

基于Gauss-Markov卡尔曼滤波的电离层数值同化现报预报系统的构建—以系统模拟试验

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Development of an ionospheric numerical assimilation nowcast based on Gauss-Markov Kalman filter—An observation system taking example for China and its surrounding area

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摘要

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摘要

本文给出了一个基于Gauss-Markov卡尔曼滤波的电离层数据同化系统的初步构建和试验结果.我们选择中国及周边地区部层观测的台站(包括子午工程台站、中国地壳形变网和部分IGS台站)作为观测系统进行模拟试验,背景场利用IRI模式,观测NeQuick模式计算得到.我们的同化结果表明,采用Kalman滤波算法,把部分斜TEC同化到背景模式当中,能够获得较好结果,说明我们设计的算法可行、所选择的各种参数比较合理,采用Gauss-Markov假设进行短期预报也取得了较合理的结果.经过进一步的改进和完善,可以用来对中国地区的电离层进行现报和短期预报,一方面满足相关空间工程应用,另一方面可有观测系统的科学意义.

关键词: 电离层 数据同化 卡尔曼滤波 误差协方差

Abstract:

In this paper, we constructed an ionospheric data assimilation system based on Gauss-Markov Kalman filter. We chose some ionosphere stations (including meridional project station lithosphere deformation GPS network, part of IGS stations) in China and its surrounding area as observation system to do the simulation experiment. International Reference Ionosphere (IRI) is chosen to be the background model, while NeQuick model output is taken to be the observations. Our assimilation results show that good estimation of ionosphere electron density by ingesting the observed slant TEC data into the model Kalman filter. It illustrates that our assimilation algorithm is feasible and the selected parameters are reasonable. We obtained reasonable short time forecast results by Gauss-Markov assumption.

Keywords: Ionosphere Data assimilation Kalman filter Error covariance

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