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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric Water-Soluble Organic Nitrogen (WSON) in the Eastern Mediterranean: Origin and Ramifications Regarding Marine Productivity" *by* Münevver Nehir and Mustafa Koçak

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Q1: Aerosol WSON concentrations exhibited large temporal variations mainly due to rain and the origin of air mass flow. Rain scavenges all compounds why preferably WSON?

A1: I agree. Rain scavenges all compounds. Meteorology was used instead of rain (see page 1, line 21).

Q2: NO3 is a secondary aerosol?

A2: NO3 is a secondary aerosol (please see A10).

Q3: Considering the Cilician Basin, the atmospheric water soluble nitrogen flux would sustain 33% and 76% of the new production in the associated coastal and open waters, respectively. I suggest to remove this part or to be more cautious.

A3: The sentence (the last paragraph of the section 3.7) was removed as suggested.

Q4: Did the samples were uniformly distributed all over seasons?

A4: Information about the seasonal observational coverage was added to the experimental section (see answer to question 8).

Q5: Did the authors perform recovery experiments with well-known mixtures of organic and inorganic compounds?

A5: Recovery experiments were carried out by using nitrate, ammonium, urea and mixture of all three species. Furthermore, the performance of our laboratory was studied by participating Quality Assurance of Information for Marine Environmental Monitoring in Europe (QUASIMEME) program. More information about recovery experiments was supplemented (see lines from 169 to 179).

Q6: Please also report median in addition to average. Also how mean and median values changes if all data are considered (sensitivity test).

A6: Median values were typed in Table 2. Number of samples were also included. Table 2 shows statistical summary for all samples (see line 287 and 288). Median values for WSON, NO3-, NH4+ and WSTN were respectively 10 %, 20 %, 40 % and 10 % lower than those that of arithmetic means.

Q7: What is the seasonality of coarse/fine ratio of WSON? Also how this ratio varies as a function of air masses origin or better in dust vs non-dust samples?

A7: Details about coarse/fine ratio of WSON for each season, air mass and dust/non-dust were given in Table 4 and 5 (also see lines 408-410, 458-460 and 477-480).

Q8: At Table 4, the number of samples reported is only 216, whereas at line 120 they report analysis of 337 results. Why this difference? They correspond to samples with precision larger than 0,3? If yes what is the seasonal representativity of these 216 samples?

A8: A total of 216 aerosols corresponded to samples with precision larger than 0.3. The observational coverage for winter, spring, summer and fall was respectively 60 %, 92 %, 81 % and 79 %. The seasonal observational coverage, after applying precision value of 0.3 (for more details see section 2.4 and Eq.4), was found to be comparable for winter (49 %), spring (53 %), summer (51 %) and fall (52 %) (see lines 129-132).

Q9: In rain water how many values have been omitted with precision lower than 0,3? What is the temporal variability of the omitted data?

A9: During the calculations of the dry and wet deposition, the values presented in Table 1 were utilized. Therefore, none of the aerosol and rain samples was omitted (see lines 208-209 and 221-222).

Q10: Sources attribution (PMF). Using only IC data, source attribution of WSON is highly subjective. No ancillary data such as metals or OC/EC, Nox are available? Why no NH4 is founding agricultural factor? Given the compounds associated with this factor better assign it to soil re-suspension. Also factor A should better attributed to long-range transport (regional sources) due to the presence of NH4 and SO4. Similarly factor B with the presence mainly of NO3 could be better attributed to anthropogenic sources (combustion) Line 487, better replace water-soluble nitrogen by WSTN.

A10: I agree that usage of ancillary data such metals and OC/EC during PMF would yield better results. Unfortunately there was no ancillary data such as metals, OC/EC and NOx. However, factor 1, 2, 3 and 4 were comparable to those obtained for Erdemli by using water-soluble ions and metals (Koçak et al., 2009). Factors 1, 2 and 5 were respectively attributed to ammonium-bisulfate (regional), nitrate (combustion) and soil re-suspension as suggested. Small amount of NH4 (3.7 %) was associated with factor

5. As stated in section 3.1, 96 % of the NH4 was originated from fine mode. Moreover, considering the first 20 % of the highest loadings in factor 5 (re-suspension), there was strong relationship between WSON and NH4 (r = 0.64). Thus, it sees that NH4 was reasonably associated with re-suspension. Water-soluble nitrogen was replaced by WSTN (see 515-518, 522-524 and Figure 6).

Please also note the supplement to this comment:
https://www.atmos-chem-phys-discuss.net/acp-2017-601/acp-2017-601-AC2-supplement.pdf

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