

基於模式資料整合之地面分析場研發技術

Development of Ground Truth Integrating Model Data

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摘 要

氣象預報中心基於測站觀測資料點，逐年發展空間數值推估之技術，稱為地面分析場，並應用於溫度、氣壓、平均風風速、相度濕度及露點溫度...等各項氣象要素。針對各項氣象要素的建置方式，主要透過具物理性或空間統計的推估方式，先以經檢核通過具可信度之測站觀測數值進行空間網格背景值的推估，並在測站位置處以測站觀測值與背景值之差異，利用克利金空間內插方式進行所有網格之內插(差值內插)，最後將網格差值內插值回饋至網格背景值，獲得地面分析場數值。近年來在RWRF數值模式以能逐時提供未來10分鐘預報輸出的情況下，地面分析場的建置亦開始考慮數值模式所能提供的物理特性資訊，並建置將數值模式資訊融合至地面分析場中的新一代建置方式。本研究將以溫度為例，說明氣象預報中心地面分析場建置中採用RWRF數值預報模式資訊的方式，並與現行作業中之地面分析場進行比較。

關鍵字：地面分析場、RWRF數值模式

Abstract

Based on station observation data, the Weather Forecast Center has progressively developed spatial numerical estimation techniques, termed Ground Truth(GT). These techniques are applied to various meteorological variables, including temperature, atmospheric pressure, average wind speed, relative humidity, and dew point temperature. The construction methodology for these meteorological variables primarily relies on physical or spatial statistical estimations. Initially, quality-controlled station observations are utilized to estimate spatial grid background fields. Subsequently, the discrepancies between the station observations and the background values are computed at the respective station locations. A Kriging spatial interpolation is then applied to these differences across all grids (residual interpolation). Finally, the interpolated residuals are integrated back into the grid background fields to derive the final surface analysis values.

Recently, given the Rapid-refresh Weather Research and Forecasting (RWRF) model's capability to generate forecast outputs at 10-minute intervals, the construction of surface analysis fields has begun incorporating the physical characteristics provided by this numerical model. This has led to the development of a next-generation methodology that fuses numerical model data into the surface analysis fields. Using temperature as a case study, this research elucidates how the Weather Forecast Center integrates RWRF numerical forecasting data into the surface analysis framework and presents a comparative analysis against the surface analysis fields currently in operation.

Key words : Ground Truth, RWRF