18 Aug 2024 Suggested Changes to Donnou et al. ABSTRACT – The purpose is to have GREATER Impact for TOAR II and Beyond.

Original has more nearly 500 words, ACP limit is 250?

In the framework of the International Network to study Deposition and Atmospheric chemistry in Africa (INDAAF) program, we present the seasonal variability of atmospheric ozone concentrations at the regional scale. The correlations of local atmospheric chemistry and meteorological parameters to ozone photochemistry are investigated, as are long-term trends in ozone concentrations. Fourteen measurement sites were identified for this study, representative of the main African ecosystems: dry savannas (Banizoumbou, Niger; Katibougou and Agoufou, Mali; Bambey and Dahra, Senegal), wet savannas (Lamto, Côte d'Ivoire; Djougou, Benin), forests (Zoétélé, Cameroon; Bomassa, Republic of Congo) and semi-agricultural/arid savanna (Mbita, Kenya; Louis Trichardt, Amersfoort, Skukuza and Cape Point, South Africa). As part of several study programmes, validation and intercomparison tests of passive samplers at remote sites have been carried out to ensure controlled-quality measurements and to provide reliable long-term gas concentrations. Over the period 1995-2020, monthly ozone concentrations were measured at these sites using passive samplers. Monthly averages of surface ozone range from 4.7±1.4 ppb (Bomassa) to 31.0±10.5 ppb (Louis Trichardt). Ozone concentrations in the wet season (in dry savanna) are higher and in the same order of magnitude comparable to concentrations in the dry season (in wet savanna and forest). In East Africa, ozone levels show no marked seasonality., We established a positive gradient of mean annual O3 concentrations from West Central Africa to South Africa. In the dry savanna, under the influence of temperature, ozone concentrations are closely linked to Biogenic Volatile Organic Carbon (BVOC) emissions ($0.51 < r < 0.95$). They are also sensitive to nitrogen monoxide (NO) emissions in the presence of high precipitation and humidity. Biogenic VOC emissions, anthropogenic NOx, temperature and radiation exhibit a good correlation ($0.49 < r < 0.92$) 40 with O3 formation in wet savannas and forests. At the southern African sites, the photochemistry of O3 is influenced most by humidity, rainfall, temperature, NOx emissions (anthropogenic and biogenic) and VOC. At the annual scale, from 2000 to 2020, Katibougou and Banizoumbou sites (dry savanna) experienced a significant decrease in ozone concentrations respectively around -0.2.4 ppb decade (with a very high certainty) and -0.8 -0.15 ppb /decade at a 95% confidence interval. Seasonal Kendall statistical tests revealed with a high certainty decreasing trends of -0.0.7 ppb decade in Banizoumbou and -0.2.4 ppb/decade in Katibougou. These decreasing trends are consistent with those observed for nitrogen dioxide (NO2) and biogenic VOCs. An significant increasing trend is observed in Zoétélé (2001-2020), estimated at 0.71 ppb decade-1 and at Skukuza (2000-2015; 0.3.4 ppb decade). The increasing trends are consistent with the increase in biogenic emissions at Zoétélé and NO2 levels at Skukuza. Very few surface O3 measurements exist in Africa, and long-term results presented in this study are the most extensive for the studied ecosystems.

COMMENTS ON CHANGES – Because the paper now has less about links (hope that those correlations can go in a 2nd paper!) it is recommended to remove the shaded material to shorten the Abstract. Also the uncertainty information is too much for the Abstract. Below is 429 words.

For nearly 30 years, the International Network to study Deposition and Atmospheric chemistry in Africa (INDAAF) program has measured surface ozone from 14 sites in sub-Saharan Africa, representative of the main African ecosystems: dry savannas (Banizoumbou, Niger; Katibougou and Agoufou, Mali; Bambey and Dahra, Senegal), wet savannas (Lamto, Côte d'Ivoire; Djougou, Benin), forests (Zoétélé, Cameroon; Bomassa, Republic of Congo) and semi-agricultural/arid savanna (Mbita, Kenya; Louis Trichardt, Amersfoort, Skukuza and Cape Point, South Africa). The data are collected with passive samplers and archived as monthly averages; quality assurance is maintained by INDAAF's calibration and intercomparison protocols with other programs employing the same systems. This analysis reports on correlations of INDAAF ozone time-series (1995-2020) with local meteorological parameters and with ozone precursors, biogenic volatile organic compounds (BVOC) and nitrogen oxides (NOx), derived from standard global databases. Monthly (*put annual averages here*) averages of surface ozone range from 4.7±1.4 ppb (Bomassa) to 31.0±10.5 ppb (Louis Trichardt), reflecting a general positive gradient from west central Africa to South Africa. In west Africa, ozone concentrations in the wet season (in dry savanna) are higher and of the same order of in the dry season (in wet savanna and forest). In east Africa, ozone levels show no marked seasonality. In the dry savanna, under the influence of temperature, ozone concentrations are closely linked to BVOC emissions (0.51 < r < 0.95). They are also sensitive to nitric oxide (NO) emissions in the presence of high precipitation and humidity. Biogenic VOC emissions, anthropogenic NOx, temperature and radiation exhibit a good correlation (0.49 < r < 0.92) with O3 formation in wet savannas and forests. At the southern African sites, the photochemistry of O3 is influenced most by humidity, rainfall, temperature, NOx emissions (anthropogenic and biogenic) and VOC. *At the annual scale, from 2000 to 2020, Katibougou and Banizoumbou sites (dry savanna) experienced a significant decrease in ozone concentrations respectively around -0.2.4 ppb decade ~~(with a very high certainty)~~ and -0.8 -0.15 ppb /decade ~~at a 95% confidence interval~~. ~~Seasonal Kendall statistical tests revealed with a high certainty~~ decreasing trends of -0.0.7 ppb decade in Banizoumbou and -0.2.4 ppb/decade in Katibougou. These decreasing trends are consistent with those observed for nitrogen dioxide (NO2) and BVOC. An significant increasing trend is observed in Zoétélé (2001-2020), estimated at 0.71 ppb decade-1 and at Skukuza (2000-2015; 0.3.4 ppb decade). The increasing trends are consistent with the increase in biogenic emissions at Zoétélé and NO2 levels at Skukuza. Very few surface O3 measurements exist in Africa and long-term results presented in this study are the most extensive for the studied ecosystems.*

SUGGESTED ABSTRACT. The original last line is good but it is important for TOAR II to have a stronger "bottom" line. This is 309 words

For nearly 30 years, the International Network to study Deposition and Atmospheric chemistry in Africa (INDAAF) program has measured surface ozone from 14 sites in Africa, representative of the main African ecosystems: dry savannas (Banizoumbou, Niger; Katibougou and Agoufou, Mali; Bambey and Dahra, Senegal), wet savannas (Lamto, Côte d'Ivoire; Djougou, Benin), forests (Zoétélé, Cameroon; Bomassa, Republic of Congo) and semi-agricultural/arid savanna (Mbita, Kenya; Louis Trichardt, Amersfoort, Skukuza and Cape Point, South Africa). The data are collected with passive samplers and archived as monthly averages; quality assurance is maintained by INDAAF's calibration and intercomparison protocols with other programs employing the same systems. This analysis reports on correlations of INDAAF ozone time-series (1995-2020) with meteorological parameters and with ozone precursors, biogenic volatile organic compounds (BVOC) and nitrogen oxides (NOx) derived from standard global estimates. Monthly (*do you mean annual averages here?*) averages of surface ozone range from 4.7±1.4 ppb (Bomassa) to 31.0±10.5 ppb (Louis Trichardt), reflecting a general positive gradient from west central Africa to South Africa. At the annual scale, from 2000 to 2020, Katibougou and Banizoumbou sites (dry savanna) experienced a significant decrease in ozone, respectively, around -0.2.4 ppb decade^{-1} and -0.8 -0.15 ppb decade^{-1}. These decreasing trends are consistent with those reported for nitrogen dioxide (NO_2) and BVOC. An increasing trend is observed in Zoétélé (2001-2020), estimated at 0.71 ppb decade^{-1} and at Skukuza (2000-2015; 0.3.4 ppb decade^{-1}). The increasing trends are consistent with increasing biogenic emissions at Zoétélé and NO_2 levels at Skukuza. Very few surface ozone measurements exist in Africa and long-term results presented in this study are the most extensive for the studied ecosystems. The importance of maintaining long-term observations like INDAAF cannot be overstated. The data can be used to assess ozone impacts on African crops. For TOAR II, they provide invaluable constraints for models of chemical and climate processes in the atmosphere.