

Interactive comment on “Schneefernerhaus as a mountain research station for clouds and turbulence – Part 1: Flow conditions and large-scale turbulence” by S. Risius et al.

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Short Reply to the comments by Referee #1

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We thank the anonymous referee for his/her review of our work. We respectfully disagree with the referee findings. The referee’s criticism originates from misunderstanding of the main purpose of our paper and/or the confusion in the usage of technical terms in different communities. In the revised version of the manuscript we shall better explain these issues.

Our work is not concerned with the study the climatology or meteorology at Zugspitze. We agree that these are important problems by themselves, as stressed by the referee. We intend to show in our manuscript that both the turbulence and the cloud properties at Zugspitze carry similar characteristics as in other well-studied turbulent flows and in airborne clouds. This is of great relevance for a large community of scientists studying inertial particle dynamics and also for scientist interested in cloud microphysics.

In Part 1 of our manuscript, we are concerned mostly with the turbulent flow in the scales ranging from the dissipation range up to the local peak of the energy spectrum at the other end of the inertial subrange (the “large scales”, see below). In Part 2 we focus on the cloud properties at dissipation scales (or the “small scales”, see below) since the sizes of the cloud droplets are typically much smaller than the dissipation scales of the turbulence and hence their dynamics is directly influenced by turbulence

at such small scales.

In both papers, we presented data from on-site observation using various type of sensors that cover the entire range of time and length scales that are important for the turbulence and cloud properties. We compared those data with other data from both laboratory measurements and air-borne observations to show that, at least for cloud-turbulence interaction study, the observation station at Schneefernerhaus is well-suited. Our results presented here can also serve as a bench-mark characterization of the turbulence and cloud physics conditions at Schneefernerhaus, which can be used for other researchers who are interested in carrying out related studies at Schneefernerhaus to evaluate the usefulness of the research station for their own investigation.

Moreover, we realized that the referee prefers to call the range of scales that we study in these two-part paper simply as “microscale turbulence”. Within the turbulence community (based on the seminal work by Richardson, Taylor, Prandtl, von Kármán, Kolmogorov and many others) it is customary to divide this range of scales into the “large scale” or the “forcing scale”, which corresponds to the range of the local peak in the energy spectrum and is related to the scale at which the kinetic energy is supplied into the turbulent motion; the “small scale” or the “dissipation scale”, at which the viscous dissipation converts the kinetic energy into heat; and in-between the “inertial (sub)range”, which is the range of scales where the kinetic energy is cascaded down to smaller and smaller scales without significant loss. This nomenclature is conventional in the turbulence community (see, also the textbooks Monin and Yaglom (1971, 1975); Tennekes and Lumley (1972); Frisch (1995); Pope (2000)) and is also widely adopted in other related communities (see, e.g., Mac Low and Klessen (2004); Wyngaard (2010)). We therefore followed the same terminology in our manuscript and assumed its general acceptance. The reaction from Referee 1 showed that we need to make this more explicit in our revised manuscript.

We shall provide detailed point-by-point response to the comments raised by Referee 1 when we submit the revised manuscript, after collecting all other referee comments.

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