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Application of the Phased Array Weather Radar
at Sha Lo Wan in monitoring high impact weather in Hong Kong

Jeffery JIN and Ying-wa CHAN

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应用沙螺湾相控阵雷达以监测对香港有高影响的天气

金睿瞳 陈营华
香港天文台

摘要

香港天文台在沙螺湾风廓线仪站安装了一台 X 波段双偏振相控阵天气雷达，并于 2021 年 10 月开始试验性运行。该雷达可在 1 分钟完成垂直 68 层的立体扫描，提供最大监测范围 60 公里、分辨率 30 米的快速更新雷达图像以监测恶劣天气。

本文评估沙螺湾相控阵天气雷达对监测 2021-2022 年发生的几次高影响天气事件的表现，包括冰雹、水龙卷和强阵风等，并利用相控阵天气雷达所提供的水凝物分类和其他双偏振产品，如差分反射率(ZDR)及差分相移率(KDP)，来分析以上恶劣天气事件的相关强对流发展特征，及对比天文台 C 波段和 S 波段雷达的观测。初步结果显示沙螺湾相控阵天气雷达能有效监测中尺度天气系统的演变，有助诊断恶劣天气的影响和加强临近预报的工作。

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Jeffery JIN and Ying-wa CHAN
Hong Kong Observatory

Abstract

The Hong Kong Observatory (HKO) has installed an X-band dual-polarisation Phased Array Weather Radar (PAWR) at the Sha Lo Wan (SLW) Wind Profiler Station which commenced trial operation in October 2021. The PAWR could complete a volume scan comprising 68-elevation layers in 1 minute. Rapid update of radar imageries with a maximum range of 60 km and resolution of 30 m could be made for monitoring inclement weather.

This paper evaluates the performance of SLW PAWR in monitoring several high impact weather events that occurred in 2021-2022. These included the occurrence of hail, waterspout and intense gusts, etc. The characteristics of severe convective development associated with the above events were analysed using hydrometeor classification and other dual-polarisation products from the PAWR such as Z_{DR} and K_{DP} . Comparison with the observations of HKO's C-band and S-band radars was also made. Preliminary results showed that the SLW PAWR was effective in monitoring the evolution of mesoscale weather systems,

which would be beneficial for diagnosing severe weather impact and enhancing nowcasting operation.