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AGRICULTURE/FORESTRY
HYDROLOGY

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Mekong Secretariat
c/o ESCAP Sala Santitham
Bangkok, Thailand

December 1975

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LISTING OF NASA THESAURUS TERM CHANGES SINCE SEPTEMBER 1971

The attached listing consists of 1229 postable and 425 non-postable terms added, deleted, or changed in the NASA Thesaurus between September 1971, the publication date of the NASA Thesaurus Alphabetical Update, NASA-SP-7040, and a cutoff date of October 31, 1975. Each nonpostable term is followed by a "USE" designation referring to a postable term. Some postable terms may be followed by explanatory status change designations. An asterisk precedes entries added since the cumulative listing of May 15, 1975.

The NASA Thesaurus contains 18580 terms of which 15200 are postable and 3380 are nonpostable. The next cumulative listing of Thesaurus term changes is scheduled for May 1976.

NASA THESAURUS TERM CHANGES SINCE PUBLICATION OF NASA SP-7040, SEPTEMBER

A-9 AIRCRAFT			
A-10 AIRCRAFT			
* ABM			
* USE APOGEE BOOST MOTORS			
ACLINAL VALLEYS	DELETED		
* ACOUSTIC SOUNDING			
ACOUSTICAL HOLOGRAPHY			
ACOUSTO-OPTICS			
ACTIVE GLACIERS			
USE GLACIERS			
ACTIVE VOLCANOES			
USE VOLCANOES			
* ADENOSINE DIPHOSPHATE			
* ADENOSINE DIPHOSPHATE (ADP)			
(CHANGED TO ADENOSINE DIPHOSPHATE)			
* ADENOSINE TRIPHOSPHATE			
* ADENOSINE TRIPHOSPHATE (ATP)			
(CHANGED TO ADENOSINE TRIPHOSPHATE)			
ADIRONDACK MOUNTAINS (NY)			
ADOLF FLATS			
USE FLATS (LANDFORMS)			
* ADP			
* USE ADENOSINE DIPHOSPHATE			
ADRIATIC SEA			
* ADVANCED AIRBORNE COMMAND POST			
* USE F-4A AIRCRAFT			
ADVANCED EVA PROTECTION SYSTEMS			
USE AEPS			
ADVANCED RECONN ELECTRIC SPACECRAFT			
* ADVANCED TECHNOLOGY LIGHT TWIN			
* USE PA-34 SENECA AIRCRAFT			
ADVANCING GLACIERS			
USE GLACIERS			
ADVANCING SHORELINES			
USE BEACHES			
AEPS			
AERIAL IMAGERY			
USE AERIAL PHOTOGRAPHY			
AERODYNAMIC INTERFERENCE			
AERONAUTICAL SATELLITES			
AEROQUATIC VEHICLES			
* AEROSAT SATELLITES			
AFRICAN RIFT SYSTEM			
AIMP-D			
USE EXPLORER 33 SATELLITE			
AIME-1			
USE EXPLORER 33 SATELLITE			
AIMP-2			
USE EXPLORER 35 SATELLITE			
AIR BAG RESTRAINT DEVICES			
AIR LAND INTERACTIONS			
AIR SEA INTERACTIONS			
USE AIR WATER INTERACTIONS			
AIR QUALITY			
AIR SEA ICE INTERACTIONS			
AIR WATER INTERACTIONS			
* AIRBORNE SURVEILLANCE RADAR			
* AIRBORNE WARNING AND CONTROL SYSTEM			
* USE AWACS AIRCRAFT			
AIRCRAFT MANEUVERS			
AIRCRAFT SURVIVABILITY			
AIRFIELDS			
USE AIRPORTS			
ALADIN 2 AIRCRAFT			
ALBANIA			
ALPALPA			
ALGAL BLOOM			
USE ALGAE			
ALKALI FLATS	DELETED		
ALL-WEATHER LANDING SYSTEMS			
* ALLEGHENY PLATEAU (US)			
ALLUVIAL CONES	DELETED		
ALLUVIAL FANS	DELETED		
ALLUVIAL FLATS	DELETED		
ALLUVIAL PLAINS	DELETED		
ALLUVIAL TERRACES	DELETED		
ALLUVIUM			
ALPHA JET AIRCRAFT			
ALPS MOUNTAINS (EUROPE)			
ALTOCUMULUS CLOUDS	DELETED		
AMAZON REGION (SOUTH AMERICA)			
AMORPHOUS SEMICONDUCTORS			
ANACLINAL STREAMS	DELETED		
ANACLINAL VALLEYS	DELETED		
ANALYSIS OF VARIANCE			
ANDES MOUNTAINS (SOUTH AMERICA)			
ANDORRA			
ANGINA PECTORIS			
ANGIOGRAPHY			
ANIK A			
ANIK B			
* ANIK C			
* USE ANIK 3			
* ANIK 3			
ANNULAR DRAINAGE PATTERNS	DELETED		
ANOMALIES			
CHANGED TO POSTABLE			
ANOMALOUS TEMPERATURE ZONES			
ANS			
USE ASTRONOMICAL NETHERLANDS SATELLITE			
ANTARCTIC ENVIRONMENT			
USE ICE ENVIRONMENTS			
ANTICLINAL MOUNTAINS	DELETED		
ANTICLINAL VALLEYS	DELETED		
ANTICLINES			
ANTICLINORIA			
USE ANTICLINES			
ANTIREFLECTION COATINGS			
ANVIL CLOUDS			
* APOGEE BOOST MOTORS			
APOLLO SOYUZ TEST PROJECT			
APOLLO 17 FLIGHT			
APPALACHIAN MOUNTAINS (NORTH AMERICA)			
* APPLICATIONS EXPLORER SATELLITES			
APPLICATIONS TECHNOLOGY SATELLITES			
USE ATS			
AQUIFERS			
ARABIAN SEA			
ARCHAEOLOGY			
ARCHIPELAGOES			
ARCTIC ENVIRONMENTS			
USE ICE ENVIRONMENTS			
AREA NAVIGATION			
ARES (SPACECRAFT)			
USE ADVANCED RECONN ELECTRIC SPACECRAFT			
ARETS			
USE ARIZONA REGIONAL ECOLOGICAL TEST SITE			
ARGON-OXYGEN ATMOSPHERES			
ARID LANDS			
ARIEL 4 SATELLITE			
* ARIANE LAUNCH VEHICLE			
ARIZONA REGIONAL ECOLOGICAL TEST SITE			
ARROYOS			
ARTIFICIAL HARBORS			
ASH CONES	DELETED		
ASTP			
USE APOLLO SOYUZ TEST PROJECT			
ASTRONOMICAL NETHERLANDS SATELLITE			
* ASYNCHRONOUS MOTORS			
ATCHAFALAYA RIVER BASIN (LA)			
ATHEROSCLEROSIS			
USE ARTERIOSCLEROSIS			
* ATLIT			
* USE PA-34 SENECA AIRCRAFT			
ATMOSPHERIC WINDOWS			
ATOLL REEFS			
USE CORAL REEFS			
ATOLLS			
ATOMIC MASS			
USE ATOMIC WEIGHTS			
ATOMIC WEIGHTS			
* ATP			
* USE ADENOSINE TRIPHOSPHATE			
ATS			
ATS (SATELLITES)	DELETED		
AUGER SPECTROSCOPY			
AUTOMOBILE FUELS			
AV-8A AIRCRAFT			
USE HARRIER AIRCRAFT			
* AWACS AIRCRAFT			
AXIAL STREAMS	DELETED		
B-1 AIRCRAFT	DELETED		
BACK BAYS	DELETED		
BACKSHORES			
USE BEACHES			
BADLANDS			
BAHRAIN			
BAJA CALIFORNIA			
USE LOWER CALIFORNIA (MEXICO)			
BAJADAS			
USE FANS (LANDFORMS)			
BALI (INDONESIA)			
BALL LIGHTNING			
BALLOON-BORNE INSTRUMENTS			
BALTIC SHIELD (EUROPE)			
* BANGLADESH			
BARBADOS			
BARBED TRIBUTARIES	DELETED		

BARCHANS	
USE DUNES	
BARENTS SEA	
BARITO RIVER BASIN (INDONESIA)	
BARIUM ION CLOUDS	
BARLEY	
BARREN LAND	
BARREMS	
USE BARREN LAND	
BARRIER BARS	DELETED
BARRIER BEACHES	DELETED
BARRIER FLATS	DELETED
BARRIER ISLANDS	DELETED
BARRIER LAGOONS	DELETED
BARRIER LAKES	DELETED
BARRIER REEFS	DELETED
BARRIERS (LANDFORMS)	
BARS (LANDFORMS)	
BASIC (PROGRAMMING LANGUAGE)	
BASINS	
USE STRUCTURAL BASINS	
BATHOLITHS	
BAY ICE	
BAYHEAD BARS	DELETED
BAYHEAD BEACHES	DELETED
BAYHEAD DELTAS	DELETED
BAYMOUTH BARS	DELETED
BAYCUS	
BEAM LEADS	
BEAUFORT SEA (NORTH AMERICA)	
BEDROCK	
BEDS (GEOLOGY)	
BELTED PLAINS	DELETED
BHUTAN	
BIG BANG COSMOLOGY	
BIGHORN MOUNTAINS (MT-WY)	
BILLOW CLOUDS	DELETED
* BIODEGRADATION	
BIOLOGICAL CLOCKS	
USE RHYTHM (BIOLOGY)	
BIOREGENERATIVE LIFE SUPPORT SYSTEMS	
USE CLOSED ECOLOGICAL SYSTEMS	
* BIOSPHERE	
* CHANGED TO POSTABLE	
BIPOLAR TRANSISTORS	
BIRDFOOT DELTAS	DELETED
* BIREFRINGENT FILTERS	
BLACK HILLS (SD-WY)	
BLACK HOLES (ASTRONOMY)	
BLADDER MECHANICS	DELETED
BLADDERS (MECHANICS)	
USE DIAPHRAGMS (MECHANICS)	
BLIGHT	
BLOCK DIAGRAMS	
BLOCK ISLAND SOUND (RI)	
* BLOOD PUMPS	
BLOOD VOLUME	
* BMC	
* USE BONE MINERAL CONTENT	
BODY-WING CONFIGURATIONS	
* BOEING 747B AIRCRAFT	
* USE E-4A AIRCRAFT	
BOGS	
USE MARSHLANDS	
BOLL WEEVILS	
BOLLWORMS	
* BONE DEMINERALIZATION	
* BONE MINERAL CONTENT	
BONNEVILLE SALT FLATS (UT)	
BORON REINFORCED MATERIALS	
* BORON-EPOXY COMPOUNDS	
BOTSWANA	
BOUNDARY LAYER EQUATIONS	
BRAIDED STREAMS	DELETED
BREAKWATERS	
BREEDING (REPRODUCTION)	
BRIDGES (LANDFORMS)	
BRITISH HONDURAS	
BROKEN CLOUDS	DELETED
BROWN WAVE EFFECT	
BRUNEI	
BRUSH (BOTANY)	
BSX	
BUBBLE TECHNIQUE	
* BUBBLE MEMORY DEVICES	
BUCKET BRIGADE DEVICES	
BURUNDI	
BUTTES	
C-1A AIRCRAFT	
CAI	
USE COMPUTER ASSISTED INSTRUCTION	
CAMEROON	
CANNONBALL 2 SATELLITE	
CANTONS	
CAP CLOUDS	
CAPIES (LANDFORMS)	
CARBON FIBER REINFORCED PLASTICS	
* CARBON LASERS	
CARBON-CARBON COMPOSITES	
* CARBONACEOUS CHONDRITES	
CARETS (TEST SITE)	
USE CENTRAL ATLANTIC REGIONAL ECOL TEST SITE	
CARIBOUS	
CAROTID SINUS BODY	
CASCADE RANGE (CA-OR-WA)	
CAST ALLOYS	
CATCHMENT AREAS	
USE WATERSHEDS	
* CAUCASUS MOUNTAINS (U.S.S.R.)	
CAYS	
USE KEYS (ISLANDS)	
CDC 6400 COMPUTER	
CEDAR RAPIDS (IA)	
CENSUS	
CENTRAL AFRICAN REPUBLIC	
CENTRAL ATLANTIC REGION (US)	
CENTRAL ATLANTIC REGIONAL ECOL TEST SITE	
CENTRAL EUROPE	
CENTRAL PIEDMONT (US)	
CFRP	
USE CARBON FIBER REINFORCED PLASTICS	
CHAD	
CHANNEL MULTIPLIERS	
CHANNEL WINGS	
CHANNELTRONS	
USE CHANNEL MULTIPLIERS	
CHAOTIC CLOUD PATTERNS	
USE CLOUDS (METEOROLOGY)	
CHAPARPAL	
CHARGE COUPLED DEVICES	
CHARGE TRANSFER DEVICES	
CHEMICAL FRACTIONATION	
CHENA RIVER BASIN (AK)	
CHESAPEAKE BAY (US)	
CHIAPAS (MEXICO)	
CHINA (COMMUNIST) MAINLAND	
USE CHINESE PEOPLES REPUBLIC	
CINDER CONES	
USE CONES (VOLCANOES)	
CIRQUES (LANDFORMS)	
CIRROCUMULUS CLOUDS	
CIRROSTRATUS CLOUDS	
CIRRUS SHIELDS	
CITRUS TREES	
CLOSED BASINS	
USE STRUCTURAL BASINS	
CLOSED FAULTS	
USE GEOLOGICAL FAULTS	
CLOSED FOLDS	DELETED
* CLOUD DISPERSAL	
CLOUD STREETS	
USE CLOUDS (METEOROLOGY)	
COACHELLA VALLEY (CA)	
CLEAN ENERGY	
COAL GASIFICATION	
COAL LIQUEFACTION	
COAL UTILIZATION	
COASTAL CURRENTS	
COASTAL DUNES	
USE DUNES	
COASTAL MARSHES	
USE MARSHLANDS	
COASTAL PLAINS	
COASTAL RANGES (CA)	
COASTAL WATER	
COFFEE	
COLD FRONTS	
COLLISIONAL PLASMAS	
COLORADO PLATEAU (US)	
COLS	
USE GAPS (GEOLOGY)	
COLUMBIA RIVER BASIN (ID-OR-WA)	
COMET HEADS	
COMET NUCLEI	
COMET TAILS	
COMMERCIAL ENERGY	
* COMMONALITY (EQUIPMENT)	
COMMONNES	DELETED

COMMUNICATIONS TECHNOLOGY SATELLITE
COMPUTER ASSISTED INSTRUCTION
COMPUTER SYSTEMS DESIGN
COMPUTERIZED CONTROL
 USE NUMERICAL CONTROL
CONDITIONED REFLEXES
CONES (VOLCANOES)
CONGO (BRAZZAVILLE)
CONGO (KINSHASA)
 USE ZAIRE
CONGRESSIONAL REPORCTS
CONIFFRS
CONSEQUENT LAKES DELETED
CONSEQUENT STREAMS DELETED
CONSEQUENT VALLEYS DELETED
CONSUMABLES (SPACECRAFT SUPPLIES)
CONTACTS (GEOLOGY)
CONTINUOUS SPECTRA
CONTINUOUS WAVE LASERS
CONTROL CONFIGURED VEHICLES
CONTROL STICKS
CONVECTION CLOUDS
COOK INLET (AK)
COPERNICUS SPACECRAFT
 USE CAO 3
COPSES
COPYRIGHTS
CORAL HEADS
 USE CORAL REEFS
CORN
CCFNER FLOW
CORONARY ARTERY DISEASE
CORROSION TEST LOCPs
COS-B SATELLITE
COSMOS 381 SATELLITE
COTTON
COULEES
 USE CANYONS
COUNTER-ROTATING WHEELS
CRATONS
* CREW EXPERIMENT STATIONS
* CREW OBSERVATION STATIONS
* CREW STATIONS
* CREW WORK STATIONS
CROP IDENTIFICATION
CROPLANDS
 USE FARMLANDS
CROSS FAULTS
 USE GEOLOGICAL FAULTS
CROSSBEDDING (GEOLOGY)
CRUSTAL FRACTURES
CUBA
CUESTAS
 USE RIDGES
CULTURAL RESOURCES
CURIUM COMPOUNDS
CURRENT CONVERTERS (AC TO DC)
CURRENTS (OCEANOGRAPHY)
 USE WATER CURRENTS
CUSPS (LANDFORMS)
CYCLOGENESIS
CYPRUS
D-2 SATELLITES
D-2E SATELLITE
 USE D-2 SATELLITES
* DAD EXPLORER
* USE DUAL AIR DENSITY EXPLORER
DAHOMY
DATA BASES
DATA BUSES
 USE CHANNELS (DATA TRANSMISSION)
DATA COLLECTION PLATFORMS
DATA COMPRESSION
DATA COMPRESSORS DELETED
DATA CONVERSION ROUTINES
DDP COMPUTERS
DDP 516 COMPUTER
DEATH VALLEY (CA)
DECIDUOUS TREES
DEEPWATER TERMINALS
DEFOLIATION
DEFORESTATION
DELAWARE RIVER BASIN (US)
DELPHI METHOD (FORECASTING)
DELTAIC COASTAL PLAINS DELETED
DELTA
DENDRITIC DRAINAGE
 USE DRAINAGE PATTERNS
DENSE FLASHES

* DENSITY WAVE MODEL
DEPRESSIONS (TOPOGRAPHY)
 USE STRUCTURAL BASINS
DESERTLINE
DESIGN ANALYSIS
DIADEME SATELLITES
 REPLACES DIADEME SATELLITE
DIASTOLIC PRESSURE
DIELECTRIC CONSTANT
 USE PERMITTIVITY
DIESEL FUELS
DIFFRACTION LIMITED CAMERAS
DIKES
 USE ROCK INTRUSIONS
DIODE-TRANSISTOR-LOGIC INTEG CIRCUITS
 USE DTL INTEGRATED CIRCUITS
DISEASED VEGETATION
 USE FLIGHT
DISTRIBUTED PARAMETER SYSTEMS
DIVIDES (LANDFORMS)
DOMESTIC SATELLITE COMMUNICATIONS SYSTEMS
DOMINICA
DOMINICAN REPUBLIC
* DOPED CRYSTALS DELETED
DORMANT VEGETATION
DRAINAGE PATTERNS
DROP TRANSFER
DROUGHT
DROUGHT CONDITIONS
 USE DROUGHT
DRUMLINS
 USE GLACIAL DRIFT
DTL INTEGRATED CIRCUITS
* DUAL AIR DENSITY EXPLORER
DUNES
DUST STORMS
DYE LASERS
DYSPROSIUM COMPOUNDS
* E-2A AIRCRAFT
* E-3A AIRCRAFT
* E-4A AIRCRAFT
EAI 8400 COMPUTER
EAI 8900 COMPUTER
EARTH RESOURCES EXPERIMENT PACKAGE
 USE EREP
EARTH RESOURCES INFORMATION SYSTEM
EARTH RESOURCES OBSERVATION SATELLITES
 USE EROS (SATELLITES)
EARTH RESOURCES SURVEY PROGRAM
EARTH RESOURCES TECHNOLOGY SATELLITE A
 USE LANDSAT 1
EARTH RESOURCES TECHNOLOGY SATELLITE B
 USE LANDSAT 2
EARTH RESOURCES TECHNOLOGY SATELLITE C
 USE LANDSAT C
EARTH RESOURCES TECHNOLOGY SATELLITE D
 USE LANDSAT D
EARTH RESOURCES TECHNOLOGY SATELLITE E
 USE LANDSAT E
EARTH RESOURCES TECHNOLOGY SATELLITE F
 USE LANDSAT F
EARTH RESOURCES TECHNOLOGY SATELLITE 1
 USE LANDSAT 1
EARTH RESOURCES TECHNOLOGY SATELLITES
 USE LANDSAT SATELLITES
EARTH TIDES
EARTHQUAKE DAMAGE
EAST GERMANY
EBF
 USE EXTERNALLY BLOWN FLAPS
ECHELON FAULTS
 USE GEOLOGICAL FAULTS
ECHOCARDIOGRAPHY
ECONOMIC DEVELOPMENT
ECOSYSTEMS
* ECS
* USE EUROPEAN COMMUNICATIONS SATELLITE
EFFECTIVE PERCEIVED NOISE LEVELS
EL SALVADOR
* ELECTRIC AUTOMOBILES
* ELECTRIC MOTOR VEHICLES
ELECTRIC POWER SUPPLIES
ELECTROMAGNETIC NOISE MEASUREMENT
ELECTROMAGNETIC SURFACE WAVES
* ELECTRON PUMPING
ELECTRONYSTAGMOGRAPHY
ELLIPTICAL GALAXIES
EMR 6050 COMPUTER
END MORAINES

USE GLACIAL DRIFT
 ENERGY CONSERVATION
 ENERGY CONSUMPTION
 ENERGY POLICY
 ENERGY TECHNOLOGY
 ENERGY TRANSFER
 SCOPE NOTE IS DELETED
 ENCLAND
 ENGLISH CHANNEL
 ENTRENCHED STREAMS DELETED
 ENVIRONMENT EFFECTS
 ENVIRONMENT MANAGEMENT
 ENVIRONMENT PROTECTION
 ENVIRONMENTAL MONITORING
 ENVIRONMENTAL QUALITY
 ENVIRONMENTAL SURVEYS
 EOLE SATELLITES
 EOS-A
 USE LANDSAT E
 EOS-B
 USE LANDSAT F
 EPNL
 USE EFFECTIVE PERCEIVED NOISE LEVELS
 EQUALIZERS (CIRCUITS)
 EREP
 EROS (SATELLITES)
 ERROR CORRECTING CODES
 USE LANDSAT SATELLITES
 ERTS
 ERTS-A
 USE LANDSAT 1
 ERTS-B
 USE LANDSAT 2
 ERTS-C
 USE LANDSAT C
 ERTS-D
 USE LANDSAT D
 ERTS-E
 USE LANDSAT E
 ERTS-F
 USE LANDSAT F
 * ESA
 * USE EUROPEAN SPACE AGENCY
 * ESA SATELLITES
 ESCARPMENTS
 ESKERS
 USE GLACIAL DRIFT
 * ESRO
 * USE EUROPEAN SPACE AGENCY
 ESRO 4 SATELLITE
 ESTONIA
 ETHIOPIA
 EUROPA
 * EUROPEAN COMMUNICATIONS SATELLITE
 * EUROPEAN SPACE AGENCY
 * EUROPEAN SPACE RESEARCH ORGANIZATION
 * USE EUROPEAN SPACE AGENCY
 * EUROPEAN SPACE RESEARCH ORGANIZATION SAT
 * USE ESA SATELLITES
 EUTROPHICATION
 EVAPOTRANSPIRATION
 EVERGLADES (FL)
 * EXOSAT SATELLITE
 EXPENDABLE STAGES (SPACECRAFT)
 EXPERIMENTAL STCL TRANSPORT RSCH AIRPLANE
 USE QUESTOL
 EXPLORER 47 SATELLITE
 * EXPLORER 48 SATELLITE
 EXPLORER 49 SATELLITE
 EXPLORER 50 SATELLITE
 * EXPLORER 51 SATELLITE
 * EXPLORER 53 SATELLITE
 * EXPLORER 54 SATELLITE
 * EXTERNAL STORE SEPARATION
 * EXTERNAL TANKS
 EXTERNALLY BLOWN FLAPS
 EXTRAGALACTIC MEDIA
 USE INTERGALACTIC MEDIA
 EXTRAGALACTIC RADIO SOURCES
 EXTRASOLAR PLANETS
 EXTRATERRESTRIAL COMMUNICATION
 EXTRATERRESTRIAL ROVING VEHICLES
 USE ROVING VEHICLES
 EXTRAVEHICULAR MOBILITY UNITS
 EXTREMELY LOW FREQUENCIES
 F-114 AIRCRAFT DELETED
 F-16 AIRCRAFT
 F-17 AIRCRAFT
 FAIRFAX (VA)

FALLOW FIELDS DELETED
 FANS (LANDFORMS)
 FARMLANDS
 FAST FOURIER TRANSFORMATIONS
 FEASIBILITY ANALYSIS
 FEATHER RIVER BASIN (CA)
 FEDERAL REPUBLIC OF GERMANY
 USE GERMANY
 FERRIC IONS
 FERRITIC STAINLESS STEELS
 FERROFLUIDS
 FFT
 USE FAST FOURIER TRANSFORMATIONS
 FIBER ORIENTATION
 FIBONACCI NUMBERS
 FILAMENT WOUND CONSTRUCTION
 USE FILAMENT WINDING
 FILE MAINTENANCE (COMPUTERS)
 FILTER WHEEL INFRARED SPECTROMETERS
 FINGER LAKES DELETED
 FIORDS
 FIRE DAMAGE
 FIREBREAKS
 FISSILE FUELS
 FIXED POINT ARITHMETIC
 FLAME RETARDANTS
 FLAME SPECTROSCOPY
 FLATS (LANDFORMS)
 * FLIGHT COMPUTERS
 * USE AIRBORNE/SPACEBORNE COMPUTERS
 FLOOD DAMAGE
 FLOOD PLAINS
 FLUIDIC CIRCUITS
 FLYING EJECTION SEATS
 * FOG DISPERSAL
 FOLDS (GEOLOGY)
 FORENSIC SCIENCES
 USE LAW (JURISPRUDENCE)
 FOREST FIRE DAMAGE DELETED
 FOREST FIRES
 FOREST MANAGEMENT
 FOSSIL FUELS
 FREEZE DRYING
 FRENCH SATELLITES
 FREON
 FRICTION WELDING
 FRONTAL WAVES
 FROST DAMAGE
 FROZEN LAKES DELETED
 FROZEN SOILS
 USE PERMAFRST
 FUNCTIONALS
 * FUSION REACTORS
 * FUSION-FISSION HYBRID REACTORS
 FV-12A AIRCRAFT
 GABON
 GADOLINIUM ISOTOPES
 GALACTIC CLUSTERS
 GALACTIC NUCLEI
 GALACTIC ROTATION
 GALACTIC STRUCTURE
 GALLIUM OXIDES
 GAMEIA
 * GAMMA RAY ABSORPTION METRY
 * GAMMA RAY ABSORPTION
 GAPS (GEOLOGY)
 GARP
 USE GLOBAL ATMOSPHERIC RESEARCH PROGRAM
 GARP ATLANTIC TROPICAL EXPERIMENT
 GAS COOLED FAST REACTORS
 GASDYNAMIC LASERS
 GASIFICATION
 GASP
 USE GLOBAL AIR SAMPLING PROGRAM
 GATE (EXPERIMENT)
 USE GARP ATLANTIC TROPICAL EXPERIMENT
 GE COMPUTERS
 GE 235 COMPUTER
 GENERAL ELECTRIC COMPUTERS
 USE GE COMPUTERS
 * GEODESIC LINES
 GEOPRACTURES
 USE GEOLOGICAL FAULTS
 GEOL SATELLITES
 GEOLOGICAL SURVEYS
 GEOS SATELLITES (ESA)
 GEOS SATELLITES (ESRO)
 USE GEOS SATELLITES (ESA)
 GEOSTATIONARY OPERATIONAL ENVIRON SATS

REPRODUCIBILITY OF THE
 ORIGINAL PAGE IS POOR

USE GOE SATELLITES
 GEOSYNCLINES
 GEOTHERMAL ENERGY CONVERSION
 GEOTHERMAL RESOURCES
 GHANA
 GLACIAL DRIFT
 GLACIOFLUVIAL DEPOSITS
 USE GLACIAL DRIFT
 GLASS FIBER REINFORCED PLASTICS
 GLOBAL AIR POLLUTION
 GLOBAL AIR SAMPLING PROGRAM
 GLOBAL ATMOSPHERIC RESEARCH PROGRAM
 GLOBULAR CLUSTERS
 GOBI DESERT
 GOE SATELLITES
 GORGES
 USE CANYONS
 GRABENS
 USE GEOLOGICAL FAULTS
 * GRAND CANYON (AZ)
 GRASSLANDS
 GRAVEL DEPOSITS
 USE GRAVELS
 * GRAVITATIONAL LENSES
 GRAZING
 GRAZING LANDS
 USE GRASSLANDS
 GREAT BASIN (US)
 GREAT LAKES (NORTH AMERICA)
 GREAT PLAINS CORRIDOR (NORTH AMERICA)
 GREAT SALT LAKE (UT)
 GREAT SMOKY MOUNTAINS (NC-TN)
 GREEN WAVE EFFECT
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 ICE JAMS DELETED
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METEOSAT SATELLITE
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* NASA STRUCTURAL ANALYSIS PROGRAM
* USE NASTRAN
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* NASTRAN
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NUTATION DAMPERS
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OAO 2
OAO 3
OAO-A
 USE OAO 1
OAO-A2
 USE OAO 2
OAO-C
 USE OAO 3
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OATS
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OCEAN DATA PLATFORMS
 USE OCEAN DATA ACQUISITIONS SYSTEMS
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 VESTIBULAR NYSTAGMUS
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 * VIKING ORBITER 1
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 ZAIRE
 ZAMBIA

NASA THESAURUS TERMS ADDED OR CHANGED DURING DECEMBER 1975

AE-E

USE EXPLORER 55 SATELLITE

ANIK 1

ANIK A

USE ANIK 1

ATMOSPHERE EXPLORER E

USE EXPLORER 55 SATELLITE

CHINESE SPACE PROGRAMS

EXPLORER 55 SATELLITE

F-17 AIRCRAFT

MICROPROCESSORS

PHOTONICS

PICOSECOND PULSES

RCA SATCOM 1

SAS

SMALL ASTRONOMY SATELLITES

USE SAS

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TYPE II QUARTERLY REPORT

I. INTRODUCTION

The main objectives of the Mekong Committee investigations using Landsat data are as follows:

A. Short-term objectives

By both photo-interpretation and automatic data processing techniques, supported by ground truth data and field surveys, establish:

- Land use, land capability and hydrogeomorphology maps of the lower Mekong basin;
- Maps showing primary forests and deciduous forest areas;
- Maps showing consecutive flood and drainage patterns of Mekong lowlands.

B. Long-term objectives

Organise a research programme for classification of agricultural crops and land use, and for soil moisture monitoring. The test area of the lower Mekong basin covers the whole Laos and Cambodia, the North and Northeast Thailand, and the Mekong delta and the high lands of South Vietnam. The whole test area is about 600,000 sqkm.

II. TECHNIQUES

1. Data quality and delivery

For the identification of Landsat data the test area of the lower Mekong basin is defined by a convex polygon with five corners as follows:

<u>No.</u>	<u>Latitude</u>	<u>Longitude</u>
1	20° 00' N	100° 00' E
2	20° 00' N	106° 00' E
3	12° 00' N	111° 00' E
4	08° 00' N	105° 00' E
5	16° 00' N	100° 00' E

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Ten Landsat ground tracks and 55 Landsat scene frames cover the entire test area.

During the reporting period 42 frames taken by LANDSAT-2 were received, each frame consisting of one positive transparency 9.5 inch, one positive film 70 mm and one negative film 70 mm in bands 4, 5, 6 and 7.

The delivery time (between date the pictures are taken and received in Bangkok) was approximately 2 months and 20 days, which is for our purpose of resource mapping quite satisfactory.

Of the 42 frames received only 16 frames are covering the area of the lower Mekong basin. Most of the frames taken during raining season are obliterated by cloud cover (See Map 1).

2. Preparation of land use maps

The technique adopted for the preparation of land use maps is based on the conventional interpretation of the two following types of photographic products processed from Landsat imagery:

a. Black and white paper prints enlarged to 1:500,000 scale from 70 mm SYCI MSS negative transparencies were used. With the help of existing aerial photographs, topographic maps and field data, the terrain features according to their greytone levels on an overlay were identified and delineated.

- Band 4 with less contrast is of less use;
- Band 5 with good contrast is useful for the preparation of land use maps and vegetation maps;
- Band 6 and 7 are more suitable in the delineation of geologic structures, soil humidity and river systems.

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b. Diazochrome colour films at 1:1,000,000 scale made from bands 4, 5 and 7 of the 9.5 inch SYCI MSS black and white positive transparencies were also used. Composite colour is made with band 4 in yellow, band 5 in magenta and band 7 in blue. To analyse the imagery false-colour composite techniques are used with the help of a projector-viewer for colour-composite reconstruction, and with colour transparencies processed from diazochrome proofing films.

The preparation of land use maps is based mainly on black and white paper prints enlarged to 1:500,000 scale from band 5.

A further enhancement of contrast in the imagery was attempted by means of a digital slicer on equipment made available for the purpose in France. Examples of these are shown in Fig. 1, 2 and 3.

Also a technique was developed for recognizing land systems out of the imagery, each of which corresponding to recurring colour patterns and colour tones. The first phase of interpretation consisting of the delineation of the major land systems is completed and a description of each is in progress. Each land system corresponds to a geographical unit with similar characteristics in physiography and soil. As sub-classification to these larger units, the hydrology of each system is being introduced. An example of the land system mapping is attached herewith (See Map 2).

3. Research programme for computer processing of remote sensing data

It is proposed to develop a processing system for classifying the remotely sensed multispectral digital data contained on the computer compatible tapes. Programs will be written to extract the digital information on the CCT's in a unified form for printing the greytone pictures as well as statistical results. The data analysis algorithms are based on pattern recognition methods utilizing statistical decision theory. The programs will be developed to permit features classification both on signatures obtained from ground truth (supervised methods), and

on signatures derived solely from the data (unsupervised method or clustering methods). The processing system will be developed to utilize efficiently the IBM 370/145 computer at the Asian Institute of Technology (AIT).

III. ACCOMPLISHMENTS

1. Preparation of land use maps, land capability maps and hydro-geomorphology maps

It is proposed to establish these maps at 1:500,000 scale. For this purpose the areas of the lower Mekong basin is divided into 37 zones. During the reporting period 26 zones had been analysed and controlled using existing aerial photographs. It was found that the analysis of Landsat data for small scale maps (1:1,000,000 - 1:500,000) had revealed informations, most of them impossible to detect through conventional aerial photography.

The preparation of the topographic map on 1:500,000 scale to be used as base map was also completed during the reporting period. It is to be expected that the land use maps will be published in 1976.

2. Research programme for computer processing of remote sensing data

On July 1975 an agreement was signed between the Mekong Committee and the Asian Institute of Technology (AIT) for the undertaking of a research programme for computer processing of remote sensing data. A ground truth station of 100 acres was established at AIT for ground truth observations. In support of the research, the ground truth data have been collected during every passage of LANDSAT-2 since August 1975. Due to the facts that AIT is replaced its CDC 3600 computer by an IBM 370/145 computer, the research in developing the processing system has to be postponed until February 1976.

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IV. CONCLUSION

Work on LANDSAT-1 imagery is progressing according to schedule. It is hoped that in future more LANDSAT-2 data can be provided, so that the numerous gaps that still exist in the LANDSAT-1 data, available for the lower Mekong basin, will be filled. Also it will be of importance to obtain more regularly consecutive coverage of the imagery, which will be necessary for successful mapping of the hydrological characteristics of the land types of the Mekong basin.

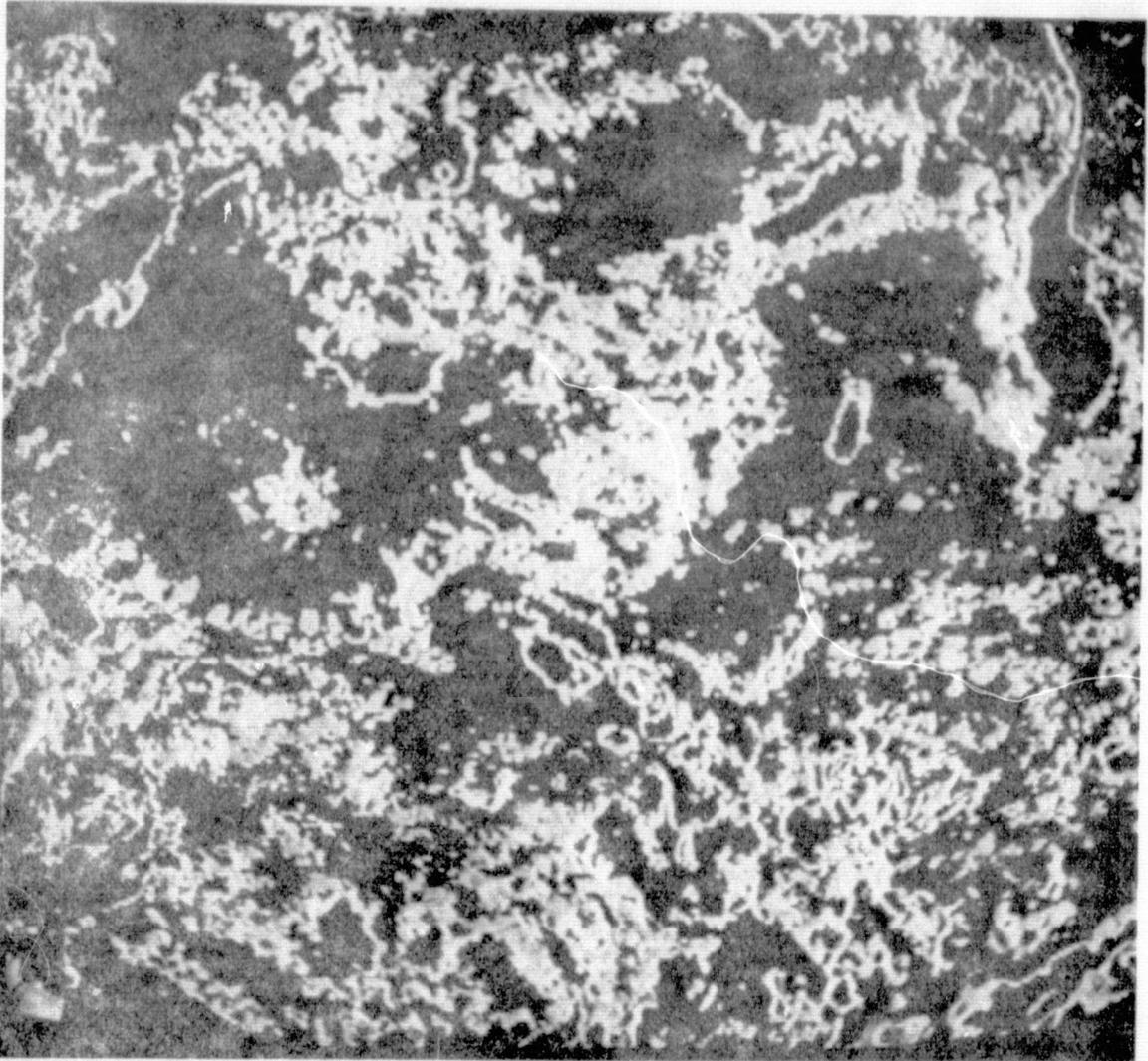


Fig. 1

Satellite frame ERTS-1 No.1202.03002 of 10 February 1973.

Band 5.

Out of the 32 energy levels, which the Digicol separates, only the blue levels 1, 2, 3, 4 have been retained. The areas separated in this way correspond to land with a high percentage of cultivation. This represents 28% of the total area covered by the frame.

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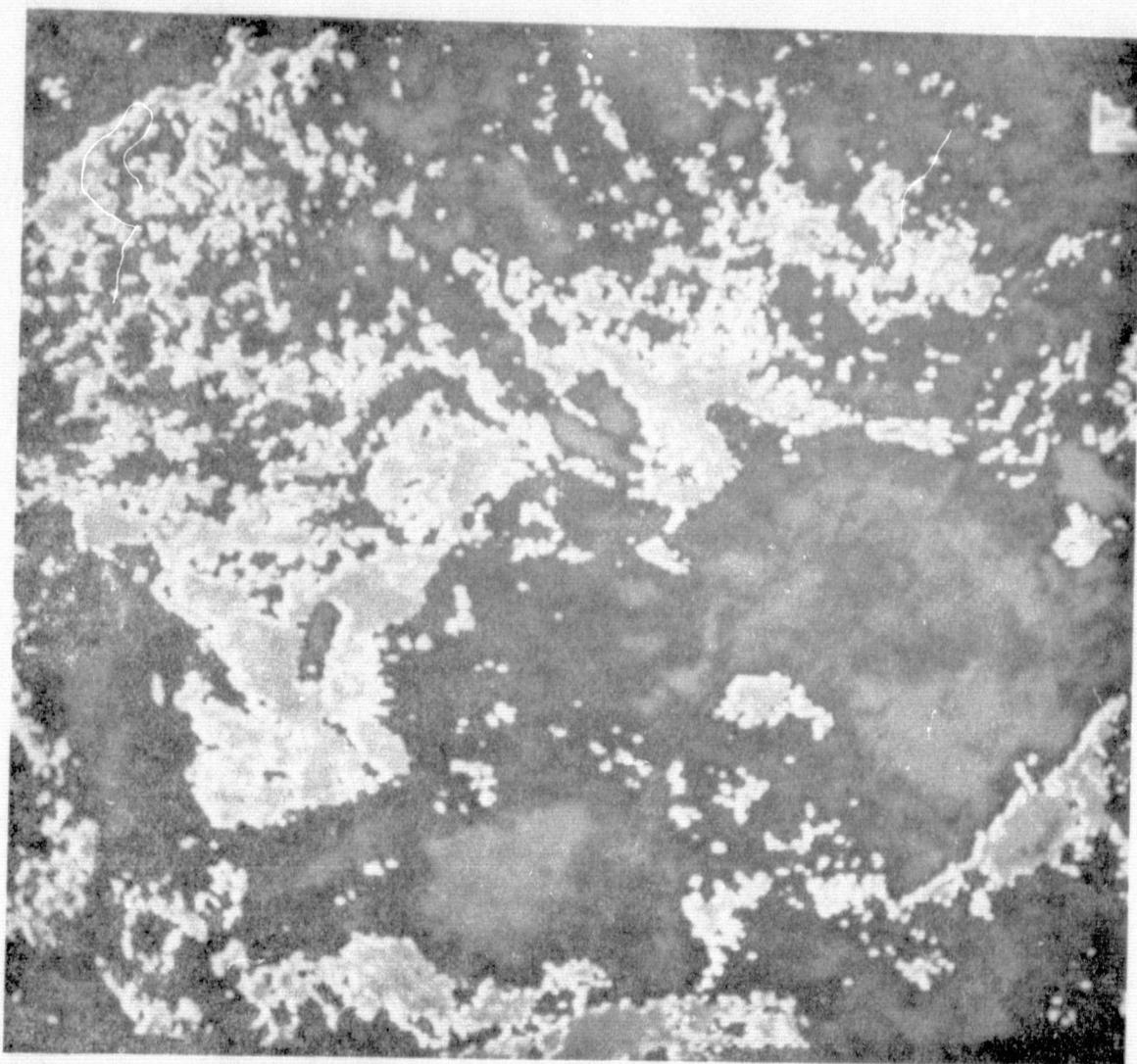


Fig. 2

Same frame as Fig. 1 but lands predominantly covered with open deciduous forest are separated. This vegetation type represents 24% of the total area of the frame.

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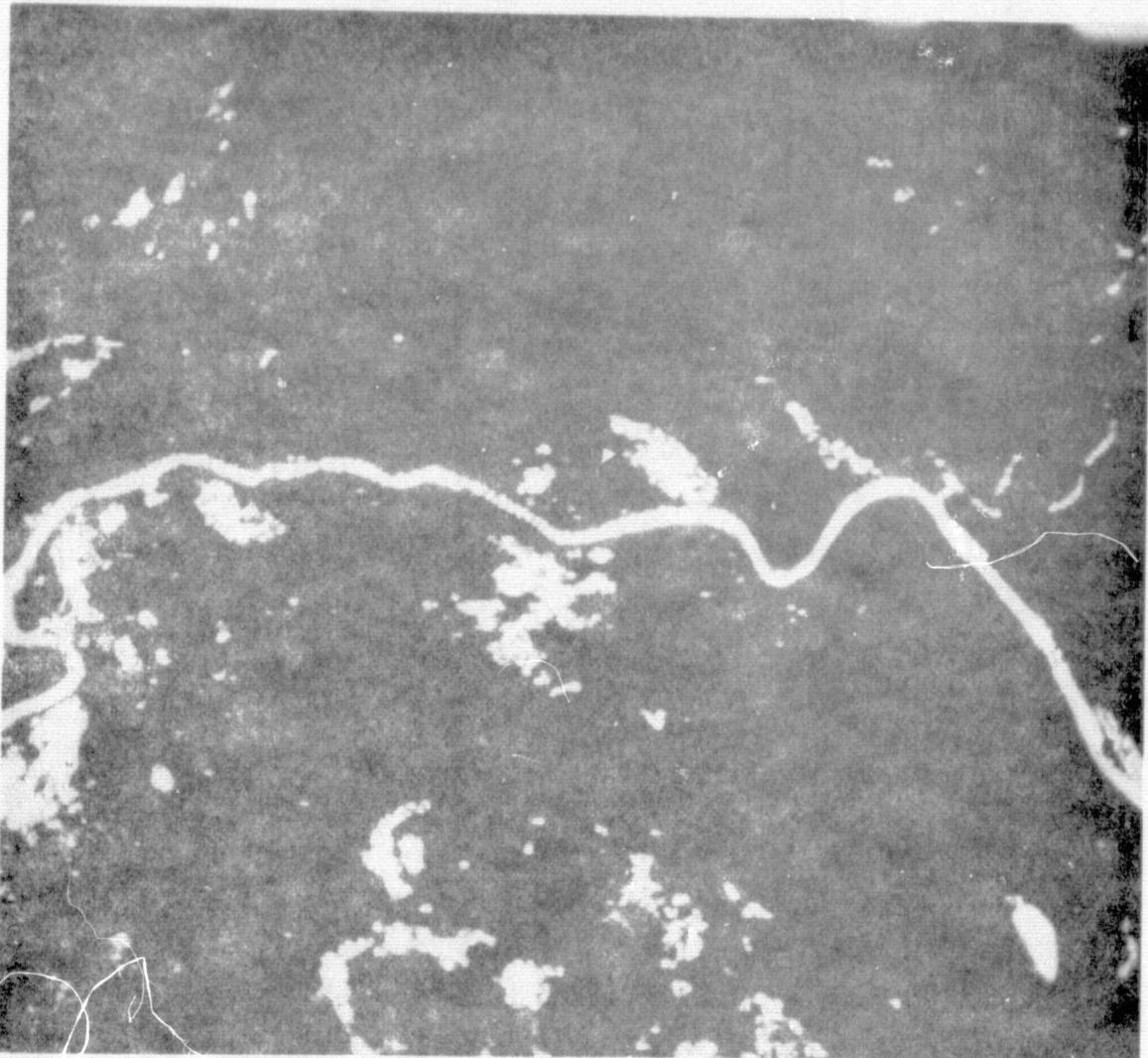


Fig. 3

The area covered by the picture is an enlargement of satellite imagery ERTS-1 No. 1148 02595 of 18 December 1972 - Band 7.

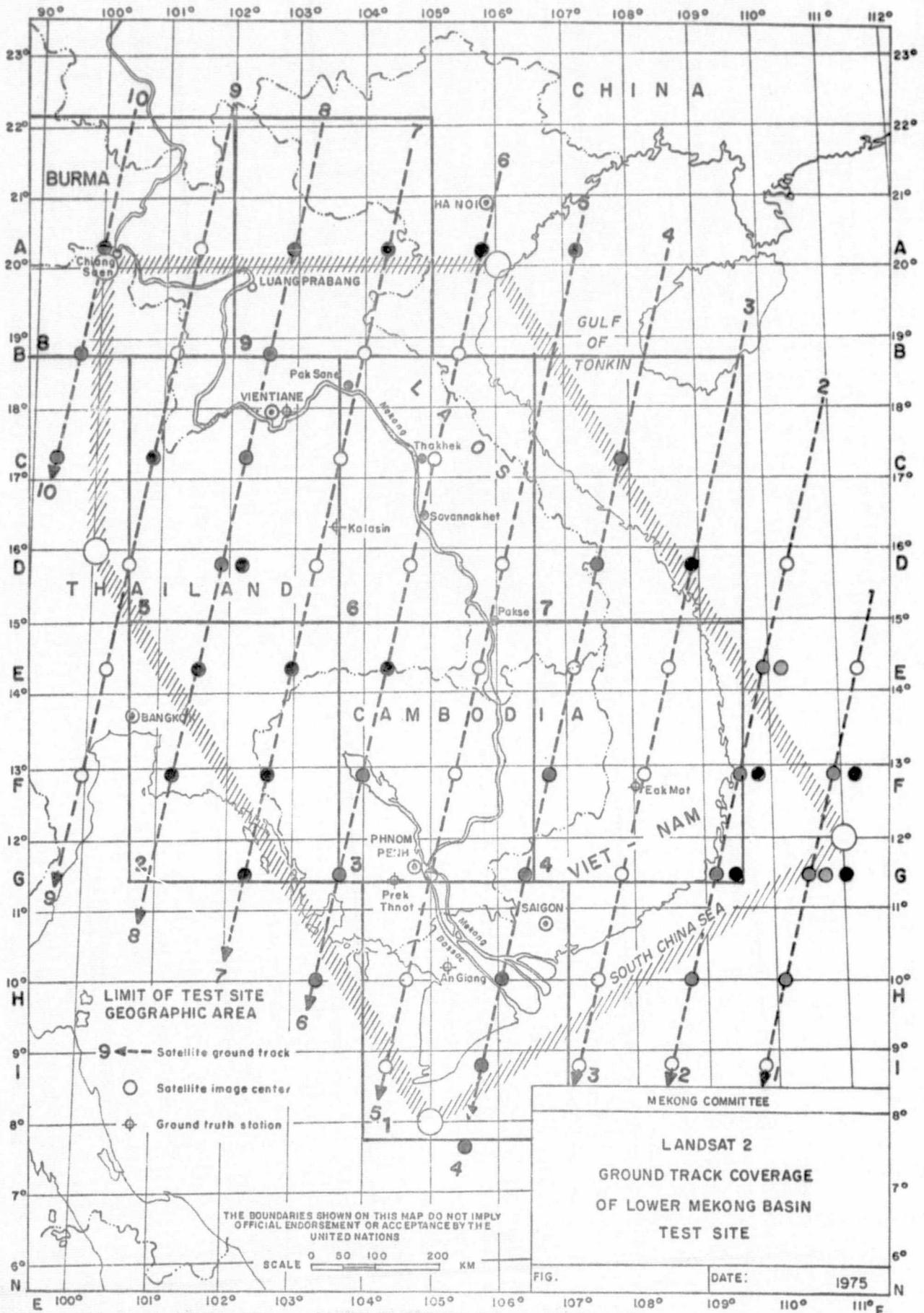
It separates humid portions in the region, between Red No.1 and Magenta No.4.

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LANDSAT 2 IMAGERY RECEIVED

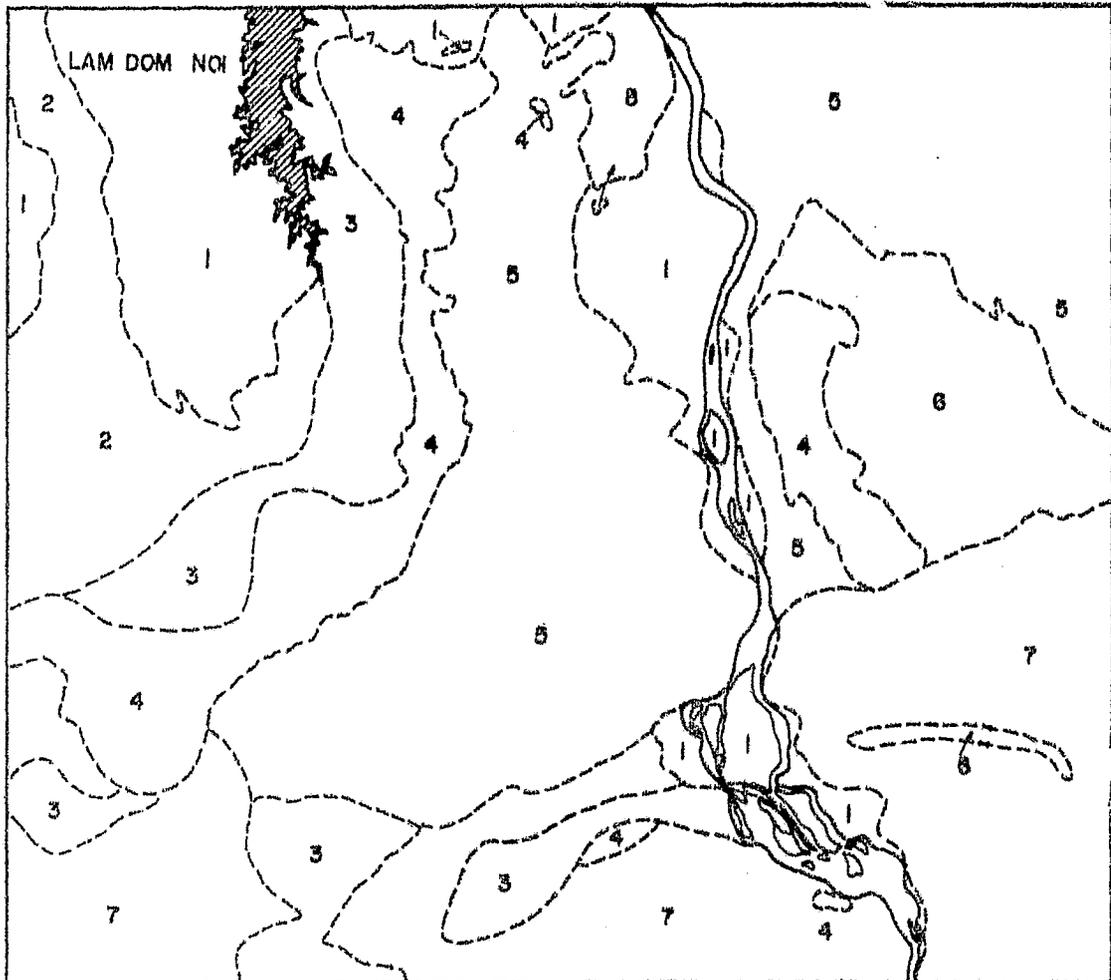
Taken in March ● May ● July ●
 April ● June ● August ●



LAND SYSTEMS

1:1,000,000

First phase preliminary interpretation



NASA ERTS E 1200 - 02494

08 Feb - 1973

LAND SYSTEMS

LEGEND

- Land system 1. Flat to undulating terrain, poorly and well drained soils.
- Land system 2. Flat to undulating terrain, well to excessively drained soils.
- Land system 3. Mainly rolling terrain with well drained soils.
- Land system 4. Hilly terrain, mainly shallow soils, well drained.
- Land system 5. Flat to gently undulating or slightly sloping terrain, mainly poorly drained soils, laterite.
- Land system 6. Dissected terrain, undulating to rolling, mainly shallow soils, well drained.
- Land system 7. Mainly flat terrain, moderately drained, shallow and deep soils.
- Land system 8. Mountainous terrain with shallow soils, well drained.