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Comment

## ***Interactive comment on “Absorption, scattering and single scattering albedo of aerosols obtained from in situ measurements in the subarctic coastal region of Norway” by E. Montilla et al.***

### **Anonymous Referee #2**

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#### General comment

The paper presents an analysis of wavelength dependent local measurements of aerosol scattering and absorption coefficients. The study intends to discuss the variability of the single scattering albedo as well as variations of the wavelength dependence of these coefficients, discussed in terms of the scattering/absorption Angstrom exponents. The optical study seems to produce first encouraging results to distinguish between (at least two?) different aerosol types (air masses). However, the manuscript is lacking potential and valuable information to confirm interpretations given in the text. The study gives no information on the meteorological situation during the measurement

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period, likewise no information about air mass origins. It is said in the manuscript that the main goal of the campaign was to acquire a comprehensive physical and chemical characterization of local aerosol. Thus, despite the fact that the authors have access to simultaneously measured physico-chemical aerosol properties, these data are not at all used to interpret findings and to confirm speculations of air mass origins or transport pathways (sea salt, continental/urban pollution), etc... I don't recommend publishing the manuscript in the present state. The manuscript should undergo some major revisions, which means additional studies that have to be carried out to work on the interpretation of the observations, and thus, to add strong scientific value to the presented optical analysis. Particular refinements are necessary related to the below general and specific comments.

#### Further Comments

1. pg2162, line 5-7: Check sentence. 2. In general, the potential of that kind of study could be to classify air masses that are simultaneously described by their optical and physico-chemical properties of the particle phase (somehow quantitatively to apply findings to other locations). 3. Abstract. Citation: "The relationships between all the parameters analyzed, mainly those related to the single scattering albedo allow to describe the local atmosphere as extremely clean". Is this the basic interpretation of findings in the study (since presented in the abstract)? 4. Introduction. The authors should reference former studies/results that related Angström absorption/scattering exponents to aerosol physico-chemical properties. 5. pg 2164, line 16 ff: Why do the authors only present results from aerosol absorption and scattering measurements? 6. pg 2169: The absorption Angstrom exponent is in the range presented for other polar regions, whereas the scattering Angstrom exponent presents higher values more typical of sites affected by urban or continental pollution. How can this be explained? 7. Pg 2170, line 1-3: No proof for the statement. And if this would be the case, this means that the study cannot distinguish any further the eventual continental/urban pollution aerosol? Because pollution was "non-significant"? 8. Pg 2170, line 13: What is

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the fit error? Definition? Values? Same for R. 9. Pg 2170, Figure 6b (also 4b). Citation: "Region 1, with higher exponents due to fine particles may be from continental urban sources. And region 2, with lower exponents due to coarse particles, clean and less absorbent, may be from marine origin". The authors have to prove their assumptions with 'statistical' processing of aerosol physical/chemical data as well as meteorology (trajectories) for their measurement site during the campaign period (to start: separation of complementary data into the two regions). 10. Pg 2171: In general, the conclusions are not sufficient. The conclusions just recall measurements and applied data processing, however, no proved substantial interpretation is given. What are the major conclusions? What can we learn from this study? Can findings be related to typical air masses and thus, applied to measurements at other sites? In general, can these results be applied for various air masses transported to the Arctic? It would be of tremendous use to deduce quantitative correlations between presented optical results and air masses' physico-chemical' features (particularly air mass origins).

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 2161, 2011.

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