Response to Referee 1

Q1. Section 2.4 - Why is KNH4HSO4 not also considered when R<2? Is there literature to support this exclusion?

A1. As the referee mentioned, there are various chemical species in sulfate aerosols. Nevertheless, most state-of-the-art models consider sulfate aerosols as a single chemical species, either ammonium sulfate or sulfuric acid (see Section 2.3 in the original manuscript; i.e., the aerosol model in Unified Model (UM) considers that all sulfate aerosols are sulfuric acids (Mann et al., 2010), while ECHAM-HAM considers that all sulfate aerosols are ammonium sulfates (Zhang et al. 2012)). This is relevant to the fact that most atmospheric models treat chemical feedback in aerosol-cloud interactions with bulk physicochemical properties of aerosols. Even though some aerosol models are available to consider full chemistry feedbacks with clouds, they are not used in large scale atmospheric models to treat various sulfate aerosols because of the complexity of the chemical processes and high computational cost. For this reason, we propose simple parameters for representing two major sulfate aerosols that are considered in many atmospheric models.

Q2. Line 168 – I assume these are all boundary layer measurements. Please clarify in text.

A2. Yes, they are all boundary layer measurements. We add a line in the revised manuscript as below.

(Line 170) “The measurements are taken within the boundary layer.”

Q3. Figure 1 – Consider adding shading to Figure 1 (similar to Figure 4) to identify measurements over land vs sea.

A3. Thanks. We add blue shadings for the measurements over the sea in Fig. 1 as is done in Fig. 4.