Review of MS SOIL-2018-19:

"Aluminium and base cation chemistry in dynamic acidification models = need for a reappraisal?" by J.P. Gustafsson *et al.*

submitted for publication in *SOIL*.

General remarks:

This relatively short paper makes a case for replacing cation exchange modelling by organic complexation modelling in dynamic acidification models. They shortly describe the two approaches and then make their case by comparing the output of four different model systems. This is done well (although sometimes very concise), except the description (equations) of the models, which in two cases are quite deficient (for details see below); but that should not be too difficult to fix.
Overall, I consider the paper suitable for publication, after the authors have also taken into consideration the (sometimes minor) remarks/corrections listed below.

Detailed remarks:
Note: *'X → Y' means: replace 'X' by 'Y' (in the text).*

Abstract:
P[age]1, L[ine]15 H+ → H^+.
P1, L15: Delete 'Consequently, ': The sentence is not a real consequence of the previous one (it's always true),
P1, L18: Insert 'model' after 'HD-MINTEQ'.

Introduction:
P3, L1: Insert 'model as a basis' (or 'as a basis') after 'SHM'.

Aluminium and base cations in dynamic acidification models – a review:
P4, L18: It could/should be mentioned that in SMART/VSD the user can choose between a Gapon or Gaines-Thomas exchange model.
P5, L31: Insert 'the' before 'UK'.
P5, L32: Why 'however' after 'In one paper'? Suggest deleting!
P6, L17: What does the stand-alone 'K_i' in eq.6 mean? In the next line it is referred to as 'Here the K_i is …'?
P6, L30: **Eq.8 does not make sense**: If I insert i=1,2,3,4 into it, I get 4 times the identical value for logK_1, …, logK_4, since the right-hand side of eq.8 does not depend on the index i!! Correct!
P6, L31: Same again!!
P8, L2: **There is no Q_i in equations (10) or (11), thus one cannot solve for them!**!

Methods:
P11, L6: It is not essential, but the scenario name is a bit 'strange'; and, actually slightly misleading, since the 3rd interval is not background depo (but close).
P11, L8: Also this name is not 'unconfusing' …
Why not just call the 'Acid' and 'Salt'? – just a thought …
P11, L13: Should it be '(Gustafsson, 201**6**)', as in the References; or is the year there wrong?

Results and Discussion:
P11, L29: 'longest' → 'longer'.
P12, L2: Also in SMART/VSD H^+ exchange is modelled!
P13, L5: '(Gustafsson, 201**6**)'?
P13, L29: 'SMART/VSD' could be added (?)

P14, L12: The ending is a bit abrupt …

References:
Insert ‘and’ before the last author in at least 3 cases: P15, L18; P16, L8; P18, L9.
P 15, L24: Is it Gustafsson 2016 or 2018?

Tables:
Table 1: Caption: Maybe expand text?
Write ‘humic acids’ and ‘fulvic acids’ instead of ‘HA’ and ‘FA’, resp., in the first column.

Table 2: Add ‘scenario’ after ‘*Background-acid-background*’ and after ‘*Background-salt*’ in the first line if the Table.

Figures:
Figure 1: Caption: (a) Insert ‘in the four soil layers (O, E, B1, B2)’ before ‘as a function’; (b) insert ‘deposition’ before ‘scenario’.
The dotted red line is not visible in the graphs as such! Why not use solid lines with 4 (sufficiently) different colours?

Figure 2: same as Fig.1

Figure 3: same as Fig.1

Figure 5: For ‘aesthetic reasons’ maybe interchange in the legends the lines ‘SHM’ and ‘Ion exchange B’ (twice) (?)