**Atmospheric Structures in the Troposphere as Revealed by High Resolution Backscatter Images from MU Radar Operating in Range-Imaging Mode**

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**Supplementary Material: Videos of Atmospheric Structures Observed during ShUREX 2015 and 2016**

The paper is accompanied by three short excerpts of videos of the Capon backscatter (echo) images of the MU radar operated in high resolution (~20 m range resolution under high enough SNR values) range-imaging mode (Complete full-length videos can be found on websites listed below). While the radar images extend from 1.34 km to 20 km altitude (ASL), only the images upto 10 km altitude are shown. Numerous vertical lines reaching down from 10 km altitude at times, especially during the day, are commercial aircraft tracks. The bright thin white lines every 33 minutes are brief interruptions in radar coverage for technical reasons. Thin dark lines, often in the shape of an inverted V in the lower part of the images, are UAV tracks, which seldom reach above 4 km altitude, because of flight restrictions. Any gaps in coverage are due to MU radar being turned off for energy conservation. The altitude is shown at the beginning of each year. The gray scale is missing in the videos but is the same as in the plots presented in the paper. These videos are useful in looking at the evolution of various atmospheric structures described in the paper. The details of full-length videos can be found in the Table below.

**Campaign Segment Start Time (LT) Stop Time (LT) File Size (MB)**

ShUREX 2015 1 June 1, 12:00 June 6, 05:00 74.8

ShUREX 2015 2 June 6, 06:00 June 11, 06:00 75.3

ShUREX 2015 3 June 11, 06:00 June 14, 09:00 73.7

\*ShUREX 2016 1 May 25, 12:00 May 29, 23:00 44.7

\*ShUREX 2016 2 May 31, 12:00 June 6, 06:00 45.3

ShUREX 2016 3 June 6, 12:00 June 13, 07:00 45.0

Tanuki 2011 1 Sep 16, 12:00 Sep 21, 22:00 49.6

Tanuki 2011 2 Sep 22, 00:00 Sep 27, 1\*2:00 49.6

\* Month of May mislabeled June.

Website addresses of videos listed in the Table are:

<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2011_1.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2011_2.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2015_1.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2015_2.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2015_3.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2016_1.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2016_2.flv>  
<http://www.rish.kyoto-u.ac.jp/mu/CaponImages/2016_3.flv>

The onset, evolution and decay of features like MCT can be clearly seen in these videos. Onset of S&L structures from an apparently turbulent initial state of the atmosphere can be seen as well as their disappearance. Intrusion of dry air, leading to certain structures is evident at times during the campaign (e.g. at 07:00 LT on 30 May 2016, wrongly labeled 30 June 2016). Persistence of layered structures is clearly evident (e.g. between 20:00 LT on June 5, 2016 and 12:00 LT on June 6, 2016). The CBL can be seen during the day, when the CBL top, made evident by a strong humidity gradient sheet impacted by convective plumes, reaches above 1.34 km (e.g. between 11:00 LT and 17:00 LT on June 3, 2016). Upward motion of parcels inside the clouds can often be seen as inverted v-shaped dark lines (e.g. between 06:00 and 12:00 LT on June 6, 2016). Precipitation inside the mid-level cloud initiating the onset of an MCT event can be clearly seen (e.g. 08:20 LT on June 5, 2015). The abrupt change in the state of the atmosphere at around 17:10 LT on June 3, 2015 is noteworthy.