



High-resolution cloud-top advection tracking

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Cloud top advection has proved an important input to cloud development studies and to satellite precipitation retrieval algorithms. This paper describes an algorithm designed to track 2D cloud-top advection to near-pixel resolutions from geostationary satellite imagery. The algorithm is based on the progressive deformation of a sequence of quadrilateral meshes, defined at increasingly high spatial resolutions. The resulting product links each cloudy pixel in the current image to a pixel location in the previous image corresponding to an equivalent location within the same cloud. It thus resembles a high resolution cloud-derived wind field but explicitly incorporates the effects of cloud growth, deformation and dispersal.

The hierarchical nature of the algorithm, operating at multiple spatial scales, makes it robust with respect to large displacements in the cloud field. This robustness is combined with a pixel scale precision (typically accurate to within two pixels) and is gained without incurring a significant additional computational overhead. This combination makes the algorithm particularly suitable for processing long sequences of operational geostationary imagery that may contain significant inter-image gaps of up to an hour.