地球物理学报 2010 53 (1): 147～155 ISSN: 0001-5733 CN: 11-2074/P

地球动力学★地震学★地热学★地磁学

一种基于径向基神经网络的地磁场*K*指数实时标定方

齐玮,王秀芳,李夕海,刘代志

第二炮兵工程学院，西安 710025

收稿日期 2008-10-7 修回日期 2009-4-7 网络版发布日期 2010-1-20 接受日期

摘要 *K*指数是一种重要的地磁活动指数，标定*K*指数的难点在于规则日变化S_R的确定，尽管FMI（Finnish Meteorological Institute,芬兰气象学院）方法能够比较准确地识别规则日变化S_R，给出合理的*K*指数，但是该方法存在一天的延迟，无法实现实时标定.为了解决这一问题，本文提出了一种基于径向基神经网络的*K*指数实时标定方法：首先用修正后的FMI方法提取*H*分量的时均值序列，接着以径向基神经网络对该序列进行建模，最后基于神经网络模型实时获取规则日变化，并结合*H*分量分均值观测数据标定*K*指数.实验结果表明：该方法能够以3.8598 nT的标准误差实时获取规则日变化S_R；实时标定的K指数与直接用FMI-*H*方法延迟一天标定的*K*指数相比，完全吻合的占69.8%，差别大于一个标度的仅占0.77%.

关键词 地磁场,*K*指数,径向基神经网络,FMI方法,规则日变化

分类号 P318

DOI: 10.3969/j.issn.0001-5733.2010.01.016

A real time *K*-indices scaling method based on radial basis neural network

QI Wei, WANG Xiu-Fang, LI Xi-Hai, LIU Dai-Zhi

The Second Artillery Institute of Engineering, Xi'an 710025, China

Received 2008-10-7 Revised 2009-4-7 Online 2010-1-20 Accepted

Abstract The difficulty to scale *K*-indices is how to identify the solar regular variation (S_R) and FMI method is a verified effective method for appropriate elimination of S_R. However FMI method is not able to give *K*-indices in real time because there is always one day's delay to acquire S_R. To solve this problem we propose a new method based on radial basis neural network which is able to give real time *K*-indices. Firstly the solar regular variations of *H* element is obtained by the modified FMI method and then radial basis neural network is used to model this time series, and finally according to the model output and the current mean minute value of *H* element *K*-indices are scaled in real time. Experiments show that this method can give real-time solar regular variations with a standard error of 3.8598 nT. The comparison between the *K*-indices scaled by FMI-*H* method with one day's delay and the real-time *K*-indices confirm this method: 69.8% are in agreement，0.77% differ more than one unit.

Key words Geomagnetic field; *K* index; Radial basis neural network; FMI method; Solar regular variation

通讯作者:
齐玮 xinqiwei@126.com
作者个人主页: 齐玮;王秀芳;李夕海;刘代志