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Validation plays the role of a “bridge” in connecting remote sensing research and applications

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Abstract

Remote sensing products contribute to improving earth observations over space and time. Uncertainties exist in products of different levels; thus, validation of these products before and during their applications is critical. This study discusses the meaning of validation in depth and proposes a new definition of reliability for use with such products. In this context, validation should include three aspects: a description of the relevant uncertainties, quantitative measurement results and a qualitative judgment that considers the needs of users. A literature overview is then presented evidencing improvements in the concepts associated with validation. It shows that the root mean squared error (RMSE) is widely used to express accuracy; increasing numbers of remote sensing products have been validated; research institutes contribute most validation efforts; and sufficient validation studies encourage the application of remote sensing products. Validation plays a connecting role in the distribution and application of remote sensing products. Validation connects simple remote sensing subjects with other disciplines, and it connects primary research with practical applications. Based on the above findings, it is suggested that validation efforts that include wider cooperation among research institutes and full consideration of the needs of users should be promoted.

Keywords: Validation; Remote sensing products; Applications; Users' needs.

1. Introduction

Remote sensing techniques have greater potential for performing rapid and consistent earth observations than traditional methods of acquiring data. Thus, remote sensing is widely applied in the assessment of resources and the environment, agricultural science, meteorology, and disaster reduction, among other fields. It improves human understanding of the earth and the environment we occupy. For instance, ASTER data have been used to map geological characteristics (Soulaïmani et al., 2014), TM/ETM+ data have been used to classify water resources (Sriwongsitanon et al., 2011), MODIS data have been used to extract flooded areas (Uddin et al., 2013), and abundant examples of other applications exist.

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