



Land Surface Observation, Modeling and Data Assimilation

LIANG SHUNLIN ET AL

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This book is unique in its ambitious and comprehensive coverage of earth system land surface characterization, from observation and modeling to data assimilation, including recent developments in theory and techniques, and novel application cases. The contributing authors are active research scientists, and many of them are internationally known leading experts in their areas, ensuring that the text is authoritative.

This book comprises four parts that are logically connected from data, modeling, data assimilation integrating data and models to applications. Land data assimilation is the key focus of the book, which encompasses both theoretical and applied aspects with various novel methodologies and applications to the water cycle, carbon cycle, crop monitoring, and yield estimation.

Readers can benefit from a state-of-the-art presentation of the latest tools and their usage for understanding earth system processes. Discussions in the book present and stimulate new challenges and questions facing today's earth science and modeling communities.

Contents:

• **Observation:**

- Remote Sensing Data Products for Land Surface Data Assimilation System Application (*Yunjun Yao, Shunlin Liang and Tongren Xu*)
- Second-Generation Polar-Orbiting Meteorological Satellites of China: The Fengyun 3 Series and Its Applications in Global Monitoring (*Peng Zhang*)
- NASA Satellite and Model Land Data Services: Data Access Tutorial (*Suhung Shen, Gregory Leptoukh and Hongliang Fang*)

• **Modeling:**

- Land Surface Process Study and Modeling in Drylands and High-Elevation Regions (*Yingying Chen and Kun Yang*)
- Review of Parameterization and Parameter Estimation for Hydrologic Models (*Soroosh Sorooshian and Wei Chu*)

• **Data Assimilation:**

- Assimilating Remote Sensing Data into Land Surface Models: Theory and Methods (*Xin Li and Yulong Bai*)
- Estimating Model and Observation Error Covariance Information for Land Data Assimilation Systems (*Wade T Crow*)
- Inflation Adjustment on Error Covariance Matrices for Ensemble Kalman Filter Assimilation (*Xiaogu Zheng, Guocan Wu, Xiao Liang and Shupeng Zhang*)
- A Review of Error Estimation in Land Data Assimilation Systems (*Yulong Bai, Xin Li and Qianlong Chai*)
- An Introduction to Multi-scale Kalman Smoother-Based Framework and Its Application to Data Assimilation (*Daniel E Salas and Xu Liang*)

• **Application:**

- Overview of the North American Land Data Assimilation System (NLDAS) (*Yulong Xia, Brian A Cosgrove, Michael B Ek, Justin Sheffield, Lifeng Luo, Eric F Wood, Kingtse Mo and the NLDAS team*)

- Soil Moisture Data Assimilation for State Initialization of Seasonal Climate Prediction (*Wenge Ni-Meister*)
- Assimilation of Remote Sensing Data and Crop Simulation Models for Agricultural Study: Recent Advances and Future Directions (*Hongliang Fang, Shunlin Liang and Gerrit Hoogenboom*)
- Simultaneous State-Parameter Estimation for Hydrologic Modeling Using Ensemble Kalman Filter (*Xianhong Xie*)

Readership: Graduate students and scientists in remote sensing, hydrology, ecology, environment and other earth sciences.

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