We sincerely thank the reviewer for the valuable suggestions and constructive comments. Below, we provide detailed responses to each of the reviewer's remarks and outline the corresponding revisions made to the manuscript.

Comment on eq 7: I suppose there's some directionality associated with this summation, like net fluxes in and out. I think the volumetric flow through the xylem at a point zi should be described as
Qaxial,i = Qradial,I (If mathtype works,)
where (for the 1D case):
Qaxial,i = pi aroot,i2 d(qaxial,i) ( )
and
Qradial,i =2 pi aroot,i qaxial,i dli ( )
where the q's are volumetric water fluxes (m3water s-1 m-2surface)
Thus, when we substitute it together, we get:
pi aroot,i2 d(qaxial,i) = 2 pi aroot,i qaxial,i dli
(1/2) aroot,i d(qaxial,i) / dli = qaxial,i
or
(1/2) aroot,i (qaxial,i+1,i - qaxial,i,i-1) / dli = qaxial,i
My main point here is that there should probably be some application of divergence theorem that is a bit brushed under this summation. The Laplacian comes out:
d(qaxial,i) / dli = d(kx d Hx/dli) / dli .
Or more generally (if applicable):
div(qaxial,i) = div(kx grad(Hx))

It is actually application of Kirchhoffs law (since it is described on a discrete graph), which provides the conservation of water volume (analogous to the divergence theorem for the continuous case)

I know that it's not quite that simple because of the directions that the fluxes come in and up the root, but It would just be nice to see some of the details in the summation/ derivation to understand better the terms in the Laplacian.

We tried to improve the explanation from Eqn (7) to Eqn (8) by adding: "Note that in the sum on the left hand side $H_{x,i}$ occurs for each edge *ij* which is the degree of node *i*, and $H_{x,j}$ enters exactly once for each *j in N(i).* Therefore, we can use the Laplace matrix *L* to easily describe Kirchhoff's law (Eqn 7) in matrix notation

Comment on eq 22: If this is the same as dli from earlier, make the notation consistent.

We use l_{root} for root length, and *dl* for segment length.

Line 330 in the marked document highlighting figure 3: Are the lateral roots considered in the Voronoi mesh? If so, state this in the text explicitly. If not, is that reasonable?

The lateral roots are considered in the Voronoi mesh. We now state it in the text as "In the first approach we use a 3D Voronoi mesh around the nodes of the root system considering all lateral roots."

Equation 32: So the fluxes into or out of the soil are linearly related to the root flux. That makes sense. Is there a relationship between the soil fluxes and the soil and pararhizal zone? Perhaps the scales of the models are different, but this might be worth pointing out.

Yes, the perirhizal models are coupled via the root hydraulic model and a fixed point iteration is used to find consistent values for the xylem potentials and potentials at the soil root interface.

Equation 39: I think it might be good to state this in more common language. Just state that the total potential can be represented by the potential at the perirhizal interface subtracted by the soil flux.

We added “Therefore, the soil total potential can be represented by the potentials at the perirhizal interfaces subtracted by the soil flux.” under Eqn (39).

Line 396 just after eq 40: There's some minor points of notation that I find a bit confusing. Q is typical for volumetric flow [m3water s-1] and q is usually volumetric water flux [m3water m-2 surface s-1 ~ m/s]. Distinguishing these more clearly in the notation would be helpful for the reader, given that there are a lot of fluxes floating around.

We have added a table with all parameter names in the last revision including description and units. This should make it easier for the reader to distinguish between the various fluxes.

Line 436 in the marked document (first sentence in section 2.7): Conductance is a coefficient on a time derivative. Conductivities are coefficients on gradients (spatial derivatives). I think these should be conductivities.

We use the term conductance to describe system specific properties that depend on geometry and material, while we use the term conductivity to describe a material property independent of geometry. We favor conductance in this context, because both radial and axial conductances are effective parameters influenced by root anatomy.