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Dr. Sang-Ki Lee
NOAA/Atlantic Oceanographic & Meteorological Laboratory,
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Dear Dr Sang-Ki Lee,

I am writing to apply for the position on 'mesoscale atmosphere-ocean coupled modeling' at the Cooperative Institute for Marine and Atmospheric Studies of the University of Miami. My research interests currently focus on understanding dynamically simulated tropical storms, specifically looking at the role that the ocean component plays in simulated tropical cyclone activity. This project would allow me to further develop the skills necessary to undertake contemporary scientific research on ocean-atmosphere interaction in tropical cyclones. Storm-driven oceanic changes can be substantial on the storm footprint and can eventually affect storm path and intensity. Including sea gilder profiles using data assimilation into NOAA's operational hurricane model may improve hurricane track and intensity forecasts. My knowledge and experience of understanding tropical cyclones in coupled models will make me an excellent candidate for this position.

I have just completed my Ph.D. in the Department of Meteorology at the University of Reading, UK under the supervision of Prof. Pier Luigi Vidale, Dr. Kevin Hodges and Dr. Jane Strachan. My doctoral research was split into three main sections. Firstly, I investigated the global El Niño Southern Oscillation (ENSO)-tropical cyclone teleconnection using a high-resolution coupled Atmosphere-Ocean General Circulation Model HiGEM (UK's High Resolution Global Environment Model). Additional experiments, including running an atmosphere-only simulated forced with observed Sea Surface Temperature (SST) and an atmosphere-only simulation forced with the coupled model SST, highlight the role of the ocean in simulation the ENSO-tropical cyclone teleconnection. Secondly, I undertook a novel model approach to investigate the influence SST in the eastern tropical Pacific has on landfalling typhoons in South East Asia. Lastly, I investigated tropical cyclones and climate change in HiGEM using idealized climate change experiments. I investigated the role of the ocean component on tropical cyclone intensity projections by forcing the atmospheric component with the simulated coupled model SST from the climate change experiments. I found that without ocean interaction, tropical cyclone intensity is projected to increase, this is due to the lack of negative feedback associated with wind-stress-induced cold water upwelling. This study is published in the *Journal of Climate*. I also have a first class (honors) Master of Oceanography degree from the University of Southampton, UK. My background in Oceanography and Meteorology is well suited for this project.

I will bring valuable knowledge to this position due to my understanding of coupled processes in tropical cyclones. I am fascinated by how the ocean influences tropical cyclone track, size and intensity, and I have read numerous papers on the topic. I also understand the principals of data assimilation as an optimal blending of prior information with observations to produce optimal balanced model states. One aspect that our research group has been interested in is the role of model resolution on tropical cyclone intensity. Stuart Webster from the Met Office has investigated tropical cyclone intensity at model resolutions of 100m. I am also part of a working group at the UK Met Office looking at ways to improve our understanding of tropical cyclone intensity in various configurations of the Unified Model. I will maintain strong links with researchers at the UK Met Office and will enjoy future collaboration to ultimately improve the predictability of hurricane intensity.

I have strong experience in numerical modelling. I designed and undertook idealized model simulations to address a contemporary research question on typhoon landfall in South East Asia and how landfall may change with different types of El Niños. SST composites of Eastern Pacific and Central Pacific El Niños were used to force an atmosphere-only General Circulation Model. This was accomplished by experiments separating SST forcing from the eastern tropical Pacific compared to global SST forcing. This experiment involved communication and collaboration beyond my three supervisors as I held discussions with a world-leading researcher on numerical modelling, Hilary Weller, and ENSO, Eric Guilyardi, to decide an effective numerical experiment to address the research question.

I have experience using FORTRAN, Matlab, IDL, Python and R for analysis, statistical tests and visualization. I have used Unix Shell scripting throughout my Ph.D. I use NCO tools in combination with C shell and bash shell scripts to efficiently analyses large amounts of NetCDF model data. I have helped with the teaching of numerical modeling to undergraduates and I attended the National Centre for Atmospheric Science Climate Modelling Summer School.

In terms of communicating my research, I have been invited to present my research at the 2014 Ocean Sciences Meeting in Hawaii in February in the 'Tropical Cyclone-Ocean Interactions: from Weather to Climate' session. I have authored two peer-reviewed papers for the *Journal of Climate* and have one more paper in preparation that I will submit from my Ph.D. research. I am also a co-author on two other papers. I have also given several international seminars and presentations, such as at the 4$^{th}$ International Summit on Hurricanes and Climate Change in Kos, Greece. I obtained a travel award in recognition of my active scientific discourse at the conference. I also presented my work at the American Meteorology Society 30$^{th}$ Conference on Hurricanes and Tropical Meteorology and I enjoyed attending the sessions on coupled modeling. I would look forward to writing a number of papers out of this project and presenting the findings at international conferences.

I would thoroughly enjoy the opportunity to be part of the Environmental Modelling Centre team and discuss the latest model developments of Hurricane Weather Research and Forecast (HWRF) system and the HYbrid Coordinate Ocean Model (HYCOM).

Thank you for your time and consideration of my application.

Sincerely,

Ray Bell