The Earth's atmosphere and the processes of interaction of its trace constituents with radiation, both solar and emitted by the Earth's surface, are fundamental to life. One of such phenomena is the greenhouse effect. Currently, our civilization is alarmed by an uncontrolled increase in the greenhouse effect leading to an increase in the average temperature of the planet's surface: global warming. Aerosols play a special role as trace constituents of the atmosphere. Despite the low concentration in the atmosphere, the interaction of aerosols with solar radiation significantly affects the energy balance of the Earth. It has long been accepted that the basic process of aerosol interaction with solar radiation is the phenomenon of scattering, which leads to the cooling of the atmosphere. Meanwhile, emerging in the atmosphere of the brown carbon (brown carbon, BrC), organic aerosol, absorbs solar radiation, which leads to an increase in temperature! Additionally, some chemical constituents of BrC are highly toxic. Thus, BrC poses a serious threat to public health (urban smog). Very large amounts of BrC are emitted into the atmosphere during the combustion of biomass, mainly as a result of widespread and more frequent forest fires, as well as the burning of pellet fuel for heat and electricity production. Interestingly, there is a feedback system here. The global increase in the average temperature of the Earth is leading to an increase in violent forest fires, thus emitting even more and more highly toxic aerosols that absorb solar radiation. The project will investigate BrC; an organic aerosol whose solar radiation absorption properties and toxicity may undergo significant changes while staying in the troposphere as a result of various chemical transformations. These chemical transformation processes often occur inside the liquid droplets, mainly in clouds.

BrC will be produced in the laboratory in the process of controlled biomass combustion. Identification of the components formed during combustion will be carried out and the pathways of their transformation as a result of chemical reactions with reactive forms of oxygen and nitrogen (OH radicals, NO and NO^2 radicals and nitrogen, NO^{2+} and NO^+ ions) in water will be examined. In addition, the absorption properties and the toxicity of the transformation products formed as a result of aging will be measured. We will conclude about the influence of the aging process on changes in aerosol properties using the atmospheric model: Chemical Aqueous Phase Radical Mechanism (CAPRAM).