

整合反演衛星雲圖之開發

Development of an Integrated Retrieved Satellite Cloud Imagery

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摘 要

傳統衛星雲圖多以二維圖資方式展示，為進一步提升視覺化效果，及增加維度以顯示更多資訊，國家災防科技中心開發了三維繪圖核心程式，用以利用日本向日葵 (Himawari) 地球同步衛星觀測來繪製立體雲圖。這種立體化方式能夠更直觀地顯示雲的資訊，使其能有如可見光真實色雲圖逼真的立體感。該三維繪圖程式可任意設定攝影機在空間中的位置、姿態、鏡頭焦距等。在燈光方面，亦可任意設定光源位置、照射方向、光源強度和顏色。物件表面可以設定透明度，並可反應對光的散射及和反射作用，以及物件表面貼圖。

災防中心引進了中研院開發的先進向日葵成像儀雲科學資料反演套件 (Advanced Himawari Imager Cloud Science Data Retrieval Package, AHICSDRP)，可將日本向日葵 (Himawari) 地球同步衛星觀測資料反演成多種雲物理及光學產品。整合反演立體衛星雲圖即是利用反演雲頂高度進行立體雲物件的建模，並以反演雲光學厚度來擬合立體雲物件的透明度。整合反演立體衛星雲圖每10分鐘即時更新自動出圖，並展示於災防科技中心天氣與氣候監測網的「3D雲圖」頁面 (https://watch.ncdr.nat.gov.tw/watch_satellite_3d)。

關鍵字：向日葵衛星

Abstract

Traditional satellite cloud imageries are often presented in a 2D figure. To enhance visual effects and add dimensions for displaying more information in cloud imagery, the National Science and Technology Center for Disaster Reduction (NCDR) has developed a 3D rendering core program. This program uses data from the Japanese Himawari geostationary satellite to generate 3D cloud images. This stereoscopic approach allows cloud information to be displayed more intuitively, providing a realistic 3D effect akin to true-color visible light cloud imageries. The 3D rendering program allows arbitrary settings for the camera's position, orientation, and focal length. For lighting, users can freely set the light source's position, direction, intensity, and color. The surface of model objects can be adjusted for transparency, and react to the effects of scattering and reflection of light sources, as well as surface texturing.

The NCDR has adopted the Advanced Himawari Imager Cloud Science Data Retrieval Package (AHICSDRP) developed by Academia Sinica. This package can retrieve various cloud micro-physical and optical products from the Himawari satellite's observations. The 3D integrated retrieved satellite cloud imagery involves using the retrieved cloud-top heights for 3D cloud object modeling and fitting the transparency of 3D cloud objects with retrieved cloud optical depth. The 3D integrated retrieved satellite cloud imageries are automatically updated every 10 minutes and displayed on the "3D Cloud Images" page of the WATCH website of the NCDR.

Key words : Himawari geostationary satellite