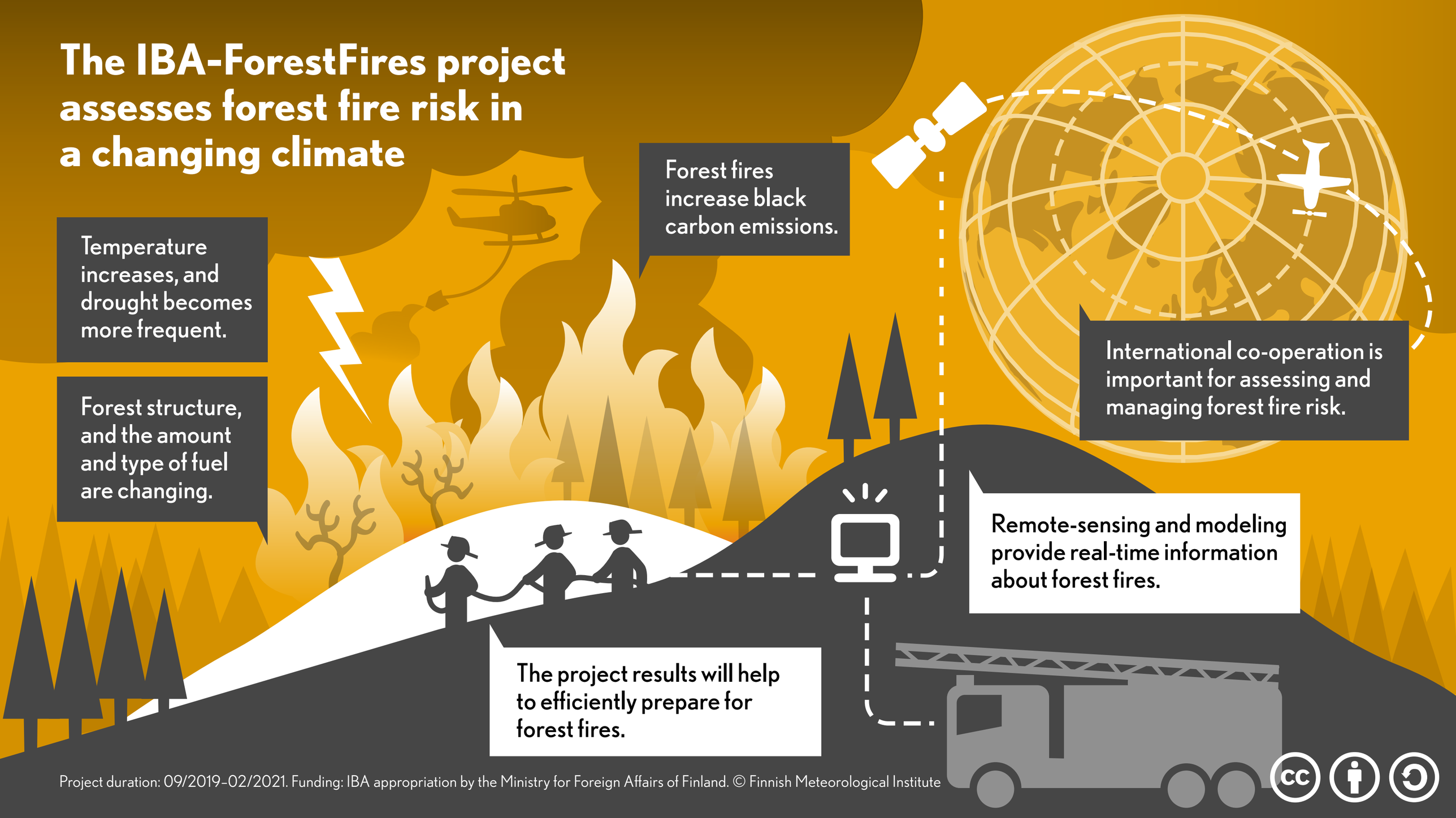
The IBA-ForestFires project assesses forest fire risk in a changing climate

Temperature increases, and drought becomes more frequent.

Forest structure, and the amount and type of fuel are changing.

Forest fires increase black carbon emissions.



International co-operation is important for assessing and managing forest fire risk.

Remote-sensing and modeling provide real-time information about forest fires.

The project results will help to efficiently prepare for forest fires.

Project duration: 09/2019–02/2021. Funding: IBA appropriation by the Ministry for Foreign Affairs of Finland.

The occurrence of forest fires depends on weather, forest fuels, and human activities

CAUSES

Most forest fires in Fennoscandia are human-caused. Lightning causes 8–13% of fires.

CHARACTERISTICS

The ignition risk, spread, and intensity of forest fires are dependent on forest fuels and meteorological conditions.

CLIMATE / WEATHER

Moisture
Temperature
Wind
Lightning

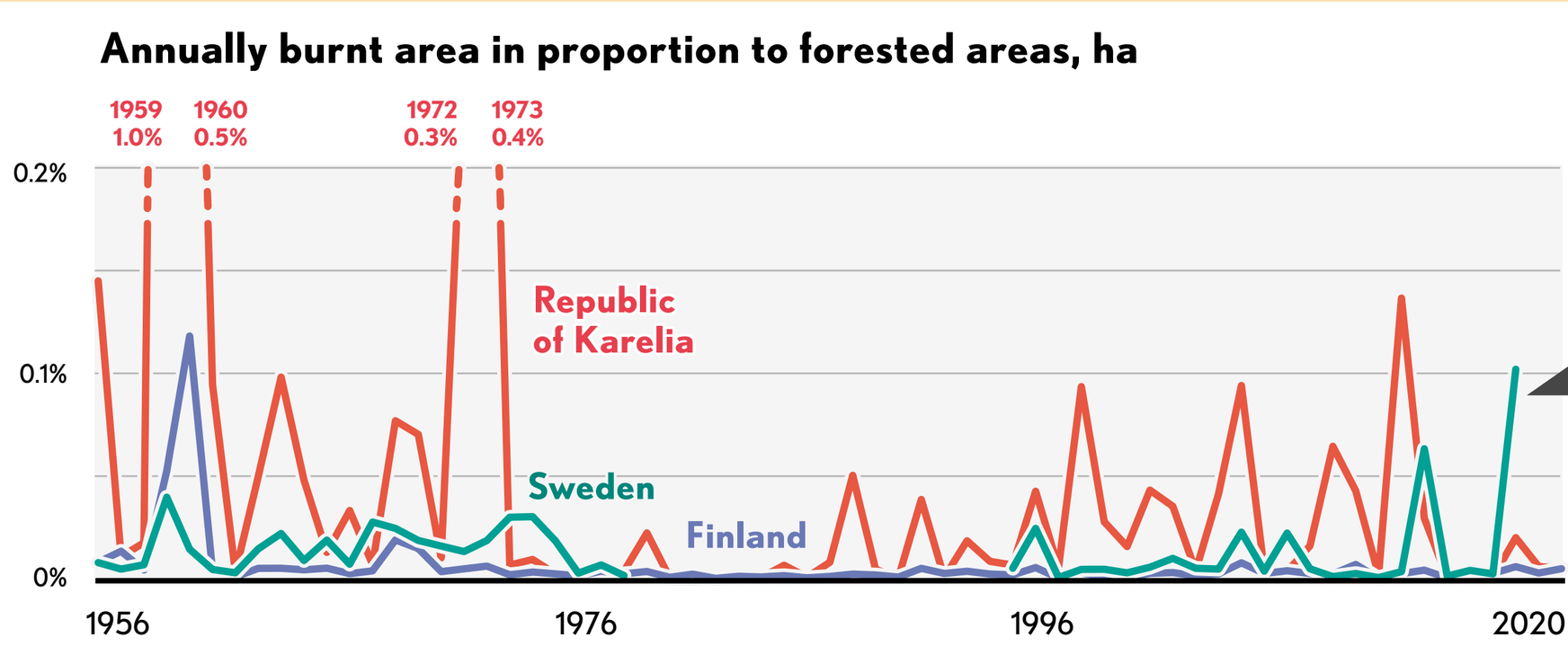
FOREST FUELS

The distribution of fuel beds and structure of forest stands – Norway spruce has the highest risk of burning explosively. Surface fires are more common in Scots pine forests.

Amount of fuels – Fires moving through intensively managed forests have less crowning potential, and therefore lower fire intensity.

Fuel characteristics – The amount of dead/live, fine/coarse fuel, and their moisture.

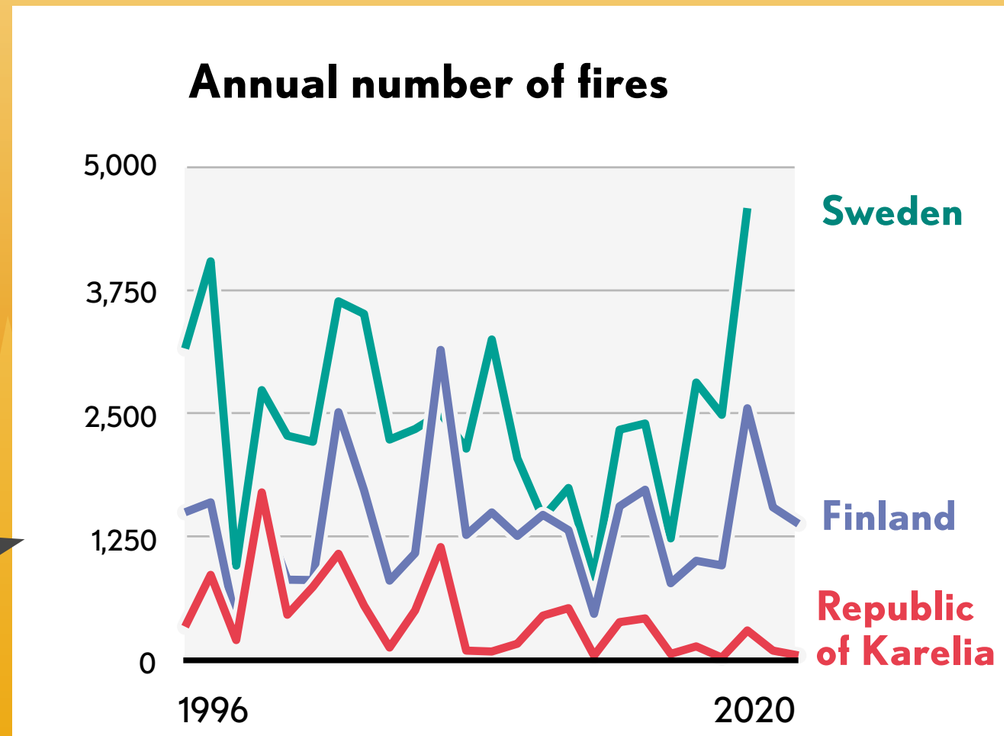
The total area burnt has mainly remained low in Fennoscandia during the recent decades



During recent decades the burnt area in Fennoscandian forests has been fairly stable except for large fires in Sweden in 2014 and 2018. In Finland, burnt areas have remained at lower level compared to Sweden and Karelia.

Total area burnt has remained low mostly due to effective fire prevention, improved fire observation and fire suppression, and intensive forest management.

Over the past two decades, no clear changes in the number of forest fires can be detected with the exception of recent increase in Sweden.



Fire statistics have been compiled from various sources and are not directly comparable.

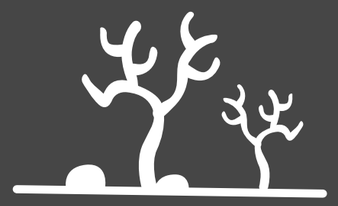
Climate change increases the risk of forest fires

	Fire risk	Fire frequency	Burnt area	Carbon emissions
Northern Finland	↑	↑	↑	↑
Southern Finland and central Sweden	↑	↑	↑	↑
Republic of Karelia	↑	↓	↑↓	↑↓

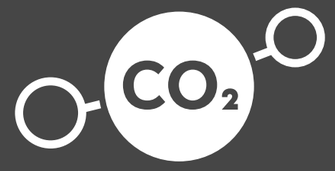
The arrows depict the direction of the change under the stabilizing climate scenario (RCP4.5) leading to 3–4 °C warming by 2100.

Fire risk is expected to increase due to climate change. At higher temperatures fine fuels on forest floors dry faster increasing the ignition potential.

In the Republic of Karelia, fire frequency is projected to decrease due to decreasing population density.



Severe forest fire seasons in Fennoscandia are likely to remain rare unless the most severe warming scenarios come to pass.



Fire carbon emissions are controlled by burnt area and fire severity, which in turn are affected by drier fuels due to climate warming.

Changes in human activities, such as behaviour, population density and forest management, and precipitation cause uncertainty in future fire risk assessments.

Damage caused by forest fires can be reduced with new technology, services, and community readiness

Cooperation

Attention to sparsely populated areas

Coordinated efforts in technology, services, and community readiness can best reduce forest fire damage.*

Enhanced tracking

Community education

Agile response equipment

Flight surveillance is used to observe fires in sparsely populated areas.

Fire risk indices describe potential for fire ignition and spread. FMI sends alerts under high risk. Fire propagation models inform firefighters about the spread and intensity of fires.

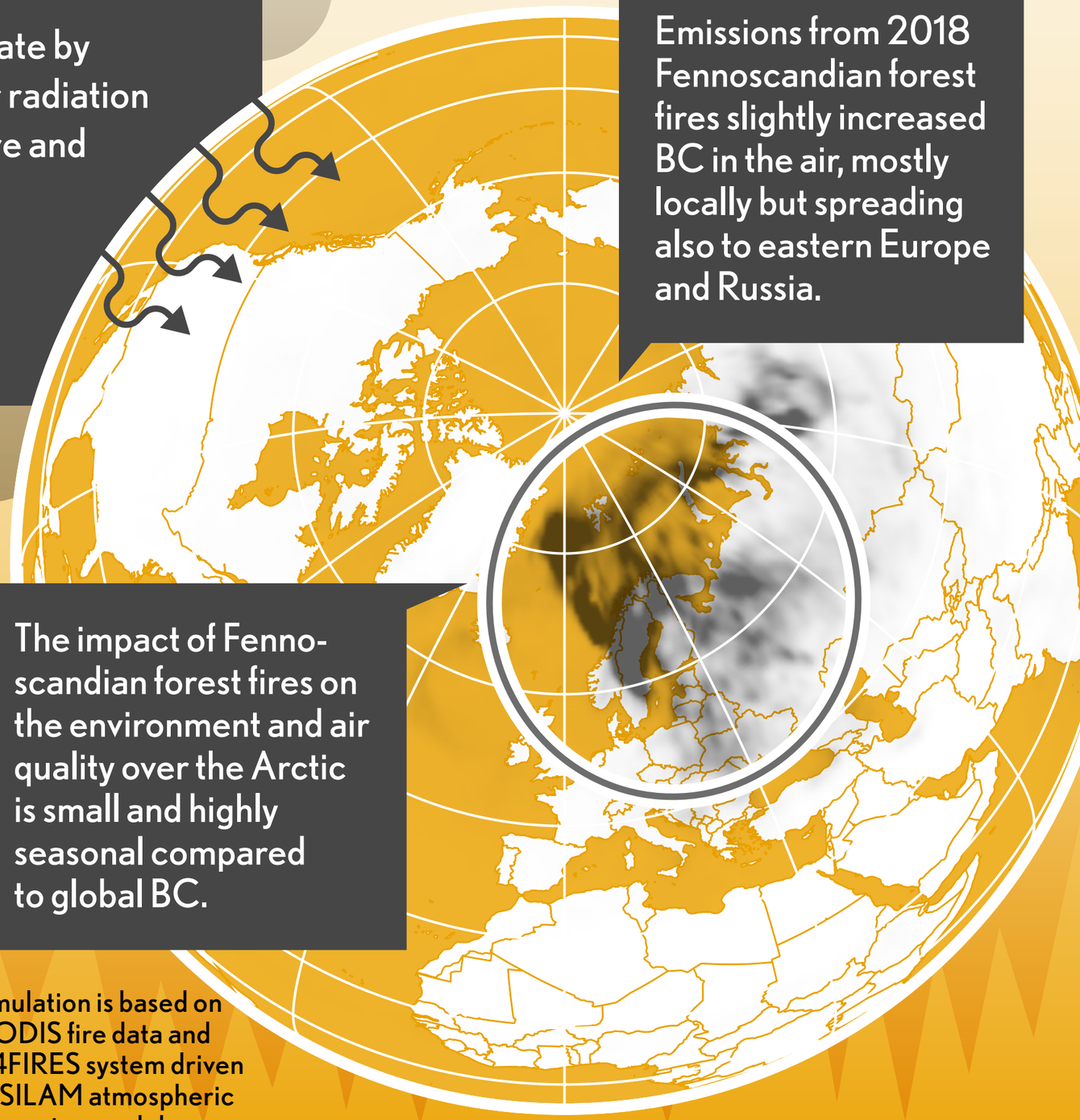
Satellite instruments observe heat signals of possible forest fires in near real-time, but the data need careful filtering.

*Based on a questionnaire with 494 respondents from rescue services and actors in the Finnish forest sector.

Forest fires are the largest source of black carbon in the Arctic – Fennoscandian fires have local effects on the environment and air quality

Black carbon (BC) is a result of incomplete combustion of carbon-containing substances, mostly fossil fuels like coal, diesel, and wood. It has adverse health effects when inhaled.

BC warms climate by absorbing solar radiation in the atmoshere and decreasing the reflectivity of snow and ice surfaces.



Emissions from 2018 Fennoscandian forest fires slightly increased BC in the air, mostly locally but spreading also to eastern Europe and Russia.

In the future, the projected increase in the number of forest fires is likely to lead to larger BC emissions.

Anthropogenic sources, such as flaring, contribute to BC emissions throughout the year.

The impact of Fennoscandian forest fires on the environment and air quality over the Arctic is small and highly seasonal compared to global BC.

Simulation is based on MODIS fire data and IS4FIRES system driven by SILAM atmospheric dispersion model.