Title	**Towards a better understanding of Arctic clouds using observations and high-resolution modelling**

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Included in session:

- ☐Svalbard research in the future
- ☐Tool Box new tools, methods, platforms to conduct research in Svalbard
- ☐From observation to integrated studies - wider use of data
- ☐Drivers of environmental changes - climatic and other human factors
- ☐A global context for Svalbard research - connecting to the world
- ☒Atmosphere research in Svalbard
- ☐Terrestrial research in Svalbard
- ☐Glaciological research in Svalbard
- ☐Marine research in Svalbard

Presentation preference (☒ oral, ☐ poster). The Advisory Scientific Committee will select presentation format.

Abstract text (Times New Roman 11) and figures. The abstract must not exceed one page in total. This leaves room for a text of about 3500 characters – space for figures will reduce this number.

Word file only.

A book of abstracts will be published in connection with the conference.

Submit no later than August 10 to **abstract@rcn.no**

In order to better understand the processes related to Arctic clouds and their role in affecting the Arctic climate, high quality cloud observations are needed. Only a few sites exist in the Arctic, where continuous cloud observations with a high vertical resolution are performed. Within the Transregional Collaborative Research Centre TR172 "ArctiC Amplification: Climate Relevant Atmospheric and SurfaCe Processes, and Feedback Mechanisms (AC)3" (www.ac3-tr.de), a new 94 GHz cloud radar has been installed at the French - German Arctic Research Base AWIPEV at Ny-Ålesund / Spitsbergen in June 2016. In combination with the existing instrumentation at AWIPEV, clouds and related physical processes can now be characterized in Ny-Ålesund much more comprehensively than before.

The knowledge gained from such observations is crucial to improve cloud parameterizations in numerical weather prediction and climate models. In order to bridge the link between the small scales

(e.g. related to the observations) and large scale models, high-resolution modelling studies with large eddy simulations (LES) are a powerful tool. Since point observations often only provide information about the temporal variability of atmospheric variables, LES can also describe the spatial variability. It can also be used as virtual lab to test our understanding of cloud processes.

In addition to the new observational capabilities for clouds at Ny-Ålesund, we will also present first results of model simulations at Ny-Ålesund with the new high resolution model ICON-LEM. We will demonstrate the potential of such simulations which are in this case particular challenging due to the complex topography around the site. A first basic comparison with the observations is done in order to evaluate the representation of the mean thermodynamical structure and clouds by the model. This evaluation is essential to show that the setup can be used to gain insight into cloud processes by combining point measurements with high-resolution model runs.

In future, the combination of the in-situ cloud observations performed at Mount Zeppelin with the remotely observed cloud properties at the AWIPEV atmospheric observatory could provide additional insight into cloud processes. In this way, we could also get a better idea of the uncertatiny related to the assumptions made in remote sensing retrieval algorithms.