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UNIVERSITY OF KANSAS
ERTS DETAILED IMAGE INTERPRETATION REPORT

CRINC DIIR No. 2264-5
Date Prepared May 9, 1973

Subject: Identification of basic cloud types from ERTS imagery.

Subject Geographic Coordinates: NA
NASA Test Site No.: NA

NASA Image Descriptors: Cumulus, Cumulonimbus Congestus, Towering Cumulonimbus Congestus, Stratus-Stratocumulus, Altostratus-Altocumulus, Cirrostratus, Cirrus.

Report Summary: It was found that seven basic cloud types could be detected from ERTS imagery. Each type exhibited characteristics that made them distinct. Suitable examples of each type were chosen, described, and a cloud identification item-index key prepared.

(E73-10977) IDENTIFICATION OF BASIC CLOUD TYPES FROM ERTS IMAGERY (Kansas Univ. Center for Research, Inc.) 6 p HC $3.00 CSCL 04B
N73-30316
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G3/13 00977

Imagery References

CRINC Image No.	NASA Image ID Block	Subject Image Coordinates X	Y	Cloud Cover	Image Quality
MP00049	1022-16393-4	NA	NA	NA	GOOD
MP00132	1039-16332-5	NA	NA	NA	GOOD
MP00221	1078-16513-5	NA	NA	NA	GOOD
MP00227	1074-16282-4	NA	NA	NA	GOOD
MP00169	1060-16505-4	NA	NA	NA	GOOD
MP00157	1077-16445-5	NA	NA	NA	GOOD
MP00238	1096-16512-5	NA	NA	NA	GOOD

Map References: NA

Digital Data Used: Yes ___ No XX

Image Analyst: James J. Ash (James J. Ash)
Principal Investigator: Donald R. Williams for Stanley Morain

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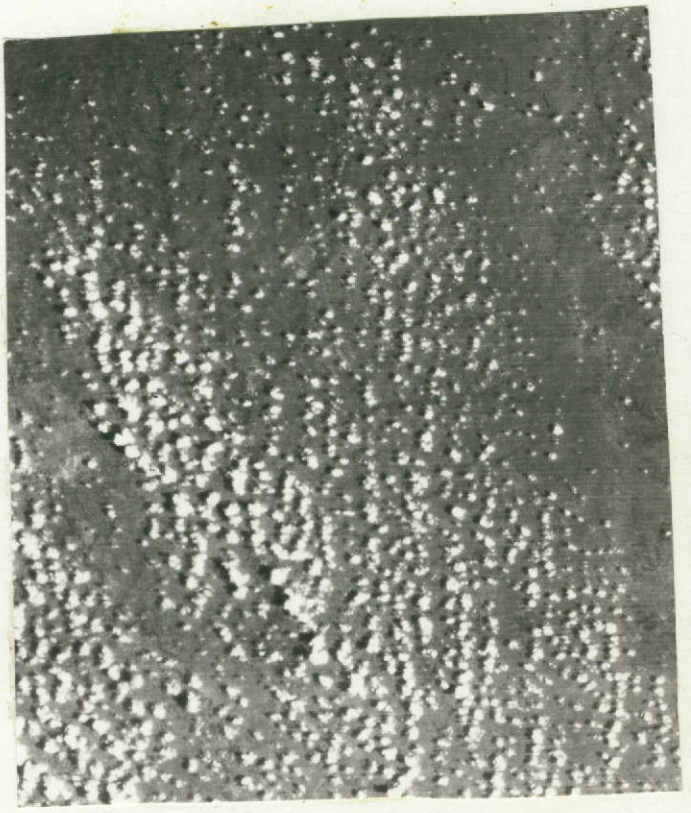
User ID No.: U664

Seven basic cloud types can be detected from ERTS imagery. In analyzing the images, it was found that each cloud type had distinct features that set them apart from the other types. A cloud identification item-index key was prepared from suitable examples of each type accompanied with a description.

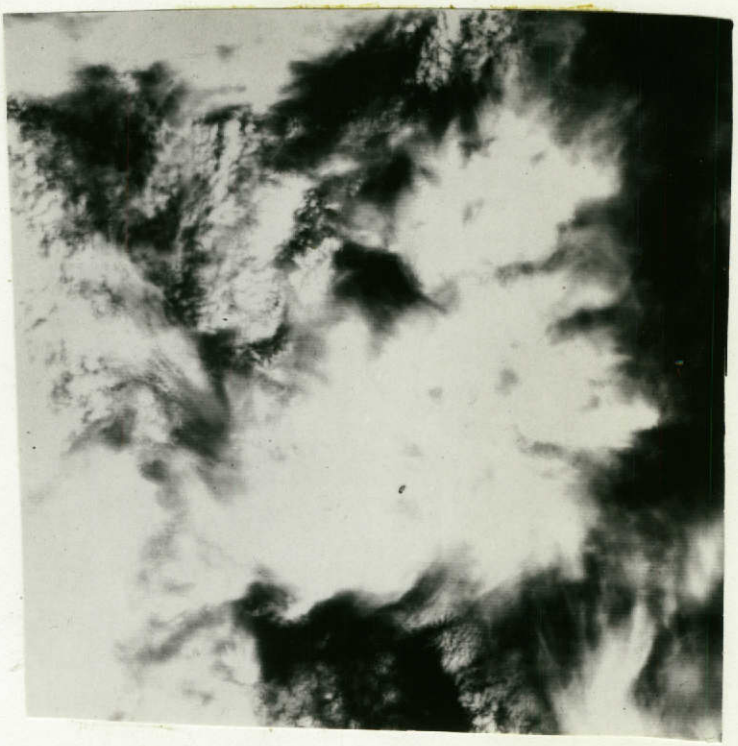
The item-index key was prepared on the basis of general appearance of cloud, and the height of cloud in relation to it's shadow, when visible. If no shadow was present, relative height with other clouds could be determined by the appearance of one type superimposed on a second type. Appearance was distinctly different for each type, varying from opaque white masses to thin, linear transparent clouds. On the basis of these observations, seven types were identified.

ERTS CLOUD IDENTIFICATION



CUMULUS: Cumulus clouds and scattered cumulus appear as small scale white dots. Occasionally cumulus can form in rows, but usually seem sporadic. Since there are no clouds that form at a lower altitude than the cumulus, land can almost always be seen below. Shadows are often cast on the ground, but do not extend far beyond the cloud due to its low altitude. These clouds appear in connection with any synoptic system but are most frequently associated with high pressure following a cold front.
NASA ERTS E-1022-16393-4 01

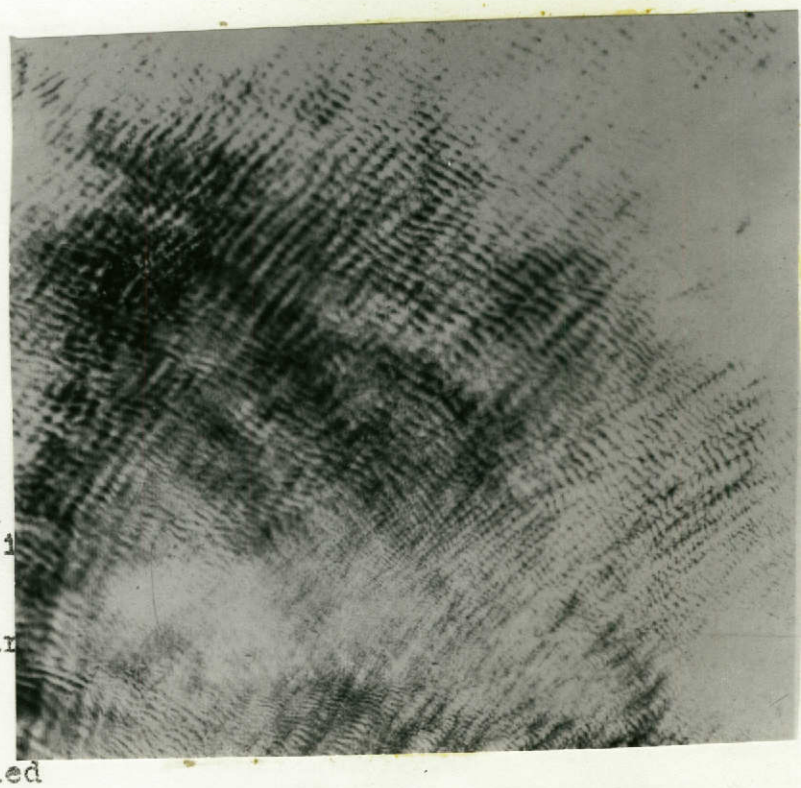
CUMULONIMBUS CONGESTUS: Appearing as a large conglomeration of scattered cumulus, cumulonimbus congestus is an indication of showers and thunderstorm activity associated with a front or squall line. The cloud features usually can be seen, since the cloud has not yet developed to an altitude high enough to form a cirrus plume. These formations cast shadows on the ground below, when visible, but the shadows do not extend far due to the low altitude of the cloud.
NASA ERTS E-1039-16332-5 01



TOWERING CUMULONIMBUS: A large white congestion of cumulus clouds, blurred in some areas would indicate the development of a towering cumulonimbus formation. These clouds have formed to a high enough altitude to form a cirrus 'anvil-top'. The cirrus appears immediately above and downwind for some distance of the cumulonimbus, often indicating the upper wind direction. The towering cumulonimbus occurs most frequently with frontal and squall lines, and can be an indicator of severe weather. Shadows are cast on the ground, when visible, but do not extend far, due to the low altitude of the cloud.
NASA ERTS E-1077-16445-5 01

STRATUS-STRATOCUMULUS: Large scale coverage can be often formed by stratus or stratocumulus clouds. These low altitude clouds are most frequently associated with a cold or warm front, but also can occur from large scale convection. These appear as either close set cumulus clouds or as one continuous cloud band. Shadows do not extend far from these clouds due to low altitude. Lines can appear in these large cloud bands, sometimes an indicator of low altitude wind direction.
NASA ERTS E-1096-16512-5 1

ALTOSTRATUS-ALTOCUMULUS: Appearing as a conglomeration of globules or as a continuous cloud sheet, altocumulus or altostratus can be difficult to distinguish from stratus or stratocumulus unless lower clouds are present. An indication of altostratus or altocumulus may be shadows cast on lower clouds or ground, or lines of altocumulus may contrast with a stratus layer below. Shadow displacement from the cloud may be slightly farther than stratus or cumulus clouds, also. Alto stratus and altocumulus are generally associ with frontal activity, and generally the only type to contain open and closed cellular patterns, the former being a cumulus globule encircled by clear air; the latter being a small area of clear air encircled by clouds. These small formations link together to form a large, cross-patch sheet of clouds.
NASA ERTS E-1078-16513-5 01



CIRROSTRATUS: A widespread layer, appearing blurred from the satellite view, is generally cirrostratus. These shields are usually found in advance of a cold or warm front. Their high altitude is evident by large shadow displacement on the ground or lower clouds, when visible. Cirrostratus often have streaks within them, indicating upper wind direction. Small cirrostratus sheets can be caused by local high altitude convection, however
NASA ERTS E-1074-16282-4 01

CIRRUS: Thin wispy cirrus clouds appear most frequently in high pressure areas, or far in advance of a frontal zone. These high altitude clouds are distinct in that they often are somewhat transparent, and cast high shadows on the ground and lower clouds. They can appear in lines, rows or streaks and often form parallel to the upper wind direction.
NASA ERTS E-1060-16505-4 02