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Please indicate the chapter/section/pages of this thesis that are extracted from co-authored work and provide details of the publication or submission from the extract comes:

Chapter 2: *Kuma, P., McDonald, A. J., Morgenstern, O., Alexander, S. P., Cassano, J. J., Garrett, S., Halla, J., Hartery, S., Harvey, M. J., Parsons, S., Plank, G., Varma, V., and Williams, J.: Evaluation of Southern Ocean cloud in the HadGEM3 general circulation model and MERRA-2 reanalysis using ship-based observations. Atmospheric Chemistry and Physics (accepted), https://doi.org/10.5194/acp-2019-201, 2020.*

Chapter 3: *Kuma, P., McDonald, A. J., Morgenstern, O., Querel, R., Silber, I., Flynn, C.: Ground-based lidar processing and simulator framework for comparing models and observations (ALCF 1.0), Geoscientific Model Development (submitted), https://doi.org/10.5281/zenodo.3785715. 2020.*

Chapter 4: *Kuma, P., McDonald, A. J., Morgenstern, O., Hartery, S., Williams, J., Varma, V., Zeng, G., Harvey, M., Parsons, S., Graeme, P: Improving Southern Ocean boundary layer cloud parametrisation in the general circulation model HadGEM3-GA7.1/UM11.4, manuscript in preparation, 2020.*

Please detail the nature and extent (%) of contribution by the candidate:

Chapter 2: *Peter Kuma participated on methodology development, voyage observations, data analysis, writing and reviewing of the manuscript. Extent: approx. 70%.*

Chapter 3: *Peter Kuma wrote the code of the framework, performed the data analysis of the case studies and wrote the text of the manuscript. Extent: approx. 70%.*

Chapter 4: *Peter Kuma participated on the TAN1802 field measurements, performed the model runs, analysis and wrote the manuscript. Extent: approx. 70%.*

Please see also "Author contributions" at the end of Chapter 2, 3 and 4 for details.

Certification by Co-authors:

If there is more than one co-author then a single co-author can sign on behalf of all. The undersigned certifies that:

- The above statement correctly reflects the nature and extent of the Doctoral candidate's contribution to this co-authored work
- In cases where the candidate was the lead author of the co-authored work he or she wrote the text

Name: *Adrian McDonald* Signature: Date: