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To whom it may concern

I write this letter with the very strongest support for **Dr Simone Kotthaus-Boussaad**, an applicant for a position as *CNRS Associate scientist normal class - Section n°19 : The Earth System: superficial envelopes*. I write this letter of support as the director of the laboratory (Urban Meteorology at King's College London) where Dr Kotthaus conducted her PhD thesis.

In terms of my own background (and ability to write this letter), I am an urban climatologist/micrometeorologist. I have been an Assistant, Associate and Full Professor at Indiana University, USA. I moved to King's College London (KCL) at the beginning of 2006, where I held the rank of Professor and Chair in Physical Geography. Since August 2013, I am Professor of Atmospheric and Oceanic Science at the University of Reading, and as of 2019 also the Met Office Joint Chair. I have served as Chair of the American Meteorological Society (AMS) Board of the Urban Environment and I am elected Fellow of the AMS. In addition, I am past President of the International Association for Urban Climate and past Lead Expert for the World Meteorological Organization (WMO) for Urban and Building Climatology. My own research is concerned with measuring and modelling urban surface-atmosphere exchanges, and have also worked on forest, agricultural and wetland ecosystems. I know Dr Kotthaus (as she publishes) and her work and its impact very well.

Dr Kotthaus proposes an ambitious research programme with the title "*City-ABC: A city's impact on Air quality and local Climate – accounting for atmospheric Boundary layer feedbacks*". The aim is to improve understanding of the complex feedback mechanisms linking atmospheric boundary layer dynamics, air quality and local climate in cities. This research programme, enabled by national and international collaborations she has in place, will address important questions about impacts of future climates on cities, and how these insights can inform sustainable planning and urban design. What is proposed is to draw on the combination of novel, very high-resolution measurements being undertaken in the Paris Observatory, with state-of-the-art modelling at different scales (large eddy simulations, street-scale dispersion, urban canopy radiative transfer, numerical weather prediction, climate). This will draw on, and greatly enhance, a suite of research projects with which she is actively engaged. As an established expert in urban and boundary layer monitoring, she has to capability to deliver on this exciting and innovative research and has the networks, partnerships and collaborations in place.

Dr Kotthaus is an internationally recognised scientist who has extensive research experience that makes her an excellent candidate for this position. Her PhD thesis on the "*Implications of the dense city centre to surface-atmosphere exchanges*" was

particularly innovative in terms of the quality of data collected and its analysis in a particularly challenging environment for micrometeorological study. From this work, she led four publications. Three use eddy covariance (EC) techniques (with radiation sensors) to observe surface energy balance fluxes of a very dense area of central London. One of the papers[1] (c*itations (google/journal) > 85/>60*) makes a particularly important contribution to the analysis of EC data. The other two[2,3] are concerned with the analysis of the spatial and temporal variability of urban the surface energy balance. The fourth paper is concerned with a spectral library of urban materials that she developed which involved developing new measurement techniques[4] (citations (google/journal) > 100/ >85).

As a postdoc, Dr Kotthaus started working with ALC's (automatic lidar ceilometers) to determine boundary layer heights. Again, this was original and very carefully conducted research. This has resulted directly in four papers. This involved analysis of the raw attenuated aerosol backscatter signals that resulted in the manufacturer changing the firmware of the instruments[5]. A new algorithm was developed to infer the mixed layer height and cloud characteristics from the ceilometer[6] and then applied to determine the mixed layer characteristics of London[7]. Dr Kotthaus has evaluated the method not only using AMDAR data[6] but also with Doppler lidar data[8]. More recently she has published papers on the boundary layer in Paris[9].

Her work has very important implications for the physical understanding and modelling of urban atmospheric processes. Given her expertise, and the quality of her work, she has also contributed to research (and published papers) on air quality in Beijing[10], Paris[11] and London[12], including processes affecting carbon dioxide exchanges[13]. Dr Kotthaus has contributed to new understanding of a wide range of urban micrometeorological processes[14] and evaluation of meso-scale models[15] and standalone urban land surface models[16].

Alongside this extensive urban research programme, Dr Kotthaus has undertaken a wide range of teaching and mentoring activities, working with students, postgraduates and post-docs. In this too she has excelled. She has mentored PhD students developing new measurement techniques[17] and using observations to develop forward models for data assimilation[18]. Dr Kotthaus truly is excellent at both mentoring and teaching. She is demanding, thorough, challenging and empathetic. Those she has taught and mentored have valued the experience and Dr Kotthaus greatly. She is reflective and has drawn on these experiences in her writing, notably chapters in books that are key to teaching[19].

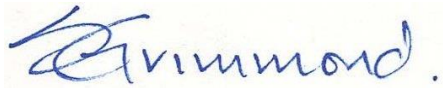
Dr Kotthaus is an exceptionally well-rounded researcher who understands research community citizenship and the importance of contributions to the broader academic community through service. As examples, she has played key roles within COST activities[20], reviewing publications, and is an elected member of the IAUC Board[21].

Further independent evidence of the quality of her work and clarity of presentation, come from the numerous awards she has received for her presentations. For example, as a PhD student two[2,3] of her papers were selected from the 8th International Conference on Urban Climate and the 10th Symposium on the Urban Environment to be published in the journal *Urban Climate* (with full peer review). She was awarded a postdoctoral Japan Society for the Promotion of Science Fellowship to visit Professor Manabu Kanda's (world-leading) group in Tokyo Institute of Technology. From this work, using thermal cameras in the COSMO model, the role of urban form on surface temperatures has been explored[17].

Without reservation, I recommend Dr Simone Kotthaus-Boussaad most highly for the scientist position at CNRS.

If there is anything you would like further information on, please do not hesitate to contact me.

Yours sincerely



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