

Hong Kong Observatory Summer Placement Programme 2019

Project Ref.	Project Title	Job description	Subject and year of study required	Specific knowledge / skills required / remarks
A2	Lightning prediction using Numerical Weather Prediction (NWP) model	<p>Develop and test algorithms for predicting the occurrence and frequency of lightning using outputs from high-resolution NWP models operated by the Hong Kong Observatory.</p> <p>Simulation results will then be validated against actual lightning density observations around Hong Kong and Guangdong.</p>	<p>Physics, Mathematics or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Strong background in Physics or Mathematics.</p> <p>Experience in programming useful but not essential</p>
A3	Exploring the use of vertical profiles of the lower atmosphere from numerical weather prediction (NWP) outputs in local aviation applications	<p>Analyse the accuracy of weather elements in the vertical profiles of the lower atmosphere around Hong Kong from NWP outputs.</p> <p>Develop algorithms for using these vertical profiles in aviation applications.</p>	<p>Physics, Earth System Science, Mathematics, Statistics, Computer Science or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Experience in data processing and analytics. Skillful in the use of computer tools (e.g. Python or R for statistical analysis).</p>

A4a	Applications of blended sandwich and high-pass filtered satellite imageries for diagnosis of severe weather	<p>Analyse the various cloud-top features of deep convections and evaluate their potential implications for the occurrence of severe weather such as tornadoes and hails.</p> <p>Identify the presence of gravity waves using high-pass filtered satellite imageries validated by flight reports.</p>	<p>Physics, Earth System Science, Mathematics, Statistics, Computer Science or related disciplines.</p> <p>Completion of 1st year of study.</p>	<p>Knowledge in database management and skills in the use of statistical analysis tools (e.g. R programming software) preferred.</p>
A4b	A study of the characteristics of microbursts in Hong Kong	<p>Study the climatology of microbursts detected by the Hong Kong Observatory's Terminal Doppler Weather Radar Systems for identifying the associated characteristics including spatial variation, diurnal variation, wind speed frequency distribution and wind direction.</p>	<p>Physics, Earth System Science, Mathematics, Statistics, Computer Science or related disciplines.</p> <p>Completion of 1st year of study.</p>	<p>Knowledge in database management and skills in the use of statistical analysis tools (e.g. R programming software) preferred.</p>

F3a	Examination of growth of storms based on satellite data and NWP model outputs	<p>Develop nowcast algorithms to predict the growth of storms based on various satellite data and numerical weather prediction (NWP) model outputs.</p> <p>Verify the performance of these algorithms in significant rainstorm cases.</p>	<p>Physics, Earth System Science, Mathematics, Statistics or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Knowledge and experience in Python.</p>
F3b	Development of a new integrated rainstorm viewer	<p>Develop a new integrated rainstorm viewer that delineates the past and forecast intensity and spatial spread of precipitation as well as rainstorm probabilities based on outputs of ensemble nowcasts and automatic warning guidance.</p> <p>Develop displays for significant historical cases for demonstration.</p>	<p>Physics, Earth System Science, Computer Science, Engineering or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Knowledge and experience in Python.</p>

F4	Verification of automatic global city weather forecasts	<p>Perform objective verification of automatic weather forecasts (e.g. air temperature, humidity, wind speed, wind direction and pressure) for global cities based on post-processed outputs from various numerical weather prediction (NWP) models.</p> <p>Investigate the relationship between forecast performance and geographical characteristics of different cities. Identify ways to further improve the automatic forecast algorithms based on the verification results.</p>	<p>Physics, Earth System Science, Mathematics, Statistics or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Knowledge in data analysis and experience in programming language including Python and/or R preferred.</p>
F5	A feasibility study of using open-source container orchestration system to deploy containers for various meteorological data processing software applications	<p>Study the flexibility and reliability of using open-source container orchestration system to operate containers for various operational meteorological data processing software applications across clusters of different operating systems (such as Linux and Windows).</p> <p>Explore the potential of deploying the container technology to provide high availability, load balancing, scheduling and rapid deploying services.</p>	<p>Computer Science or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Knowledge in Linux and windows system as well as shell scripting language.</p> <p>Experience in using open-source software, virtual machine and container preferred.</p>

F6D1	Study of historical high-impact weather events	<p>Study the socio-economic impacts of historical weather events and compile a knowledge base of weather impacts.</p> <p>Consolidate, quality check and properly format the existing and potential data sources for effective record and research studies.</p> <p>Analyse the statistical relationships between impacts and weather for developing impact-based forecasts.</p>	<p>Physics, Earth System Science, Mathematics, Statistics, Computer Science or related disciplines.</p> <p>Students major in economics with strong background in mathematics/statistics may also apply.</p> <p>Completion of 2nd year of study.</p>	<p>Experience in data analysis and use of statistical analysis tools (e.g. R programming software).</p> <p>Knowledge in computer programming highly preferred.</p> <p>Knowledge in historical information and literature search (Chinese and English), both online and in library preferred.</p>
D1	A study on the long term variation of solar radiation in Hong Kong	<p>Study the long term variation of solar radiation in Hong Kong as compared with nearby regions.</p> <p>Further explore correlations between variation of solar radiation and changes in cloud amount, visibility, air quality index (PM2.5/10), etc.</p>	<p>Physics, Earth System Science, Mathematics, Statistics, Computer Science or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Knowledge in data management and skills in the use of statistical analysis tools (e.g. R programming software) preferred.</p>

D4	Production of educational and promotional videos	Assist in the production of educational and/or promotional videos for the Hong Kong Observatory (HKO), including screenwriting, filming and post-production. The videos may be broadcast on local TV channels (as part of “Cool Met Stuff” series), and/or uploaded to HKO’s social media platforms including YouTube, Facebook and Instagram.	Film and television, creative media, multimedia technology, or other related disciplines with an emphasis on digital video production. Completion of 2 nd year of study.	Proficient in digital video production, and video editing software (e.g. Adobe Premiere or Final Cut Pro). Knowledge in animation production will be an advantage. Applicant must submit a portfolio of previous work. Please specify your role involved in each of the video submitted.
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R2	Development of VR-based training/education tools	<p>Develop interactive staff training tools for selected outdoor work or interactive educational tools for promotion of public education on meteorology related topics. The student will have the chance to collaborate with other student or staff in the Observatory in this project.</p>	<p>Computer Science, Mechanical Engineering, Creative Media or related disciplines.</p> <p>Completion of 2nd year of study.</p>	<p>Strong skills in C++ programming, HTML5 and 3D tools (e.g. Unity, Unreal).</p> <p>Proficient in graphic, audio design and animation.</p> <p>Experience in VR game programming and movie editing tools will be an advantage.</p>
R4a	Study on ambient gamma radiation data	<p>Carry out statistical analysis of past ambient gamma radiation data including data from High Pressure Ionization Chamber (HPIC) and gamma spectrometry systems.</p> <p>Investigate means to improve the quality control of ambient gamma dose rate data from HPIC.</p>	<p>Statistics, Computer Science, Mathematics or related disciplines.</p> <p>Completion of 2nd year of study preferred.</p>	<p>Experience in using Microsoft EXCEL or other statistical analyzing tools for data analysis.</p> <p>Knowledge in SQL will be an advantage.</p>

R4b	Analysis of Lightning, UVI and UVA data	Perform climatic and spatial analysis of lightning data. Carry out analysis and correlation study of UVI and UVA.	Computer Science, Statistics, Meteorology or related disciplines. Completion of 2 nd year of study preferred.	Good knowledge of JavaScript, HTML5, CSS. Use of Microsoft EXCEL or other statistical analyzing tools.
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