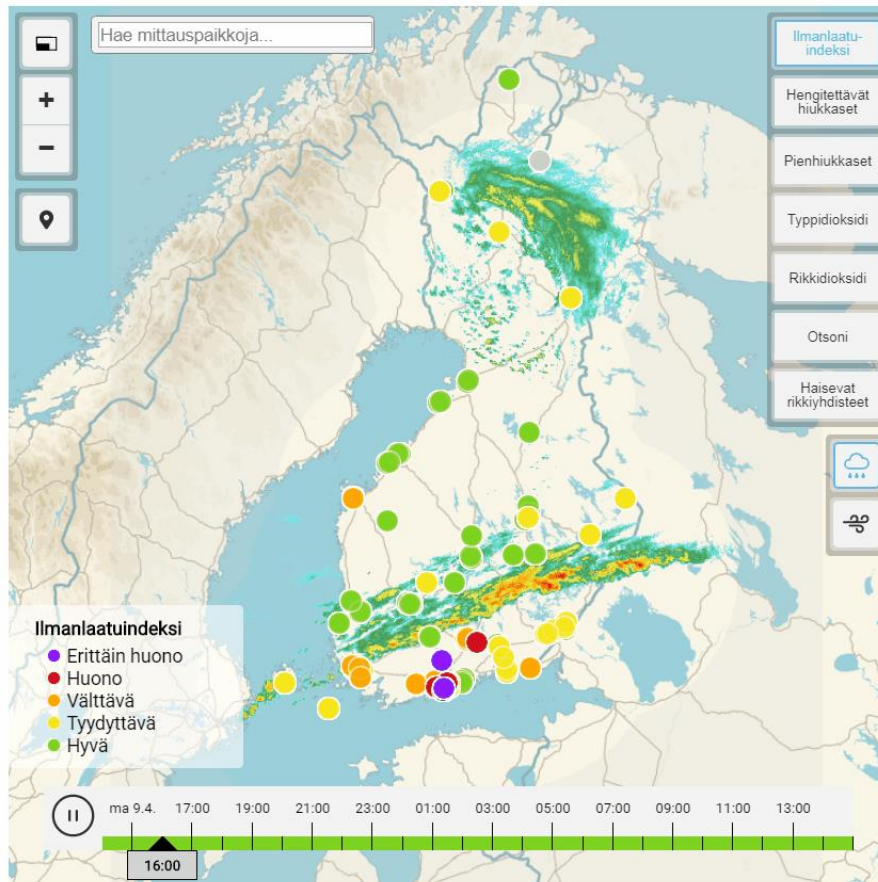
Index classification	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	O <sub>3</sub>	CO	TRS
good	below 20	below 40	below 20	below 10	below 60	below 4000	below 5
satisfactory	20-80	40-70	20-50	10-25	60-100	4000-8000	5-10
fair	80-250	70-150	50-100	25-50	100-140	8000-20000	10-20
poor	250-350	150-200	100-200	50-75	140-180	20000-30000	20-50
very poor	above 350	above 200	above 200	above 75	above 180	above 30000	above 50



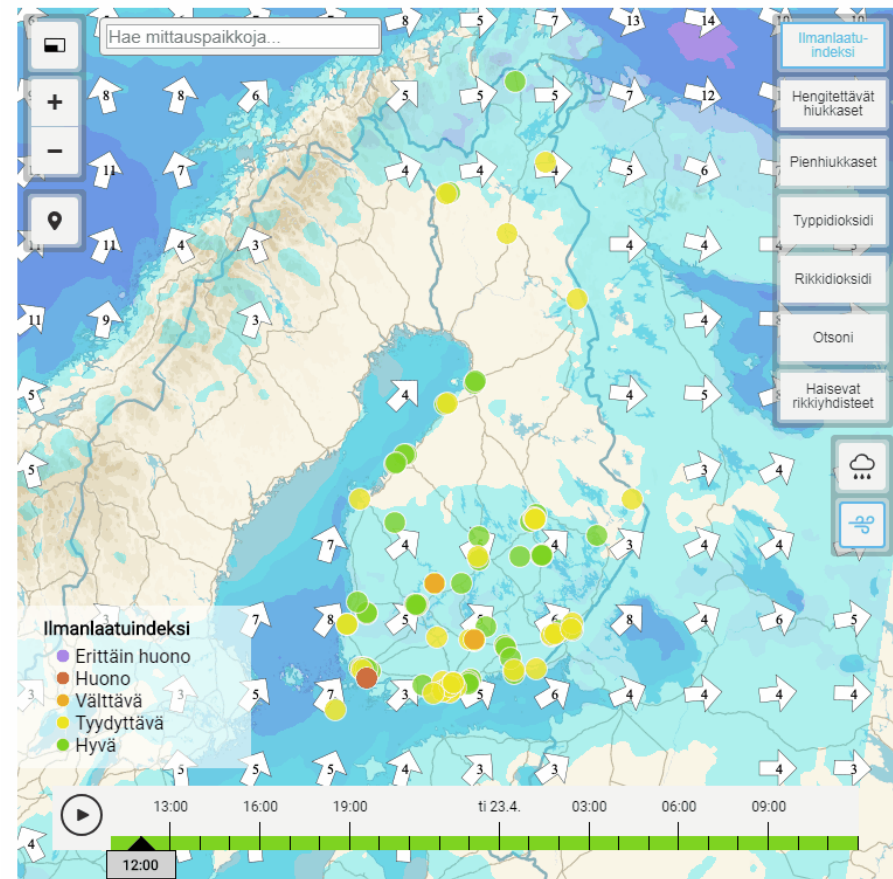


# Precipitation, ws and wd can be displayed together with AQ info

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Ilmanlaatu Suomessa

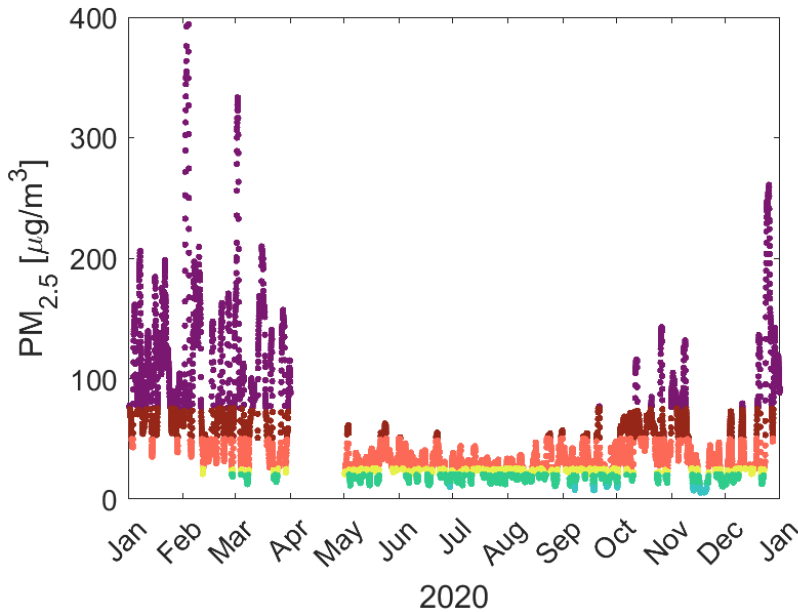




# EU AQI Almaty 2020

Station 30: Zhankozha Batyr street, 202, school № 26

European air quality index



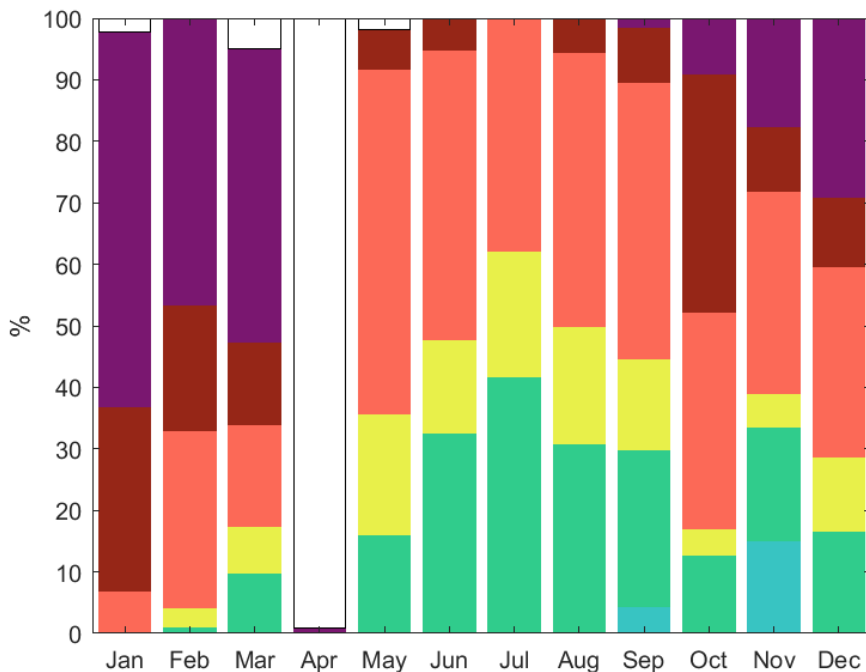
Index level	Min concentration [ $\mu\text{g}/\text{m}^3$ ]	Max concentration [ $\mu\text{g}/\text{m}^3$ ]	Share of hours
Extremely poor	75	800	19.5 %
Very poor	50	75	13.8 %
Poor	25	50	35.0 %
Moderate	20	25	11.2 %
Fair	10	20	18.8 %
Good	0	10	1.8 %



# EU AQI Almaty 2020

Station 30: Zhankozha Batyr street, 202, school № 26

Monthly distribution of European air quality index

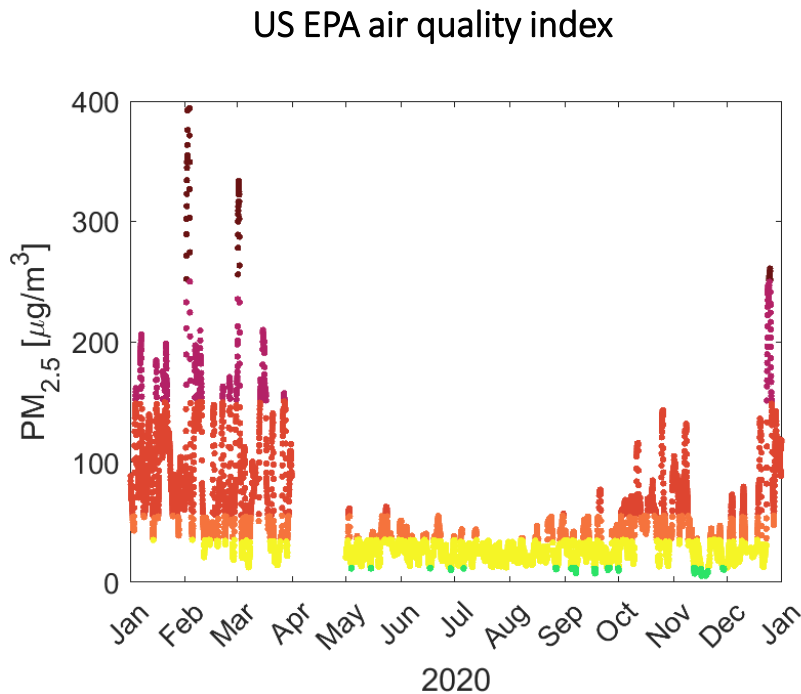


	Good	Fair	Moderate	Poor	Very poor	Extremely poor	Missing data
Jan	0	7.2	4	42.4	38	8.5	2.3
Feb	1.3	19.1	30.6	36.1	11.9	1	0
Mar	3.7	46.5	21.4	28.4	0	0	5
Apr	0	0	57.1	42.9	0	0	99
May	88.5	11.5	0	0	0	0	1.9
Jun	93.8	6.3	0	0	0	0	0
Jul	96.6	3.4	0	0	0	0	0
Aug	68.9	28.6	2.5	0	0	0	0
Sep	58.2	41.8	0	0	0	0	0
Nov	0	51.4	19.2	29.5	0	0	0
Oct	6.3	21.1	16.4	43.8	8.5	4	0
Dec	0	2.7	4.4	28.2	37.4	27.3	0



# USEPA AQI Almaty 2020

Station 30:Zhankozha Batyr street, 202, school № 26



Index level	Min concentration [ $\mu\text{g}/\text{m}^3$ ]	Max concentration [ $\mu\text{g}/\text{m}^3$ ]	Share of hours
Hazardous	250.5	500	1.1 %
Very unhealthy	150.5	250.4	4.4 %
Unhealthy for sensitive groups	55.5	150.4	24.1 %
Unhealthy	35.5	55.4	19.0 %
Moderate	12.1	35.4	48.4 %
Good	0	12	2.9 %

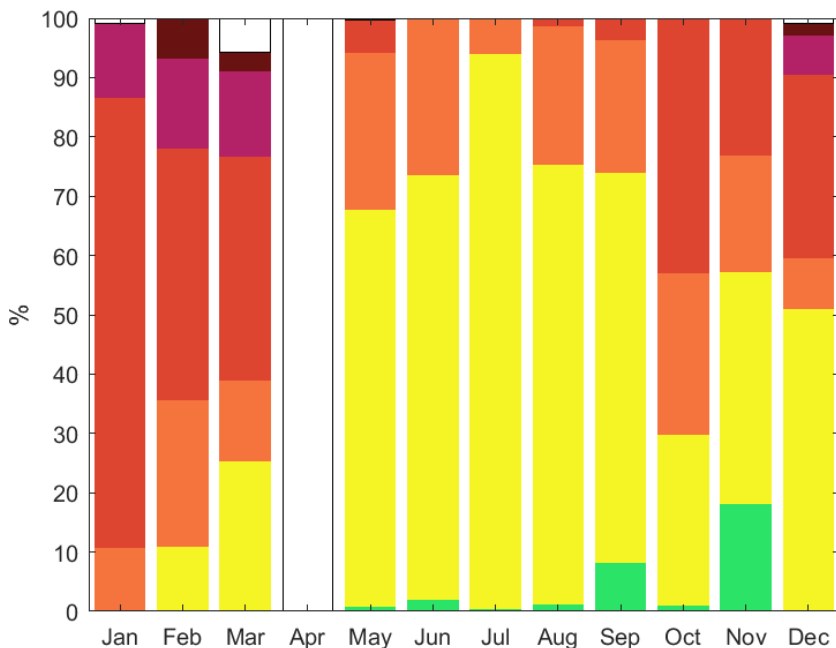




# EU AQI Almaty 2020

Station 30:Zhankozha Batyr street, 202, school № 26

Monthly distribution of US EPA air quality index



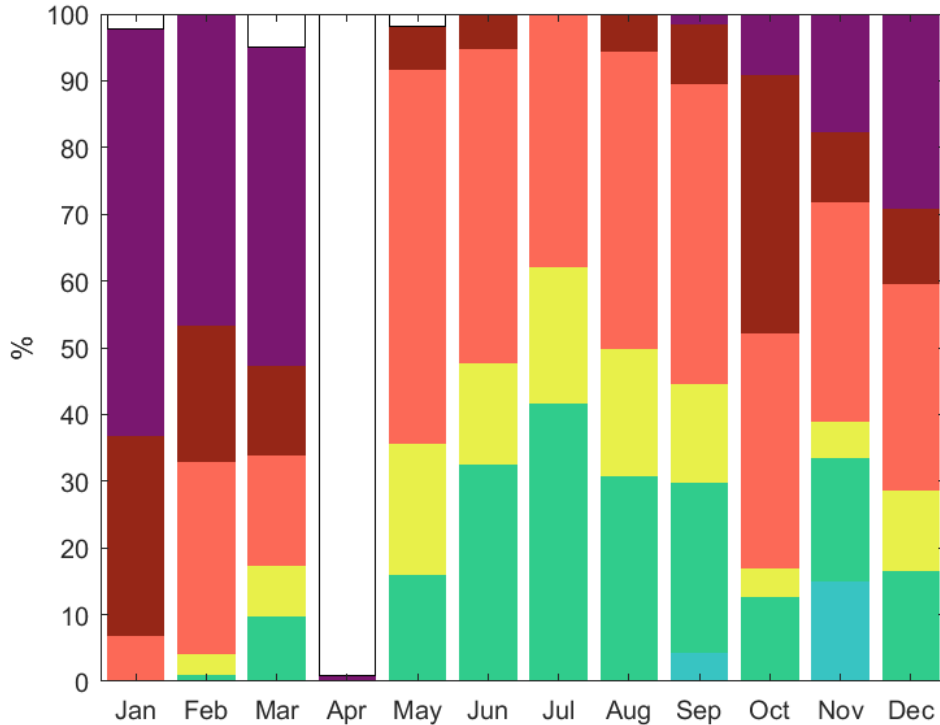
	Good	Moderate	Unhealthy	Unhealthy for sensitive groups	Very unhealthy	Hazardous	Missing data
Jan	0	0,1	10,6	75,9	12,4	0	0,9
Feb	0	11,1	24,7	42,4	15,1	6,8	0
Mar	0	25,4	13,6	37,8	14,4	3,1	5,7
Apr	0	0	0	0	0	0	100
May	0,9	66,9	26,3	5,5	0	0	0,3
Jun	2,1	71,5	26,4	0	0	0	0
Jul	0,4	93,7	5,9	0	0	0	0
Aug	1,2	74,2	23,4	1,2	0	0	0
Sep	8,3	65,6	22,4	3,6	0	0	0
Oct	1,1	28,8	27,1	43	0	0	0
Nov	18,2	39,1	19,6	23,1	0	0	0
Dec	0	51,1	8,6	30,9	6,6	2	0,8



# AQI Almaty 2020

Station 30: Zhankozha Batyr street, 202, school № 26

## EU



## USEPA

