

Physico-chemical characterization of African urban aerosols (Abidjan in Cote d'Ivoire and Cotonou in Benin) and their toxic effects in human bronchial epithelial cells during the dry season 2016.

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This study is a contribution to the WP2-DACCIWA program with the aim to characterize particulate pollution on domestic fire site, traffic sites and waste burning site of two West-African capitals (Abidjan, Cote d'Ivoire and Cotonou, Benin) and to study aerosol biological impacts on lung inflammation. Such an impact is still largely unknown, especially for the particles emitted by intense African traffic sources and domestic fires.

In this context, fundamental research of this study is centered on the following key scientific question: what is the link between aerosol size differentiated composition and inflammation markers for the main combustion sources prevailing in South West Africa during dry and wet seasons?

To tackle this question, intensive campaigns in Abidjan and Cotonou have been conducted in July 2015, January and July 2016, and January 2017.

In this paper, we will present our first results for the campaign of January 2016.

In terms of aerosol size differentiated composition, main aerosol components (mass, black carbon, organic carbon, water soluble particles ...) were measured. We may notice that PM measured for all the sites is generally higher than WHO norms. Organic carbon and dust particles are the two more important contributors for the ultra-fine and fine particle sizes with more organic carbon in Abidjan and dust particles in Cotonou respectively.

In terms of in vitro biological studies on sampled aerosols on these sites, size-fractionated PM from the different sampling sites were compared for their ability to induce a proinflammatory response characterized by the release of the cytokine IL-6 by human bronchial epithelial cells. PM from waste burning site did not induce significant IL-6 release whatever the size fraction whereas PM from domestic fire were the most reactive especially the ultra-fine fraction. Ultra-fine particles from traffic (Abidjan and Cotonou) always induced a dose-dependent IL-6 release.

A tentative cross-analysis between physico-chemical and toxicological results will be proposed.