IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

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APPLICATION AND CASE OF MULTI-SOURCE SATELLITE COLLABORATIVE MONITORING TECHNOLOGY IN PINE WILT DISEASE

Abstract

Pine Wilt Disease is a major international quarantine disease and one of the most serious forestry disasters in the world. With the development of commercial remote sensing satellite constellations with high spatial resolution, high coverage and high frequency, the ability to provide continuous and stable satellite data services for epidemic prevention and control has been greatly improved, which makes it possible to monitor the discoloured standing trees of large-scale pine forests and prevent and control the epidemic accurately. This paper develops a set of monitoring technology systems based on multi-source satellite data collaboration, which provides the general survey and detailed investigation of discoloured standing trees in a large range of pine forests and realizes the accurate and rapid monitoring of Pine Wilt Disease at the level of a single tree. The risk assessment of Pine Wilt Disease in a large area is realized through the analysis and model construction of the key elements of the natural transmission of pine wood nematode in a short distance and the artificial transmission of Pine Wilt Disease in a long distance; The health index based on the red edge spectrum was constructed to identify the distribution of pine forests in abnormal health conditions, and the detailed investigation scope was further determined on the basis of risk assessment; During this period, the high-precision geographical distribution of pine forest patches in the monitoring area was obtained through multi-spectral and multi-temporal satellite data as the mask layer for filtering non-pine trees; Collect typical positive and negative samples from the monitoring area for Yolov5 model training, realize the rapid preparation and identification of discolored pine in high spatial resolution images, and develop Pine Wilt Disease monitoring system and mobile verification terminal to provide information means for epidemic prevention and control supervision. This technical system has been successfully applied in the northeast of China, realizing the accurate identification of hundreds of thousands of discolored pine trees.