## Supplementary

## **DRAFT – DO NOT CITE OR QUOTE**

## An overview on the airborne measurement in Nepal,-part 1: vertical profile of aerosol size-number, spectral absorption and meteorology

Ashish Singh<sup>1</sup>\*, Khadak S. Mahata<sup>1</sup>, Maheswar Ruphaketi<sup>1</sup>\*, Wolfgang Junkermann<sup>2</sup>, Arnico K. Panday<sup>3</sup>, Mark G. Lawrence<sup>1</sup>

<sup>1</sup>Institute for Advanced Sustainability Studies, Potsdam, Germany <sup>2</sup>Institute of Meteorology and Climate Research, IMK-IFU, Garmisch-Partenkirchen, Germany <sup>3</sup>International Centre for Integrated Mountain Development (ICIMOD), Lalitpur, Nepal

\*Corresponding author: Ashish Singh (<u>ashish.singh@iass-potsdam.de</u>) and Maheswar Rupakheti (<u>maheswar.rupakheti@iass-potsdam.de</u>)



Figure S1: Testing and assembly of the instrument package inside IKARUS-C42 in the COMCO IKARUS station in Germany (a) field station in Pokhara Valley (b) sketch of the Instrument package (c)



Figure S2: Monthly mean values of key meteorological parameters measured at the Pokhara regional airport (*station ID: 804, 28.1993528, 83.9784028, 820 meters altitude*) using an *ENVIRODATA weather station.* December 2016 is missing due to data availability. The monthly value of solar radiation shown here is 95 percentile of the daily values to reflect the peak insolation values. Wind speed and rainfall intensity are 10x for graphical clarity. Note that rainfall values presented here are not cumulative over a month, rather average of the month. (December data is not available)



Figure S3: Frequency of wind speed and direction observed in the Pokhara Valley during May 2016



Figure S3.1: Wind speed (ms<sup>-1</sup>) and direction from 5-7<sup>th</sup> May 2016 measured at the Pokhara Regional Airport meteorological station



Figure S4: Daily temperature and relative humidity at 500mb using the NCEP NCAR reanalysis ( $2.5x \ 2.5^{\circ}$ ) data over South Asia from May 1 to 7 2016.



Figure S5: Monthly mean value of AOD 500 nm in Pokhara Valley for 2010-2016 (Note: Level 2 and 1.5 were used)



Figure S6: Local Meteorology in the Pokhara Valley from May 1-10 2017.

Weather condition is coded by individual number (see NOAA

<u>https://www7.ncdc.noaa.gov/CDO/dataproduct</u> for details). Weather condition in the figure is shown as a black square box. Weather condition of 5 indicate Hazy conditions;17-thurderstorm but no precipitation; 3-cloud generally forming; 2-sky unchanged

The sky cover is numerically coded as follows:

CLEAR =1, SCATTERED (1/8 TO 4/8) =2, BROKEN-5/8 TO 7/8 =3, OVERCAST=4, OBSCURED=5, PARTIAL OBSCURATION=6

(Also see NOAA https://www7.ncdc.noaa.gov/CDO/dataproduct for details).



Figure S7: AOD and other data products from the Level1.5 AERONET direct product in the Pokhara Valley from May 1-10 2017. The top panel includes AOD 500nm and AOD coarse and fine. The bottom panel includes AE 440-870nm, fine mode fraction and visibility



Figure S8: MODIA AQUA AND TERRA AOD at 550 nm over the IGP and Himalayan region from May 1 to May 7. The plots were generated using the Level-3 MODIS Atmosphere Daily products, **MOD08\_D3** at  $(1^{\circ} \times 1^{\circ})$  resolution. Top panel (AQUA) and bottom panel (TERRA).



Figure S9: Fire count recorded by the MODIS from May 1-7<sup>th</sup> (*Upper plot*). The red dots in the figure indicate the fire counts which are mostly in the North Western part of India (Source for the plot: <u>https://worldview.earthdata.nasa.gov</u>). (*Bottom plot*) local recorded for the same period by the National Emergency Operation Centre (<u>http://neoc.gov.np/en/</u>) via the ICIMOD portal (<u>http://118.91.160.238/NepalForestFire/index.html</u>)



Figure S10: Morning test flight (Flight F3) on May 6<sup>th</sup> 2016 is shown here, the rest of the results are already shown in in Figure. Each subplot is arranged by (i) size distribution measured by the Grimm OPC 1.108 (0.3-20  $\mu$ m), limited to 1  $\mu$ m in the figure, (ii) Total particle concentration (also indicated as *TPC*, Dp >11 nm) measured by the CPC 3760 and absorption aerosol at 370 nm and 880 nm (iii) temperature (°C) and dew point (black dot, in °C) and relative humidity (or RH %), (iv) calculated absorption Ångstrom exponent averaged for every 500 meters elevation band.