ENVIRONMENTAL IMPACT OF FIREWORKS ON AEROSOL CHEMICAL CHARACTERISTICS DUE TO CHAMPIONSHIP-WINNING CELEBRATION

F. Picca*, F. Sasso, A. Pignatelli†, M. Commodo‡, P. Minutolo ‡, A. D'Anna****

francesca.picca@unina.it

* Centro Servizi Metrologici e Tecnologici Avanzati, Università degli Studi di Napoli Federico II, Napoli, 80146, Italy

** Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, Università degli Studi di Napoli Federico II, Napoli, 80125, Italy

†Dipartimento di Fisica, Università degli Studi di Napoli Federico II, Napoli, 80125, Italy

‡ Istituto di Scienze e Tecnologie per l'Energia e la Mobilità Sostenibili, CNR, Napoli, 80125, Italy

Abstract

In this work, a seven-day intensive in situ measurement campaign was carried out using a high-resolution aerosol mass spectrometer (HR-ToF-AMS) to detect changes or alterations in air quality in Naples.

Indeed, in the first week of May 2023, there were huge celebration events in the city related to winning the Italian Soccer championship. As a means of celebration, citizens heavily used fireworks and smoke bombs.

In particular, two days proved significant: 4th May 2023 and 7th May 2023 on the occasion of the mathematical victory and the subsequent first game played in Naples, respectively.

As a definition, fireworks and smoke bombs are a mix of chemical substances that give rise to combustion and then to the generation of compounds that, after the effect of light, explosion and heat, release into the atmosphere some particles that almost immediately alter the air quality and also create more or less serious health problems. In addition, the same particles could remain in the atmosphere and generate adverse future issues.

From in situ measurements, it was possible to detect the presence of species related to and derived from the activity of fireworks/smoke bombs, such as chlorates, nitrates, and organic compounds and assert the concentration of which shows a significant increase in the hours associated with the festivities. Moreover, these measurements also allow evaluation of their behaviour on the atmosphere in the subsequent days.