Imaging the Ionosphere by Assimilating Observations From Multi Sources/Platform and Error Sources Analysis

Naifeng Fu |SHAO

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Abstract

In this paper, using the IRI [**?**] model as the real field, the ionosphere observation data of the GNSS-IGS station on May 6, 2016 was simulated. With the Nequick [**?**] model as the background field, the $2.5^\circ \times 5^\circ \times 13layer \times 1h$ of the global ionospheric density field was constructed by the KF filter algorithm, and the following work was processed : 1. Analyzed various errors and influences in the ionosphere inversion, especially the easily overlooked errors, and proposed and verified the corresponding improvement methods; 2 The effects of multi-system data and multi-source data observations on the observation quality and spatial distribution configuration in ionospheric inversion are analyzed.
Keywords: data assimilation,GNSS ,COSMIC,electron density,radio occultation.

1 Introduction

In 2013,Ludger ,etc. telled that ... [**?**], telling that the opinion [**?**] of Ludger developed at 2009 is incorrect.

2 Data

2.1 Satellite constellation and Stations

2.2 Ionospheric empirical models

2.3 Observing systems

3 Method

3.1 the Reconstruction Model

The main Kalman filter equation that we described is as follows:

$$X_a = X_b + P_{ne}H^t[\lambda^2 H P_{ne} H^t + R_{obs}]^{-1}(Y - HX_b) \tag{1}$$

where X_b and X_a are the prior and assiminated electron densities,respectively. P_{ne} and R_{obs} are the error covariances of the background model and observations, respectively. H is the observation matrix and and Y is the observation vector.

3.2 the Error Sources and the Error Classification

Kalman filter Function[1] with the order of the observation number.

3.2.1 The Influence of the Inversion Algorithm's Error

3.2.2 The Influence of the Model Assumption's Error

three factors is showed as follow:
$itemize)The influence and correction of The topionosphere and plasmalayer$

The influence and correction of the ionospheric time variations

The influence and correction of the ionospheric grid representation
itemize)