



Thi-Phuong Nguyen¹, Tony Basset², Stéphane Moularat³, Faisal Bousta⁴, Geneviève Oriat⁴, Anne Lama⁵, Caroline Laffont¹, Patricia Ramond⁵, Enric Robine³

1. Laboratoire Scientifique et Technique, Bibliothèque nationale de France, 2. Conservatoire National des Arts et Métiers, 3. Centre Scientifique et Technique du Bâtiment (CSTB), 4. Laboratoire de Recherche des Monuments Historiques (LRMH), 5. Archives Nationales,

Contamination by fungi in paper based collections repositories is a major and recurrent problem which concerns not only archives and libraries but every other institution in charge of the preservation of cellulose containing cultural heritage: engravings, maps, photographs, etc.

Unfortunately such contaminations can still only be detected when they become visibly obvious on the documents or the building materials. At this stage of the fungi development, it is often too late and the decontamination, long, difficult and costly. Moreover, unless using harmful chemicals, it is not always efficient.

The main aim of DECAGRAPH project is to apply a methodology already developed for dwelling houses and historical buildings, to an early detection of biological contaminants specifically found on paper based collections.

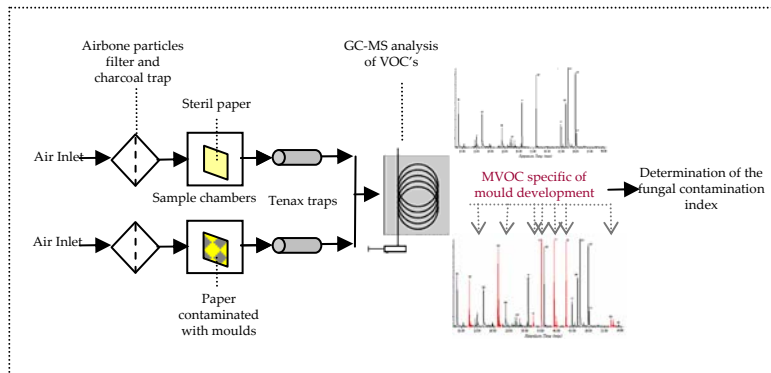
Based on the detection of organic volatiles emitted by fungi in their early stage of development (MVOC), the results of this project will be used to parameterize a sensor for continuous monitoring of biological indoor air quality in paper based collections repositories.

This simple to use and low cost sensor will be equipped with a warning device. Thanks to it, the collection keepers could be warned about a contamination from its very beginning and take rapidly the actions necessary to prevent the contamination from being invasive and harmful to the documents.



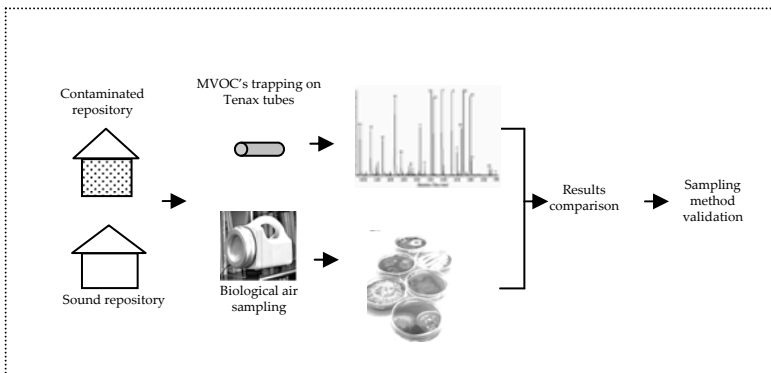
Definition of target tracers and development of an index

- Choice of 4 moulds specific to libraries and archives environments. Culture on 4 types of papers
- Analysis of the VOC's emitted by the papers alone, the moulds alone and the moulds on papers. Identification of biological volatile organic compounds (MVOC's) tracers specific of an early stage of mould development on paper-based collections
- Determination of the fungal contamination index based on binary responses (existence or lack of MVOC's) – Information on the presence or absence of mould activity.



Determination of the sampling conditions

- MVOC analysis of 1 contaminated and 1 sound repositories
- Study of the spatial repartition of the MVOC's in the repositories
- Comparison with classical methods of biological air sampling and spores cultivation
- Sampling method validation (MVOC's sampling duration, sampling localisation, etc.)



In situ analysis

- MVOC's and classical biological air sampling study in several repositories
- Determination of the fungal contamination by using the contamination index
- Contamination index validation

Development of a sensor for the monitoring of indoor air quality