Research Progress in Parameter Sensitivity Analysis in Ecological and Hydrological Models of Remote Sensing

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Abstract: Parameter sensitivity analysis (SA) is an important research method for uncertainty analysis(UA), key parameters identification and parameters optimization in remote sensing, ecological and hydrological models. In this paper, the sensitivity analysis of ecological and hydrological research based on remote sensing is analyzed. The sensitivity analysis methods commonly used in remote sensing ecological hydrology are reviewed, and the advantages and applicable conditions of each SA method are summarized. Parameter sensitivity analysis as the prior knowledge of the model promotes the development of uncertainty analysis and parameter optimization. In future studies, Under the framework of Uncertainty and Sensitivity Matrix (SUM), it is necessary to pay more attention to the research of multi-stage remote sensing inversion by combining global SA, scale effect of parameter Sensitivity index and spatio-temporal heterogeneity of parameter Sensitivity. Sobol 'and EFAST are the most reliable and stable global sensitivity methods among the current sensitivity algorithms, which are most suitable for most remote sensing inversion and model. In addition, computational efficiency should be improved to accommodate future more complex models and rapidly growing volumes of data. Parameter sensitivity analysis can be judged according to the order of sensitivity so as to provide a priori knowledge for multi-stage inversion in the process of remote sensing inversion. The difference of parameter sensitivity analysis in different scales, different bands and different observation angles, as well as the parameter uncertainty, must be paid attention to and analyzed. The four platforms for

sensitivity analysis and uncertainty analysis also are introduced in order to make it more convenient for remote sensing scientists to use parameter sensitivity analysis method. Meanwhile, efficiency of sensitivity analysis calculation should be improved to adapt to more complex models and rapidly increasing data size in the future.

Key words: Remote sensing; Parameter sensitivity analysis; Parameter optimization; Uncertainty analysis