Subject: Authors' Response to all Referee reviews (Referee #1, Referee #2, Referee #3)

Dear Referees,

We really appreciate your effort and valuable although critical comments regarding to manuscript No. acp-2017-1005. We accept your statement for major revision of manuscript as well as recommendation to submit of revised paper to another type of journal. Currently we work on completely new version of manuscript that will consider most of your comments. Please find enclosed supplement including our reply to principal problems.

On behalf of all co-authors, yours sincerely, Svetlana Bičárová

In the following, answers to principal problems are shortly described.

Problem: Improving of the results organization, interpretation and conclusions.

Answer: We accept this comment. Revised manuscript will focus on the role of environmental factors in process of O_3 uptake only to dwarf mountain pine in Slovak study site in the High Tatra Mts. (SK–HT). We also accept comment concerning English Language revision. As English is not our native language, upon completion of the professional discussion, the text will be sent to a professional linguistic correction.

Problem: The inclusion of the French study site and on-site data in FR-Alp plot (C3)

Answer: Modelling of stomatal ozone flux requires complex inputs based on real measurements and specific parameters. Database of measured input variables in FR-Alp is not supported by measurement system focused on modelling of stomatal ozone flux. We worked with the available data that were modified. Of course, we agree that the best is to have data from one location. At one study site in FR–Alp (plot C3, Col de Salèse), the ozone symptoms on Swiss stone pine were assessed and there were also measured ozone concentrations using passive samplers. The following data sources were used to prepare the input file for the PODy calculation.

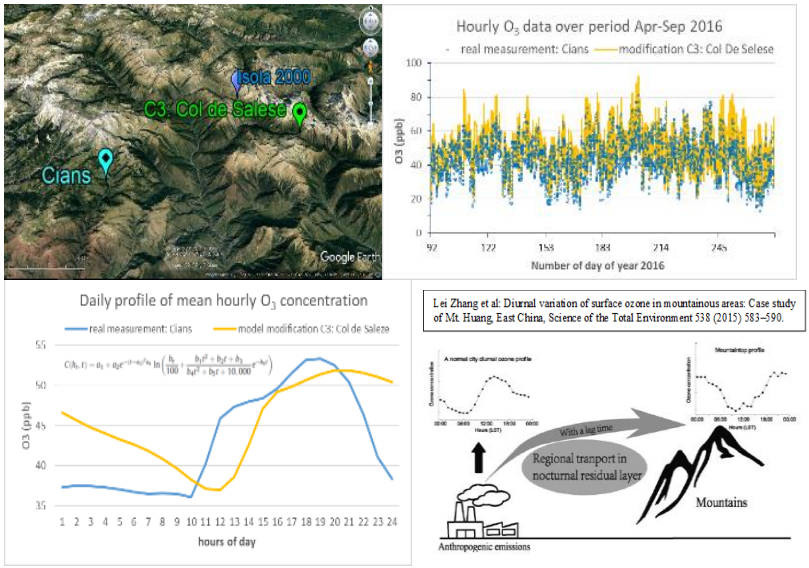
Ozone data
- real measurement (passive samplers) on plot C3-Col de Salèse with seasonal O_3 mean of 46 ppb
- real measurement (active ozone analyzer) on site Cians with relatively similar seasonal O_3 mean of 43 ppb

Diurnal variability of hourly data from the Cians ozone analyzer were modified according to eq. 3 (in manuscript) and then recalculated with respect to monthly mean differences. Partial steps of this modification illustrate figures below this answer.

Meteorological data
- hourly data from the nearest Isola 2000 meteorological station were used in the input file

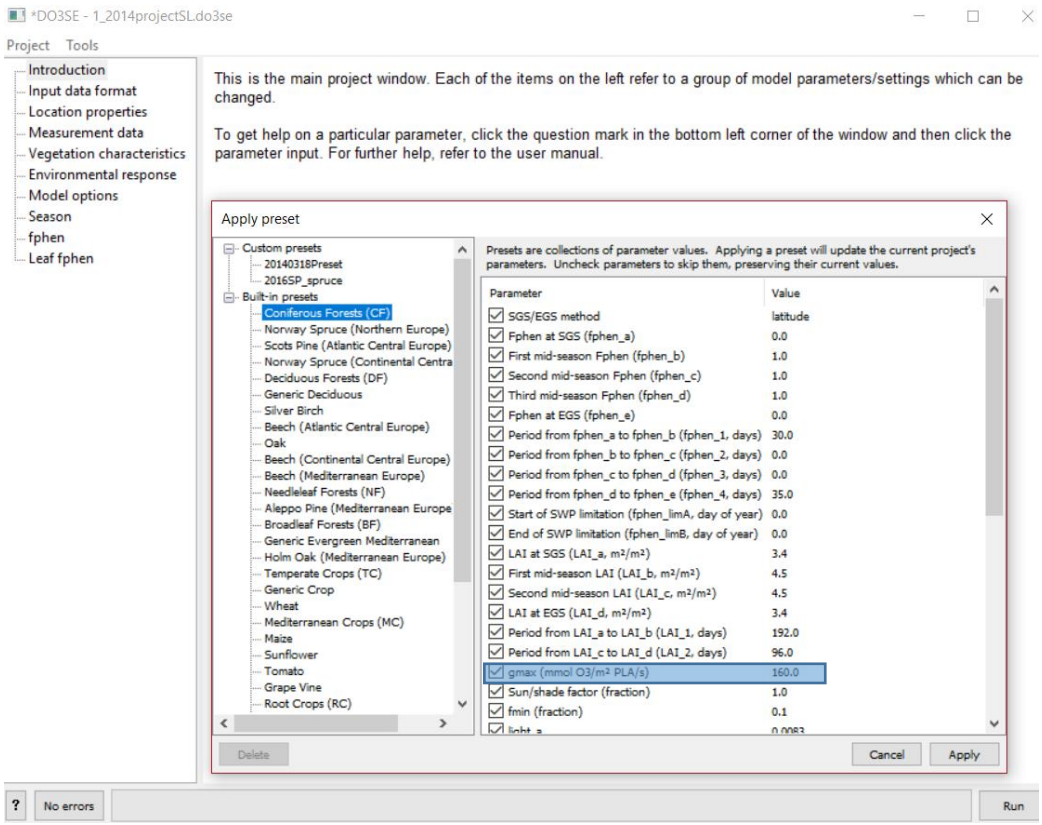
According to the average air temperature for the period from April to September, the climate at C3-Col de Salèse (13.8 ° C) is similar to that of Isola 2000 (13.7 C).

Although collection of one-site real hourly O_3 and meteorological data at C3 plot is serious problem, modification of available data provides rational framework for model estimation of PODy. Nevertheless, revised manuscript will not include French study site. In the future, increase attention should be paid to extension of real field measurements of ozone, meteorological and environmental variables on timberline zone of mountains in Europe.



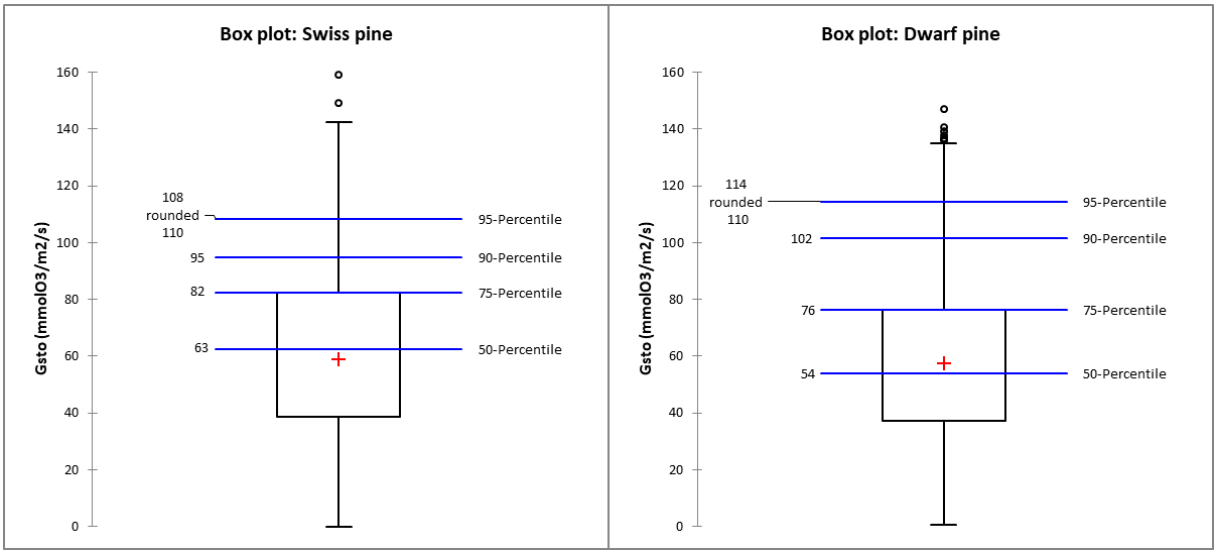
Problem: Parameterization for coniferous forest (CF)

Answer: We used parameterization for coniferous forest according to built-in preset in model DO3SE (see below). List of complete parameters is included in supplement Part SI-1: Details to section: Methods DO3SE model parameterization for version (DO3SE_INTv3.0.5)..



Problem: Maximum stomatal conductance Gmax for Swis pine is 110 $mmolO_3\ m^{-2}$ PLA s^{-1}. Is it true or false?

Answer: Next box plots illustrate Quantiles estimation of measured values of stomatal conductance Gsto SK–HT region. In this study we defined 95-Percentil as maximal stomatal conductance Gmax. After rounding it is value of 110 $mmolO_3\ m^{-2}$ PLA s^{-1} for both Swiss pine and dwarf pine. Median or 50-Percentile values between 50 and 60 $mmolO_3\ m^{-2}$ PLA s^{-1} are substantially lower and, do not correspond at all with median value of 125 $mmolO_3\ m^{-2}$ PLA s^{-1} for Norway spruce (Continental Central Europe). Norway spruce median value 125 $mmolO_3\ m^{-2}$ PLA s^{-1} referred e.g. in Körner et al. (1979), Dixon et al. (1995), Emberson et al. (2000), Zweifel et al. (2000, 2001, 2002) was derived from range of values between 87 and 140 $mmolO_3\ m^{-2}$ PLA s^{-1}. This range is probably related to variability of Gmax values.



Problem: The validity of ozone-induced injury data

Answer: The visible ozone symptoms assessment was carried out by the national experts of ICP Forests, Expert Panel on Ambient Air Quality, who was trained at intercalibration courses on visible ozone symptoms. Variation of surveyors was not assessed. Other types of international training workshops would be useful.

Problem: For the SWP, did you follow the Part X: Sampling and Analysis of Soil protocol (ICP Forests manual) for field campaigns to measure Field Capacity and Wilting Point?

Answer: Yes, we partially followed the methodology of ICP Forest Manual (part X), as the Pedological characterisation and detailed soil profile description at our plots was complemented by sampling according to genetic horizons and a detailed soil classification was based on the World Reference Base for Soil Resources (IUSS Working Group WRB, 2015). Final soil type of each site was displayed in Table 1 in manuscript. Besides, at all research localities we continuously monitored soil water (matrix) potential (SWP, MPa) at three fixed depths and in three different soil profiles to catch hydropedological variability of each site (methodology fully in line with ICP Forests Manual, part IX Meteorological measurements). Detail analyses and laboratory determining of pF retention curves (wilting point and field capacity) were not the objectives of this study. But manufacturer of sensors for SWP measurements (Gypsum blocks, GB-2 Delmhorst Instrument, Co. and MicroLog SP3, EMS Brno, CZ) declare the limit value of -1,5 MPa as wilting point, when the soil water becomes unavailable for forest trees.