AIR CONCENTRATIONS OF SO_2 AND WIND TURBULENCE NEAR *LA PLATA* PETROCHEMICAL POLE (ARGENTINA)

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Abstract— **The aim of the present work is to show the correlation of the SO_2 atmospheric concentration, taken in the surroundings of La Plata city, and the characteristics of the wind turbulence in such area. The first results indicate that there are a reasonable agreement between them.**

Keywords— **atmosphere, pollutant, sulphur dioxide, wind, turbulence.**

I. INTRODUCTION

The atmospheric pollution can be understood as the presence in air of one or more pollutant gases and / or particulate matter (or a combination of both), in an amount and time duration such that may affect the ecosystem.

This problem can be addressed in different steps, i.e.: to detect and measure the concentration of pollutant gases in the studied region, to process the data and correlate it with other atmospheric parameters, in order to act toward the solution of the problem.

The SO_2 is a pollutant gas that is currently taken as pollution indicator of urban and industrial areas, which can severely affect the human health if its concentration is large. It is usually emitted by fixed and mobile sources (mainly fosil-fuel based machines), and in presence of water vapor it is the main component of the acid rain. More details about this subject can be found in Del Giorgio (1977), Morettón (1996) and Sigrist (1994).

The meteorological parameters of the studied region play and important role in the behaviour of the local pollutants (Del Giorgio, 1977).

Some results about relationships between atmospheric concentrations of SO_2, and the characteristics of the wind turbulence in the region near La Plata's Petrochemical Pole, are presented in this work.

II. METHODS

A. For the determination of SO_2 concentrations

To obtain the Sulphur Dioxide concentration values, a commercial equipment Lear Siegler, model ML 9850, was used (Siegler, 1992). The equipment was placed in a laboratory at the Facultad Regional La Plata (F.R.L.P.), U.T.N. This type of analyzer, that uses an optical emission spectroscopy method, is an ultraviolet (UV) fluorescence spectrometer designed to continuously measure low concentrations of SO_2 in ambient air. Sulphur Dioxide exhibits a strong ultraviolet absorption spectrum between 200 and 240 nm. Absorption of radiation at these wavelengths results in the emission of fluorescence radiation at wavelengths between approximately 300 and 400 nm. The amount of fluorescence emitted is directly proportional to the SO_2 concentration.

UV radiation at 213.9 nm from a zinc discharge lamp is separated from the other wavelengths in the zinc spectrum by an optical band-pass filter. The 213.9 nm radiation is focused into the fluorescence cell where it interacts with SO_2 molecules in the beam path. A certain amount of the fluorescence, i.e., that emitted perpendicularly to the excitation beam, is collected and focused onto a photomultiplier tube, through a 350 nm filter. A reference detector monitors the emission from the zinc lamp and is used in order to correct for temporal lamp fluctuations.

The precision in the SO_2 measurements is 0,5 ppm or 1% of reading, whichever is greater, working between 5 to 40 ºC (USEPA Designated Range: 15 to 35 ºC). The SO_2 data was continuously stored in a floppy disk.

The equipment was calibrated using standard SO_2 concentrations. Adequate chemical methods, and biological indicators (Rosato, 1999), were also used.