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A new APOLLO daytime over land algorithm for computing convective cloud composites over the Iberian Peninsula and Balearic Islands

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A new Advanced Very High Resolution Radiometer (AVHRR) Processing scheme Over cLouds, Land and Ocean (APOLLO) daytime over land algorithm is presented to derive accurate convective cloud composites over the Iberian Peninsula and Balearic Islands, Spain. APOLLO was designed to process AVHRR HRPT data as well as Local Area Coverage and Global Area Coverage data over Western Europe and the North Atlantic. This cloud analysis tool has been modified and extended by other researchers. The original daytime over land scheme (solar elevation is greater than 5º) was modified and presented here for computing cloud detection for both NOAA-17 and NOAA-16/AVHRR data. The algorithm consists of four spectral tests applied to each pixel and the fixed or constant thresholds have been successfully tested to be functional during the eight-months March-October (central months of the warm season). Therefore, the quality characteristics are the same for the entire data set. The Test 1 corresponds to the snow-ice detection; Test 2 is the thermal infrared test; Test 3 is the albedo or visible test, and Test 4 is the Q ratio NIR/VIS. The algorithm discretizes all AVHRR data into three groups called cloud-free, cloudy and snow-ice. The algorithm identifies a pixel as cloudy if at least two tests (Test 2, 3 or 4) prove positive. The high-resolution (1.1 km) cloud mask is obtained by subtracting snow-ice pixels from cloudy ones. A detailed description of the good and accurate high-resolution cloud test and results obtained are presented, and the problems detected for each test

are discussed. The new APOLLO algorithm enables the routine production of various products. For example, the convective cloud composites become a valuable regional climatological tool for forecasters to use in detecting the location and strength of convection associated with sea breeze development under differing synoptic regimes. The cloud frequency results can be used in short-term forecasts.