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Contribution of harbour activities to atmospheric aerosol in the Brindisi area

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The port areas are economic centres and transport hubs, that bring together different transport modes (sea, road, railway transport) and also industrial activities. Ship emissions when docked and during port manoeuvring can have a substantial negative effect on local air quality. The Fagerli and Tarrason (2001) simulation results indicated that ship traffic emissions contribute to 5% and 10% of PM10 concentrations in large parts of Great Britain, Portugal and Italy; similarly to what was obtained by Dalsoren et al. (2009). At the beginning of 2012 it was started the research project CESAPO (Contribution of Emission Sources on the Air quality of the POrt-cities in Greece and Italy), funded within the framework of Interreg Italy-Greece (2007/2013), having as objective the quantification of the contribution to atmospheric particles of emission sources in two important Mediterranean port-cities, namely Patra (Greece) and Brindisi (Italy). In this work the first results of the CESAPO project will be presented giving more emphasis on the analysis of the maritime transport and the activities within the harbour of Brindisi that is characterized by several emission sources operating concurrently. In 2010 and 2011, in the port of Brindisi freight traffic and total goods movement accounted for more than 9.5 million tons, with over 520,000 passengers. To recognize the contribution of harbour activities to PM2.5 and to the total number concentration of particles with respect to other emission sources (urban traffic and industrial pollution) it has been performed an intensive observation period (IOP) of 5 months (June 1 to October 31, 2012). During the IOP the data of 10 fixed monitoring stations (of the regional network managed by ARPA Puglia) and those from two additional stations specifically installed during the project inside the harbour area. A station was used to characterize the chemical composition of PM2.5 and PAHs (in the gaseous and aerosol phases) and the other was devoted to high temporal resolution (1 second) measurements of PM2.5 mass and number particle concentrations. Results show that the contribution of port activities (ship traffic and loading/unloading of ships) is not easily distinguishable in the daily average concentration as it was also observed in the port of Venice (Contini et al., 2011). Average long-term concentrations of PM10 and PM2.5 in the port are smaller than those observed in the urban area, but numerous short peaks (durations variable between 10 and 100 minutes) of concentration were observed associated to harbour activities in which the PM2.5 concentrations increase of 3-4 times and number particle concentrations increase up to a factor 10. These concentration peaks were analysed using a statistical methodology that takes into account the wind direction and the actual ships traffic to quantitatively characterize the contribution of vessels traffic emissions during arrive and departure operations or during loading/unloading. Results will be presented and compared to those obtained in other harbour areas in Europe.

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