



A humidity controlled Nephelometer system to study the hygroscopic properties of aerosols in the marine environment

Aditya Vaishya, Colin O'Dowd, and S. Gerard Jennings

Centre for Climate & Air Pollution Studies, School of Physics, National University of Ireland Galway, Galway, Ireland
(a.vaishya1@nuigalway.ie)

A Humidograph system has been designed to study the hygroscopic properties of aerosols for different air-masses and for different seasons in the marine environment. Since ambient marine aerosols are likely to be found in a metastable state, and in accordance with recommendations of WMO/GAW to sample dry aerosol, a drying unit (Nafion based) is placed just after the inlet to dry the aerosols to a relative humidity (RH) < 40% so as not to misinterpret the optical properties of hygroscopic aerosols if they are on the descending branch of the hysteresis curve. The flow after the dryer is split into two, one going to a 3-wavelength TSI-3563 Integrating Nephelometer, and the other to a Gore-Tex based humidifier followed by a single-wavelength TSI-3561 Integrating Nephelometer. The humidifier is used to vary the RH from 40% to 90%. While the TSI-3563 Integrating Nephelometer will operate at RH < 40%, the TSI-3561 Integrating Nephelometer will operate under varying RH conditions. Software developed in LabVIEW is used to control the hardware components and to log the data in a predefined format. Results of the performance of the Humidograph system in the laboratory and at the Mace Head Atmospheric Research Station are presented.