Here are 2 final (very minor) suggestions from referee 1 before the paper is accepted:

Section 3:
Line 104: "has rotational symmetry" I think you mean lambertian surfaces. Could you specify it ?

Response:

We have clarified the statement in the paper. The new statement does not imply that Lambertian surfaces are a requirement for the dimensional reduction, since a more general class of BRDFs (of which Lambertian surfaces are a subset) permit it, but it does not get into the details that precisely define this class since this is not crucial for the paper.

> Previous statement:
>
> The radiation field is five-dimensional, with three spatial and two directional coordinates, but due to rotational symmetry around the solar direction the spatial dimensions can be reduced to two (SZA and altitude) when the atmosphere is a function of only altitude and SZA and when the surface reflectivity has rotational symmetry.
>
> New statement:
>
> The radiation field is five-dimensional, with three spatial and two directional coordinates, but symmetries around the solar zenith reduce the dimensionality to 4 for certain atmospheric and surface configurations, including common cases such as a horizontally homogeneous spherical shell atmosphere and Lambertian surface.

Figure 7: there is no legend for the different types of lines on the right of the figure.
Could you add it, as it has already been done in figure 6 ?

Response:

We have added the requested legend to Figure 7. We have also altered the spacing of the equivalent legends in Figures 4 and 6 so they are all consistent.