

Dear Editor,  
Prof. Urs Baltensperger,

Thank you and thank to the staff of ACP for your work. We are glad to notice that both referees appreciated the effort done in the revision process.

As required the whole text was proofread and edited to emendate the typos and to improve the language (here below the complete list of changes).

With our best regards,  
Yours sincerely,

Dr. Luca Ferrero

### **Language corrections**

Line 1: “cloud” was modified in “clouds”

Lines 22-23: “in all sky condition” was changed: “in all sky conditions”

Line 29: “Average cloudiness” was changed in “The average cloudiness”

Line 31: “situations” was changed to “conditions”

Line 36: “in” was changed to “of”

Line 37: “from” was changed to “in”

Line 38: “and over” was changed to “up to”

Line 44; “respectively, while cirrocumulus-cirrostratus by  $-60\pm 8$  and  $-54\pm 4\%$ ,” changed to “respectively; cirrocumulus-cirrostratus decreased the  $HR_{BC}$  and  $HR_{BrC}$  by  $-60\pm 8$  and  $-54\pm 4\%$ ,”

Lines 45-46: “A higher impact on  $HR_{BC}$  and  $HR_{BrC}$  was found for stratocumulus” changed to “A higher impact on  $HR_{BC}$  and  $HR_{BrC}$  suppression was found for stratocumulus”

Line 49: “by a factor” was removed

Lines 60-61: “Both direct and indirect radiative effects of anthropogenic and natural aerosols on climate are still the major sources of uncertainties” changed to “Both direct and indirect radiative effects of anthropogenic and natural aerosols are still the major sources of uncertainties on climate”

Line 62: “that the aerosol direct radiative effect, on a global scale, may switch from positive to negative” changed to “that the aerosol direct radiative effect (on a global scale) may switch from positive to negative”

Lines 64-65: “aerosols are a heterogeneous complex mixture of particles characterized by different size, chemistry, and shape” changed to “aerosol is a heterogeneous complex mixture of particles characterized by different size, chemistry, and shape”

Lines 69-71: “However, inaccuracies related to simplified model assumptions on chemistry, shape, and the mixing state of particles can affect the results (Nordmann et al., 2014; Koch et al., 2009), amplifying the uncertainties on the estimated global and regional aerosol effects on the climate (Andreae and Ramanathan, 2013).” changed to “However, inaccuracies related to simplified model assumptions on chemistry, shape, and the mixing state of particles can affect the results (Nordmann et al., 2014; Koch et al., 2009); this amplifies the uncertainties on the related global and regional aerosol effects on the climate (Andreae and Ramanathan, 2013).

Lines 72-74: “Although the clear sky approximation is useful when comparing measurements to radiative transfer modelling outcomes during experimental campaigns performed in fair weather conditions (e.g., Ferrero et al., 2014; Ramana et al., 2007), in general” changed to “The clear sky approximation is useful when comparing measurements to radiative transfer modelling outcomes

during experimental campaigns performed in fair weather conditions (e.g., Ferrero et al., 2014; Ramana et al., 2007); however, in general”

Line 77: a comma was added before “especially”

Line 80: “the” was added before “scattering”

Line 82: “determined the that scattering” was changed to “determined that the scattering”

Line 96: “and, for example for the south eastern Atlantic,” changed to “and, for the south eastern Atlantic,”

Lines 100-101: “they estimated an all-sky direct radiative effect for total anthropogenic aerosols of  $-0.27 \text{ W m}^{-2}$  (range:  $-0.58$  to  $-0.02 \text{ W m}^{-2}$ )” changed to “they estimated an all-sky direct radiative effect of  $-0.27 \text{ W m}^{-2}$  (range:  $-0.58$  to  $-0.02 \text{ W m}^{-2}$ ) for total anthropogenic aerosols”

Lines 104-105: “BC is the second most important positive anthropogenic climate-forcing agent” was changed to “BC is the second most important positive anthropogenic climate forcer”

Line 105: “, while BrC contributes” was changed to “; BrC contributes”

Line 110: “absorbing aerosol” was substituted by “LAA”

Lines 111-112: “thus affecting atmospheric stability, cloud distribution and even synoptic winds such as the monsoons” was changed to “thus affecting the atmospheric stability, the cloud distribution and even the synoptic winds such as the monsoons”

Lines 116-117: “Since, similarly to aerosols, cloudiness and cloud type change on short time scales, long-term, highly time-resolved measurements, covering different sky conditions,” was changed to “Since cloudiness and cloud type change on short time scales similarly to aerosols, long-term, highly time-resolved measurements (covering different sky conditions)”

Lines 127-128: “reported a counterintuitive feedback linking the atmospheric heating induced by tropospheric absorbing aerosol to a cloud cover increase” was changed to “reported a counterintuitive feedback: the atmospheric heating induced by tropospheric absorbing aerosol could lead to a cloud cover increase.”

Lines 137-140: “The study was performed in Milan (Italy), located in the middle of the Po Valley (section 2), which is an air pollution hot-spot in Europe with meteorological characteristics similar to those of a multitude of basin valleys surrounded by hills or mountains in which low wind speeds and stable atmospheric conditions promote the accumulation of aerosol” was improved in “The study was performed in Milan (Italy), located in the middle of the Po Valley (section 2), which is an air pollution hot-spot in Europe; its meteorological conditions are similar to those of a multitude of basin valleys (surrounded by hills or mountains) in which low wind speeds and stable atmospheric conditions promote the accumulation of aerosol”

Lines 141-143: “Cloud presence cannot be neglected over the investigated area considering that in the last 50 years annual mean cloudiness, expressed in oktas, is estimated to be  $\sim 5.5$  over Europe” was changed to “Cloud presence cannot be neglected over the investigated area considering that, in the last 50 years, the annual average cloudiness, expressed in oktas, was estimated to be  $\sim 5.5$  over Europe”

Line 144: “This feature is similar with” changed to “This feature is similar to”

Line 156: “Aerosol, cloud and spectral irradiance measurements were carried in an experimental measurement station located in Milan” was changed to “Aerosol, cloud and spectral irradiance were measured in Milan”

Lines 161-162: “A full description of the aerosol behavior in Milan at the University of Milano-Bicocca and of the aerosol properties” was changed to “A full description of the aerosol behavior in Milan, at the University of Milano-Bicocca, and of the related properties”

Line 172: “The aerosol, cloud and radiation instrumentations has been installed” was changed to “The aerosol, cloud and radiation instrumentations have been installed”

Lines 188-189: “negative values are not generated and results in good agreement with other filter photometers” was changed to “negative values are not generated and the results are in good agreement with other filter photometers”

Line 191: a comma was added after  $3.24\pm 0.03$

Line 193: “Global Atmospheric Watch” was corrected into “Global Atmosphere Watch”

Line 197: “the” was added before “Collaud Coen et al. (2010) procedure”

Lines 204-205: “From eq. 1 it follows that the expected C in Milan is  $3.20\pm 0.35$ ; within its range the experimental  $3.24\pm 0.03$  value lies.” was rewritten as “From equation 1, it follows that the computed C in Milan is  $3.20\pm 0.35$ , in keeping with the experimental one ( $3.24\pm 0.03$ ).”

Line 210: “sites” was improved with “locations”

Line 211: “applied in the present work” was put in brackets

Line 213: “that of” was deleted

Line 222: “explaining that” was changed with “:”

Lines 223-224: “yields a decreasing AAE values” was improved to “yields to decreasing AAE values”

Line 234: “(Toshiba” was corrected in “; Toshiba”

Line 263: “measurements” was added to the end of the sentence.

Line 272: “The full overlap is obtained at altitude of some hundred meters” was changed to “The full overlap is obtained at an altitude of some hundred meters”

Line 280: a comma was added after the word “data”

Line 284: “absorbing aerosol” was substituted with “LAA”

Line 298: “describing” was changed to “which describes”

Line 294: “(as used in Ferrero et al., 2018) equation 2” was improve into “(as used in Ferrero et al., 2018), the equation 2”

Line 299: “Eqs.” was changed to “Equations”

Line 300: “eq. 3” was changed to “the equation 3”

Line 304: “to derive HR” was changed to “to derive the LAA HR”

Line 307: “input to equations 3” was corrected to “input to equation 3”

Line 310: “possibility to derive HR in all sky conditions,” was corrected in “possibility to derive the HR in all sky conditions,”

Lines 315-316: “the HR was determined to the near-surface atmospheric layer” was changed to “the HR was determined into the near-surface atmospheric layer”

Line 320: “were performed since 2005” was corrected with “are performed since 2005”

Line 333: a “the” was added.

Line 340: “eq.” was changed to “equation”

Line 347: “Identification of cloud classes” was changed to “The identification of clouds classes”

Line 351: “literature reports a huge quantity of papers and reviews aimed at classify clouds” was changed to “literature reports a huge quantity of papers and reviews aimed at classifying clouds”

Line 368: “ $R_t$  is the 20-minutes running average” was changed to “where  $R_t$  is the 20 minutes moving average”

Line 401: “an hourly-resolvedcolor code” was corrected into “an hourly-resolved color code”

Line 462: “The lowest” was changed to “The lower”

Line 463: “their highest values” was change into “their higher values”

Line 469: “the lowest monthly irradiance” was changed into “the lower monthly irradiance”

Line 470: “while the highest” was change in “while the higher”

Lines 470-471: “The highest monthly average HR was recorded in December ( $1.43 \pm 0.05$  K day<sup>-1</sup>) while the lowest one in March” was changed in “The higher monthly average HR was recorded in December ( $1.43 \pm 0.05$  K day<sup>-1</sup>) while the lower one in March”

Lines 477 and 479: “eq. 3” was changed with “equation 3”

Lines 488-489: “during the whole campaign, the average cloudiness was  $3.58 \pm 0.04$  oktas with the highest monthly value in February ( $4.56 \pm 0.07$  oktas) and the lowest in November ( $2.91 \pm 0.06$  oktas).” was changed in “during the whole campaign, the average cloudiness was  $3.58 \pm 0.04$  oktas with the higher monthly value in February ( $4.56 \pm 0.07$  oktas) and the lower in November ( $2.91 \pm 0.06$  oktas).”

Lines 519 and 520: “lowest” was substituted with “lower”

Lines 524, 536, 540, 627, 632, 640: “overcast conditions” was changed in “overcast condition”

Line 569: “during afternoon” was changed in “during the afternoon”

Lines 611-612: “were found to produce” was improved in “produced”

Line 643: a “that” was added to the sentence in brackets

Line 667: “Overall, the derived linear regressions indicate a decrease of ~12% per oktas” was corrected in “Overall, the derived linear regressions indicate a decrease of ~12% per okta”

Line 668: “In details,” was corrected in “In detail,”

Line 675: a “the” was added the sentence.

Line 680: “prevailing clouds type” was corrected in “prevailing clouds types”

Lines 684-685: “were experimentally determined based on high time resolution radiation and aerosol measurements in the Po Valley” was changed in “were experimentally determined based on radiation and aerosol measurements (at high time resolution) in the Po Valley”

Line 702: “about 12% for both species” was improved in “about 12% per okta for both species”