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中文题目：使用信号自由度方法评估风场融合中观测数据的影响

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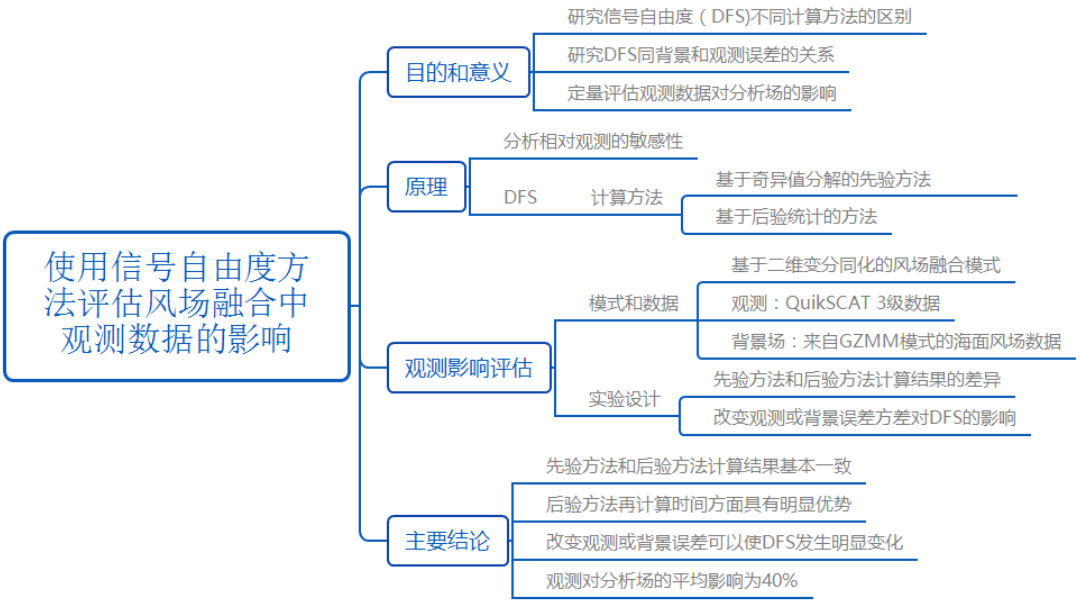
中文摘要：本文主要讨论了使用二维变分同化（2D Var）进行海面风场融合时观测对分析场影响的评估。本文首先介绍了同化系统中分析相对于观测的敏感性的原理及其与信号自由度（DFS）的关系，并把 DFS 思想应用于南海海面风场 2D Var 同化系统中，实现了海面风场融合中分析场对观测的敏感性分析，定量研究了观测数据对分析场的影响。本文利用基于变形观测算子奇异值分解的先验方法和基于后验统计的方法两种方案对 2D Var 海面风场融合中的纬向风速（U）和经向风速（V）数据的信号自由度进行了计算。结果表明使用先验和后验方法得到的 DFS 基本一致，但由于后验方法使用的偏差都是同化系统的副产品，后验方法在计算时间方面具有明显优势。DFS 的值取决于观测误差协方差和背景误差协方差矩阵有关。当改变观测误差方差或背景误差方差时，DFS 的值发生明显变化。由于观测误差是一个常数，因此不同观测位置的观测影响与背景误差协方差矩阵有关。观测对分析场的平均影响均约为 40%，即背景场对分析场的平均影响约为 60%。

文章结构框图：



英文题目：Evaluation of Impact of Observations in Blended Sea Surface Winds from Two-Dimensional Variational Method Using Degrees of Freedom

作者：WANG Ting, XIANG Jie*, FEI Jianfang, WANG Yi, et al.

英文摘要：The paper presents evaluation of observational impacts on blended sea surface winds from a 2-dimensional variational data assimilation (2D-Var) scheme. First briefly introduced are the analysis sensitivity with respect to observations in variational data assimilation systems and its relationship with the degrees of freedom for signal (DFS), and then the DFS concept is applied to the 2D-Var sea surface wind blending scheme. Two methods, *a priori* and *a posteriori* methods are

used to estimate the DFS of zonal (**U**) and meridional (**V**) components of winds in the 2D-Var blending scheme. The *a posteriori* method can obtain almost the same results as the *a priori* method. Because only by-products of the blending scheme are used for the *a posteriori* method, the computation time is reduced significantly. The magnitude of the DFS is critically related to the observational and background error statistics. Changing observational and background error variances can affect the value of DFS. Because the observational error variances are assumed to be uniform, the observational influence at each observational location is related to the background error variance and the observations located at place where there are larger background error variances have larger influence. The average observational influence of **U** and **V** with respect to the analysis is about 40%, which means that the background influence with respect to the analysis is about 60%.