

AGRISTARS

FAMILIARIZATION BRIEFING

5 MARCH 1980



NASA



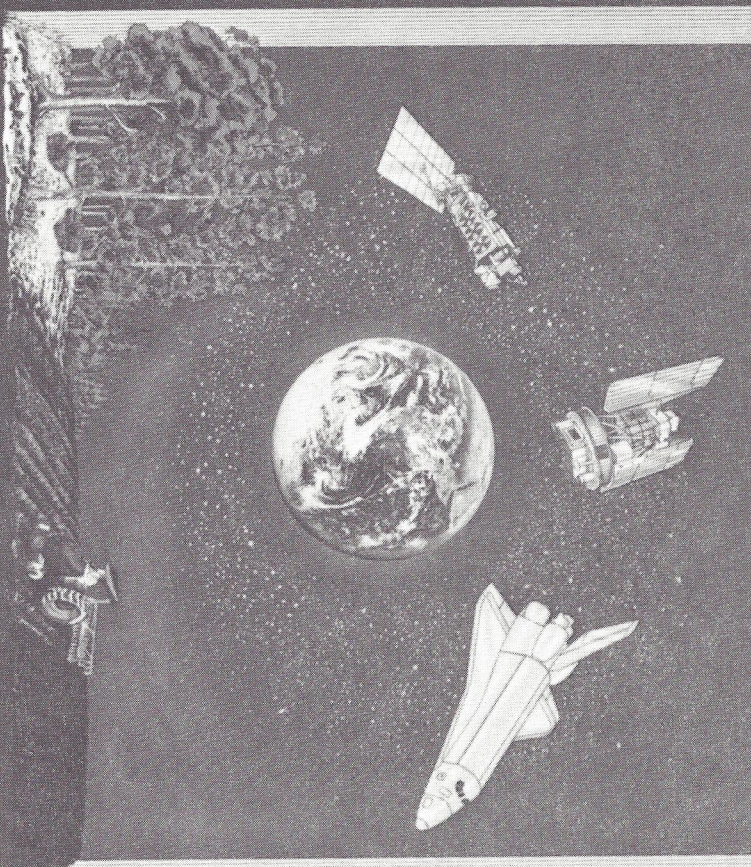
Lyndon B. Johnson Space Center
Houston, Texas 77058

Agriculture and Resources

Inventory Surveys Through

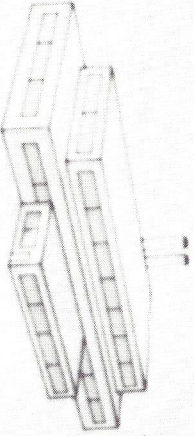
AGRISTARS

Aerospace Remote Sensing

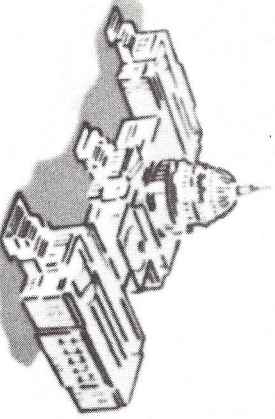


★ USDA ★ NASA ★ USDC ★ USDI ★ AID ★

USES AND USERS OF GLOBAL AGRICULTURAL INFORMATION

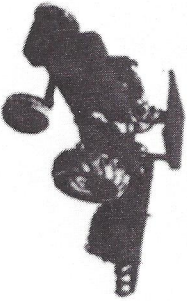


**FARM-RELATED
MANUFACTURING**

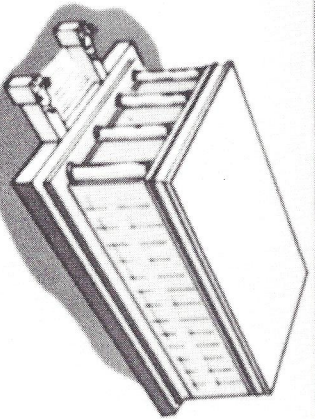


GOVERNMENT

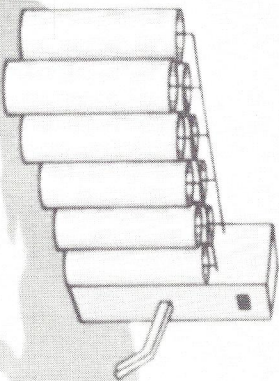
- USES OF AGRICULTURAL DATA**
- MARKET ANALYSIS
 - DECISION NEEDS
 - POLICY FORMULATION
 - RESOURCE UTILIZATION
 - TECHNOLOGY DEVELOPMENT



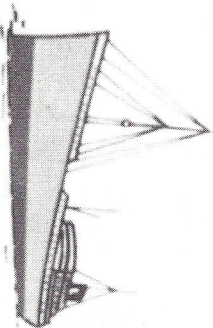
**FARM
OPERATORS**



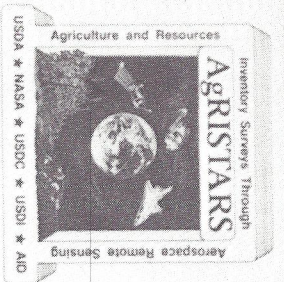
INVESTORS



AGRIBUSINESS



**SHIPPING/RAIL
TRANSPORTATION**



AGRISTARS IS A JOINT PROGRAM OF THE

U.S. DEPARTMENT OF AGRICULTURE, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, THE U.S. DEPARTMENT OF COMMERCE, THE U.S. DEPARTMENT OF THE INTERIOR, AND THE AGENCY FOR INTERNATIONAL DEVELOPMENT.

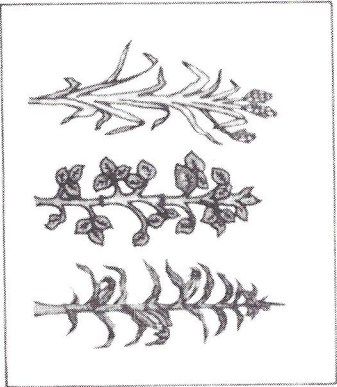
THE PROGRAM IS DESIGNED TO DETERMINE THE USEFULNESS OF REMOTE SENSING TO IMPROVE THE OBJECTIVITY, RELIABILITY, AND TIMELINESS OF DATA FOR FUTURE U.S. DEPARTMENT OF AGRICULTURE INFORMATION SYSTEMS.

AGRISTARS RESEARCH WILL ADDRESS :

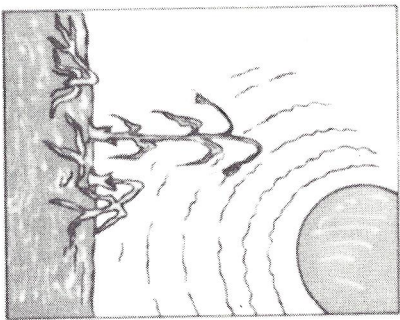
- EARLY WARNING OF CHANGES AFFECTING PRODUCTION
- COMMODITY PRODUCTION FORECASTS
- LAND-USE MONITORING
- RENEWABLE RESOURCES INVENTORY
- LAND PRODUCTIVITY ESTIMATES
- CONSERVATION PRACTICES ASSESSMENTS
- POLLUTION DETECTION AND EVALUATION

AGRISTARS SCOPE

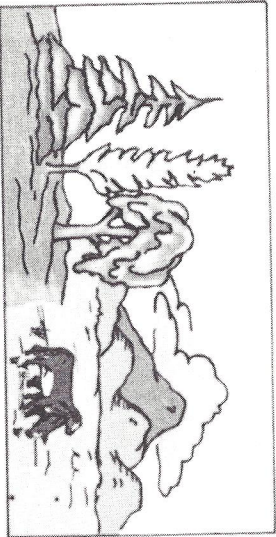
WORLDWIDE STUDIES OF DIVERSE AGRICULTURAL TOPICS



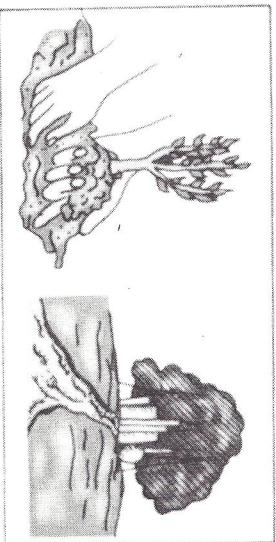
CROP PRODUCTION
FORECASTS



CROP CONDITION
ASSESSMENT



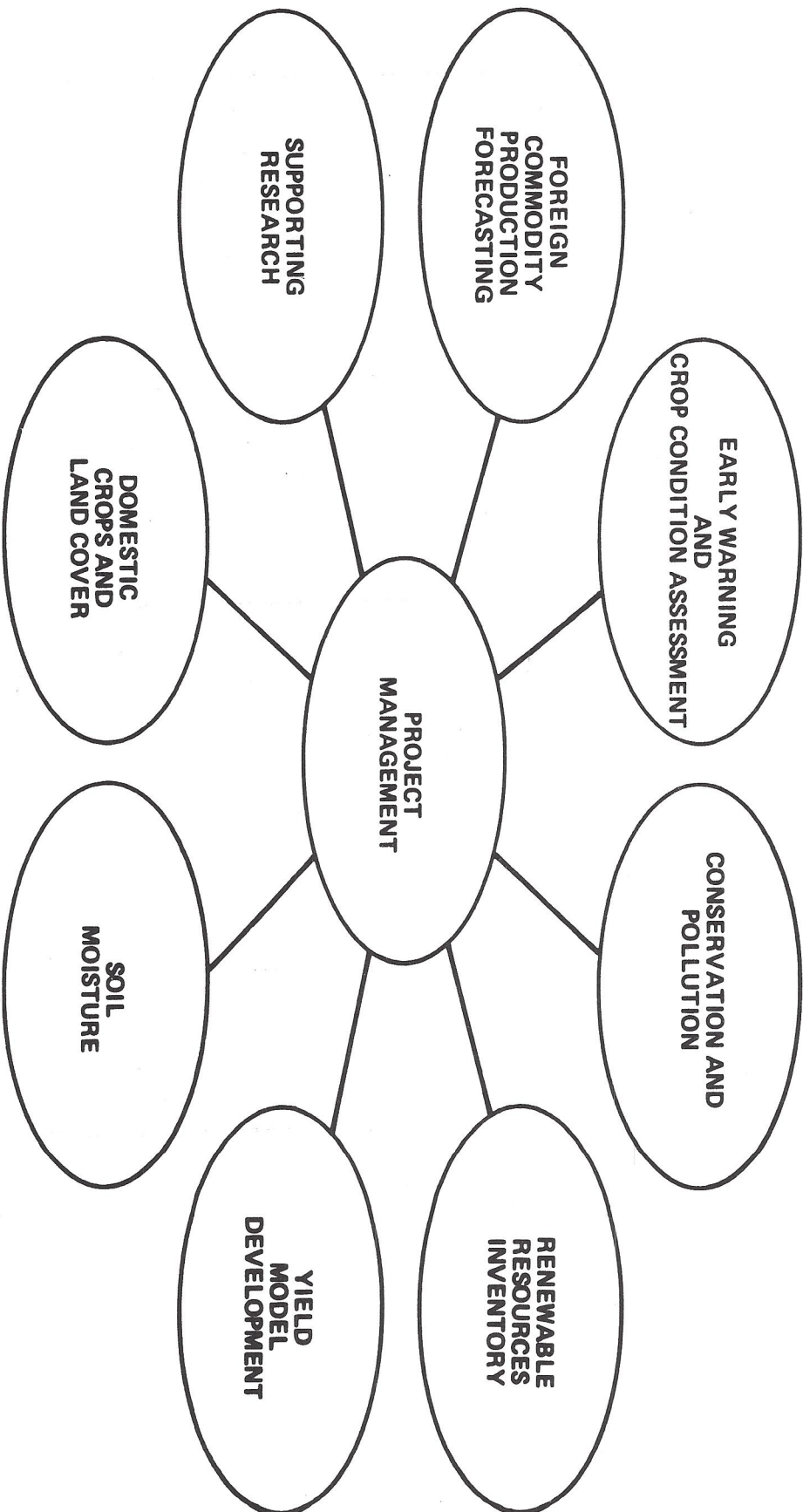
FORESTRY AND RANGE



CONSERVATION AND POLLUTION

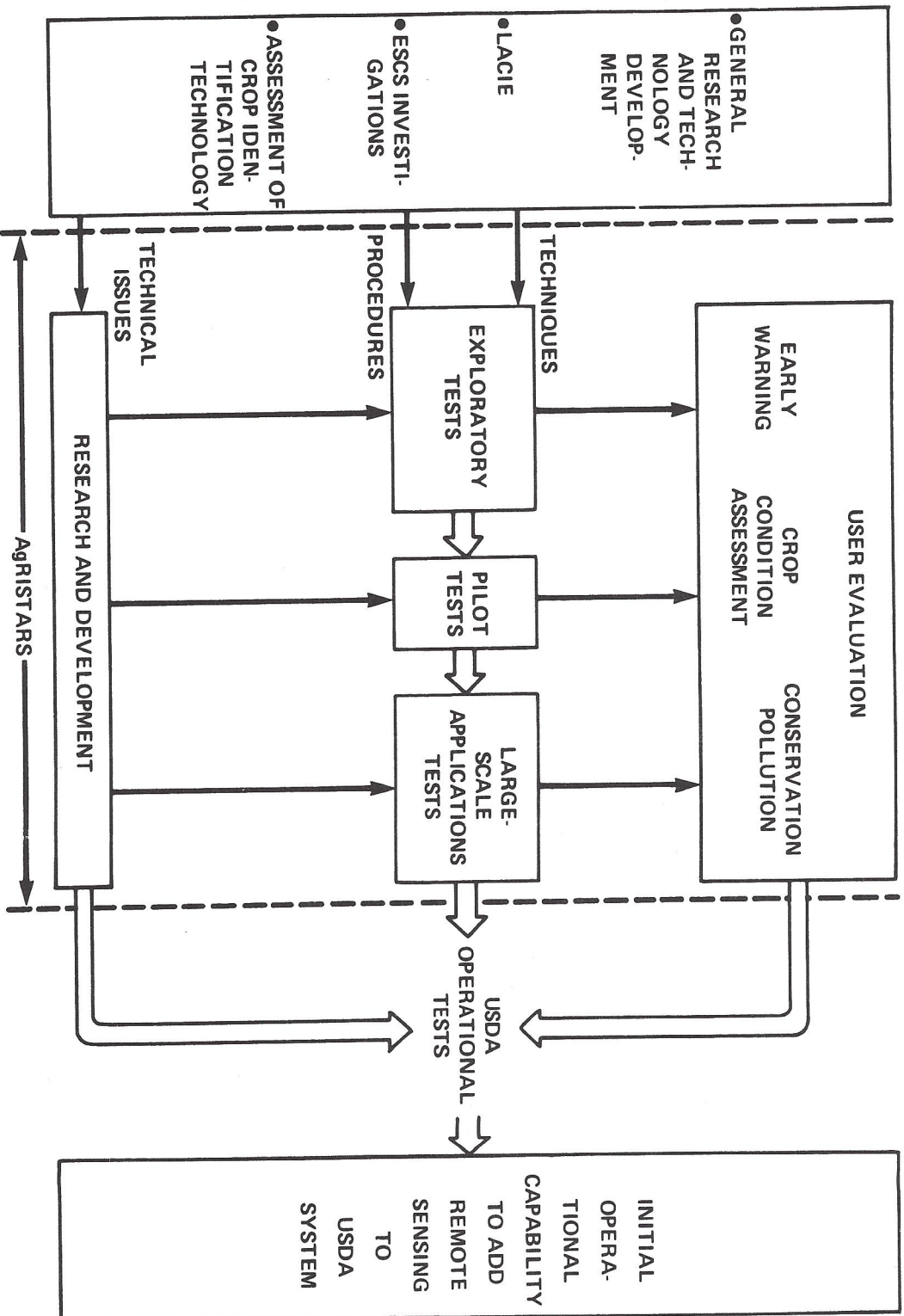
NASA-S-79-10837

COMPONENT PROJECTS OF AGRISTARS



NASA-S-79-10835A

AGRISTARS PROJECT ELEMENTS



RESPONSIBILITIES OF PARTICIPATING AGENCIES

NASA

- RESEARCH, DEVELOPMENT AND TESTING OF APPLICATIONS TECHNIQUES
- LANDSAT DATA ACQUISITION
- DEFINITION OF REQUIREMENTS FOR FUTURE SENSORS

USDC

- METEOROLOGICAL DATA
- RESEARCH, DEVELOPMENT, AND TESTING OF CONVENTIONAL AND SATELLITE METEOROLOGICAL DATA APPLICATIONS

USDA

- USER REQUIREMENTS
- AGRICULTURAL DATA
- RESEARCH, DEVELOPMENT, TESTS, AND APPLICATIONS
- LARGE-SCALE APPLICATIONS TESTS
- USER EVALUATION

USDI

- LANDSAT DATA STORAGE, RETRIEVAL, AND DISSEMINATION

AID

- EVALUATE RESULTS FOR APPLICATIONS IN DEVELOPING COUNTRIES



NASA-S-79-1701

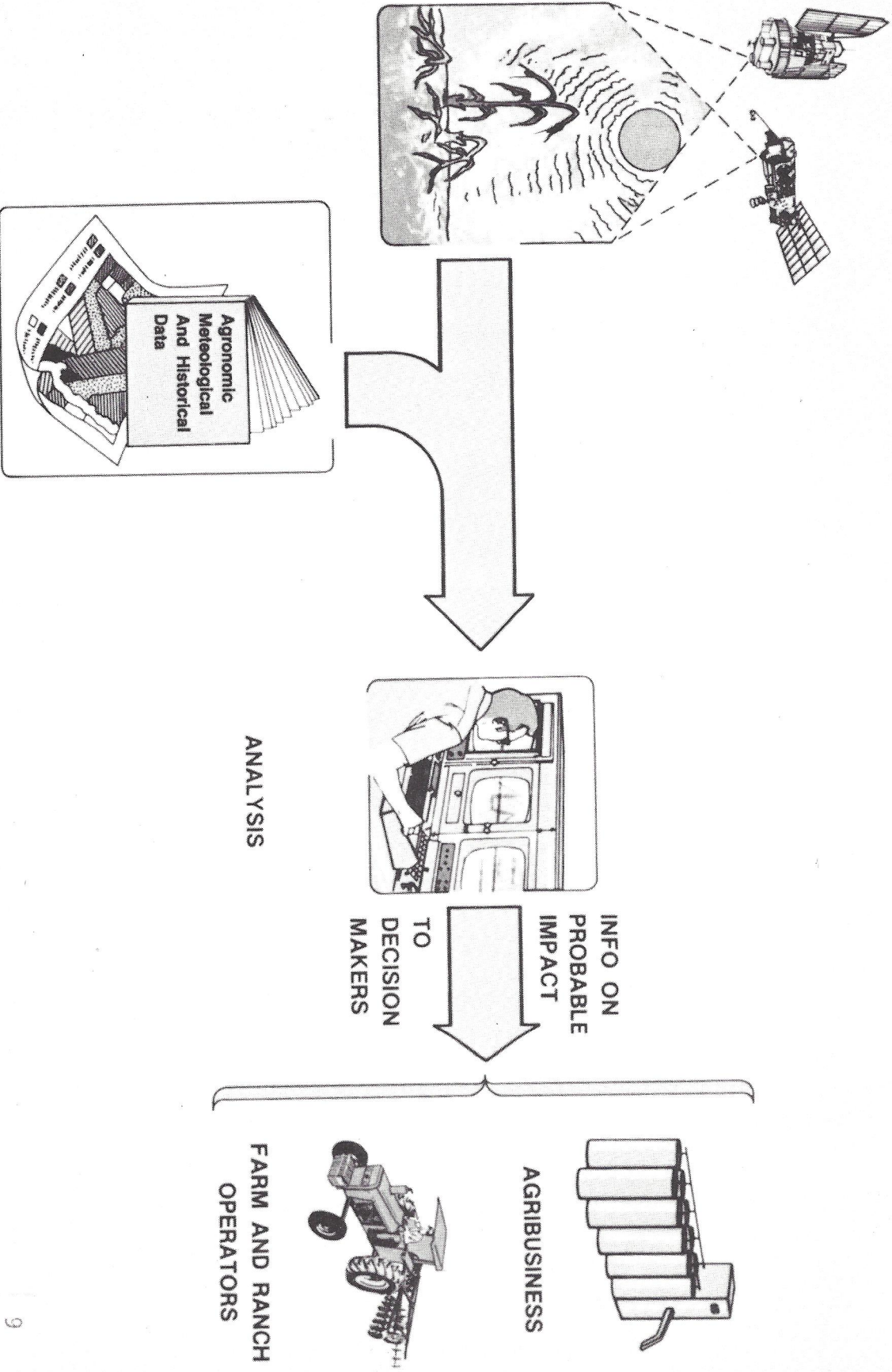
EARLY WARNING/CROP CONDITION ASSESSMENT

OBJECTIVE: TO PROVIDE A CAPABILITY FOR THE USDA TO RESPOND IN A TIMELY MANNER TO FACTORS WHICH AFFECT THE QUALITY AND PRODUCTION OF ECONOMICALLY IMPORTANT CROPS.

TASKS: - RD & T OF TECHNIQUES AND PROCEDURES IN THE FOLLOWING AREAS:

- SOIL MOISTURE MODEL/METHODOLOGY UTILIZATION
- RELATIONSHIPS BETWEEN SPECTRAL DATA, PLANT COMPONENTS, AND AGRONOMIC VARIABLES
- WINTER-KILL ALARM MODEL AND ASSESSMENT TECHNIQUES
- EARLY SEASON CONDITION ASSESSMENT
- UNTIMELY FREEZE ALARMS AND ASSESSMENTS
- ADVERSE TEMPERATURE/WIND ALARMS AND ASSESSMENTS
- DISEASE/INSECT ALARMS AND IMPACT ASSESSMENTS
- DETERMINATION OF FLOOD DAMAGE
- EXTENT SNOW COVER
- ASSESSMENT OF SENSOR BANDS
- METHODOLOGY OF SAMPLING FROM LANDSAT DATA BASED ON ANALYSIS OF SPECTRAL DATA

FUTURE APPLICATIONS OF EARLY WARNING TECHNIQUES



NASA-S-79-1712

FOREIGN COMMODITY PRODUCTION FORECASTING

OBJECTIVE: DEVELOP AND EVALUATE TECHNOLOGY FOR MAKING IMPROVED PRODUCTION FORECASTS IN THE FOREIGN AREAS. DETERMINE SUITABILITY FOR POSSIBLE INTEGRATION INTO USDA CROP INFORMATION SYSTEMS

- TASKS:**
- ADVANCEMENT OF MULTICROP SAMPLING AND AGGREGATION TECHNOLOGY
 - CLASSIFICATION - DEFINE AND EVALUATE A PROCEDURE FOR ESTIMATING CROP AREA AT A REGION OR COUNTY LEVEL
 - CONDUCT PILOT TESTS OF PRODUCTION TECHNOLOGY UTILIZING AREA ESTIMATION AND YIELD MODELS PROVIDED BY THE YIELD TEAM
 - QUANTIFY THE ERRORS IN CROP GROWTH ESTIMATION MODELS AND THE ERRORS INCLUDED IN OTHER COMPONENT OUTPUTS DUE TO CROP GROWTH STAGE ESTIMATION
 - ASSESS ACCURACY OF AGRICULTURE REMOTE SENSING RESEARCH PRODUCTS (SAMPLING SCHEME, CLASSIFICATION, CROP GROWTH STAGE, AND YIELD MODELS)
 - CONDUCT PILOT TESTS AND SUPPORT USER-LED LSATS



NASA-S-79-1714

SUPPORTING RESEARCH

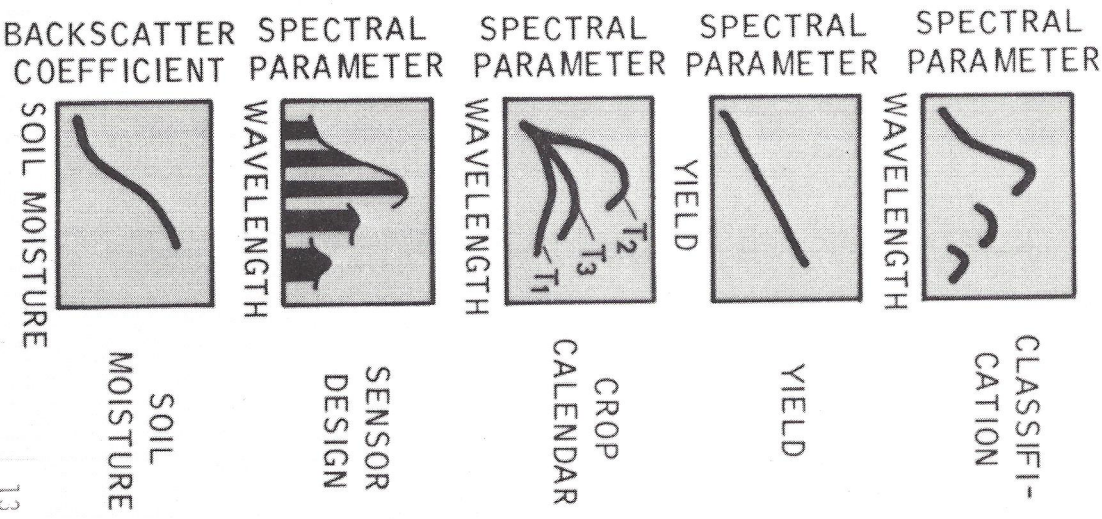
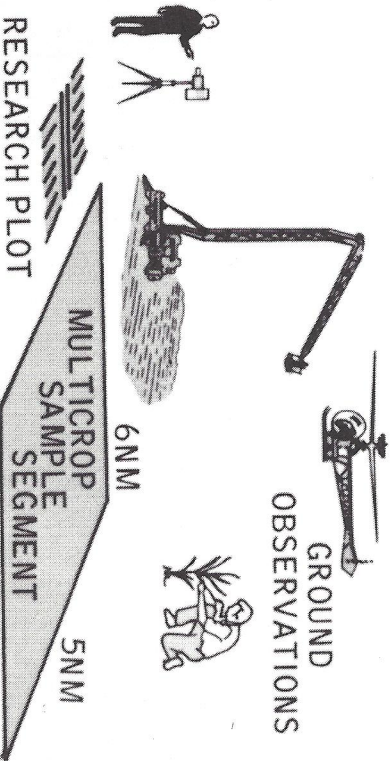
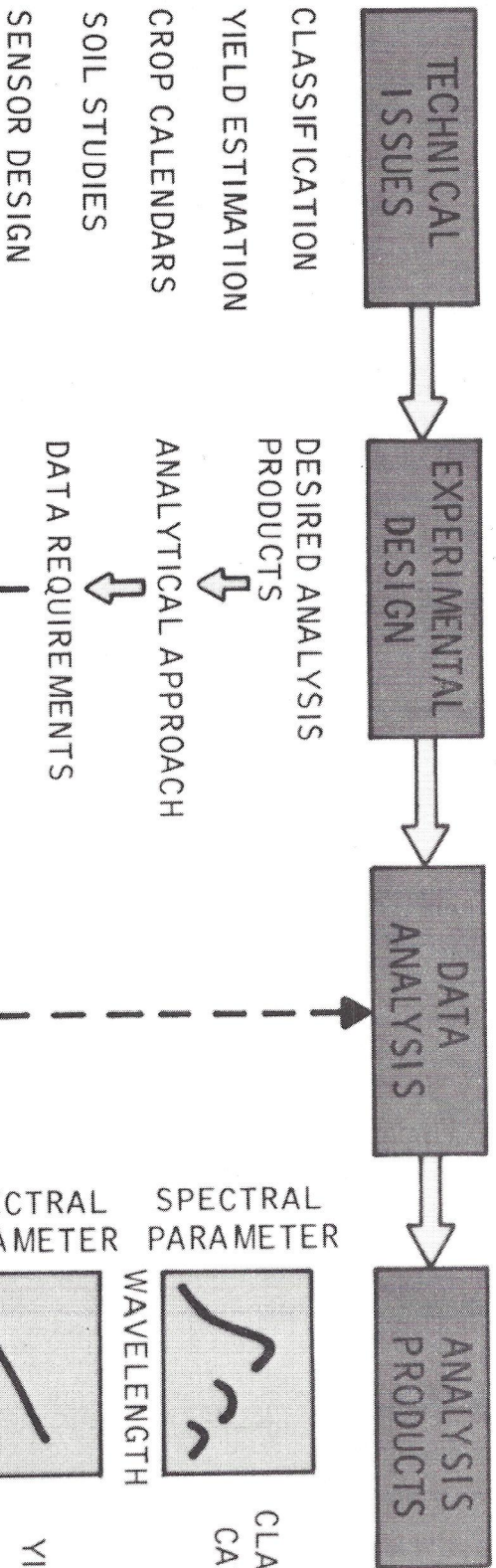
OBJECTIVE:

TO AUGMENT EXISTING TECHNOLOGY AND/OR DEVELOP NEW APPROACHES TO IMPROVE THE TECHNOLOGY FOR PROJECTS IN THE JOINT PROGRAM. ALL 7 MAJOR INFORMATION CATEGORIES WILL BE ADDRESSED, WITH EMPHASIS ON FCPF

TASKS:

- ADVANCE MULTICROP SAMPLING AND AGGREGATION TECHNOLOGY FOR FUTURE FCPF SYSTEM
- DEVELOP AND EVALUATE MORE ACCURATE AND EFFICIENT PROCEDURES FOR AREA ESTIMATION
- DEVELOP TECHNIQUES FOR ESTIMATING STAGE OF CROP GROWTH
- DEVELOP AND TEST YIELD ESTIMATION TECHNIQUES WHICH INVOLVE LANDSAT SPECTRAL INPUTS
- DEVELOP TECHNIQUES FOR UTILIZING SATELLITE DATA TO AID IN THE DISCRIMINATION AND VERIFICATION OF MAJOR CROP STRESS FACTORS
- R&D IN SOIL RESEARCH - RELATE SOIL PHYSICAL/CHEMICAL PROPERTIES TO REMOTE SENSING DATA; ESTABLISH TECHNIQUES TO UTILIZE REMOTE SENSING TO GROUP SOIL FEATURES INTO PRODUCTS (E. G. MAPS)
- FIELD RESEARCH - PROVIDE BASIC UNDERSTANDING OF RELATIONSHIPS AMONG SPECTRAL, AGRONOMIC, AND METEOROLOGICAL VARIABLES

SUPPORTING FIELD RESEARCH





NASA-S-79-1706

DOMESTIC CROPS & LAND COVER

OBJECTIVE: DEVELOP, TEST AND EVALUATE, THE USE OF SATELLITE DATA FOR MORE PRECISE, COST EFFECTIVE, AND TIMELY DOMESTIC CROP AND LAND. COVER ACREAGE ESTIMATES AT THE STATE, CROP REPORTING DISTRICT (CRD), MULTICOUNTY, AND COUNTY LEVELS IN THE U. S.

- TASKS:**
- RD & T - IMPROVE PRECISION IN ACREAGE ESTIMATION IN THE FOLLOWING AREAS
 - INVESTIGATING AND DEVELOPING METHODOLOGY FOR CLASSIFICATION AND MENSURATION
 - ASSESS THE CURRENT TECHNOLOGY FOR USING AUTOMATED PROCESSING TECHNIQUES
 - MULTITEMPORAL ANALYSIS - TO DEFINE THE OPTIMUM DATES OR COMBINATION OF DATES WHICH WOULD GIVE MAXIMUM SPECTRAL SEPARATION OF FEATURES
 - PREPROCESSING/REGISTRATION - TO ANALYZE THE DEGREE OF PREPROCESSING REQUIRED FOR ATMOSPHERIC, RADIOMETRIC, GEOMETRIC, AND SUN ANGLE CORRECTIONS
 - IMPROVE ALGORITHMS - WHICH HAVE POTENTIAL FOR IMPROVING CROP AND LAND COVER CLASSIFICATION AND MENSURATION
 - IMPROVE THROUGHPUT/TIMELINESS - RESEARCH AND DEV., BETTER DIVISIONS OF TASKS OR PROCEDURES FOR GREATER EFFICIENCY
 - FUTURE SENSOR EVALUATIONS - THE RADIOMETRIC, SPECTRAL, AND SPATIAL CHARACTERISTICS OF THE DATA WILL BE EVALUATED IN TERMS OF IMPROVING PRECISION

NASA-S-79-1715

SOIL MOISTURE

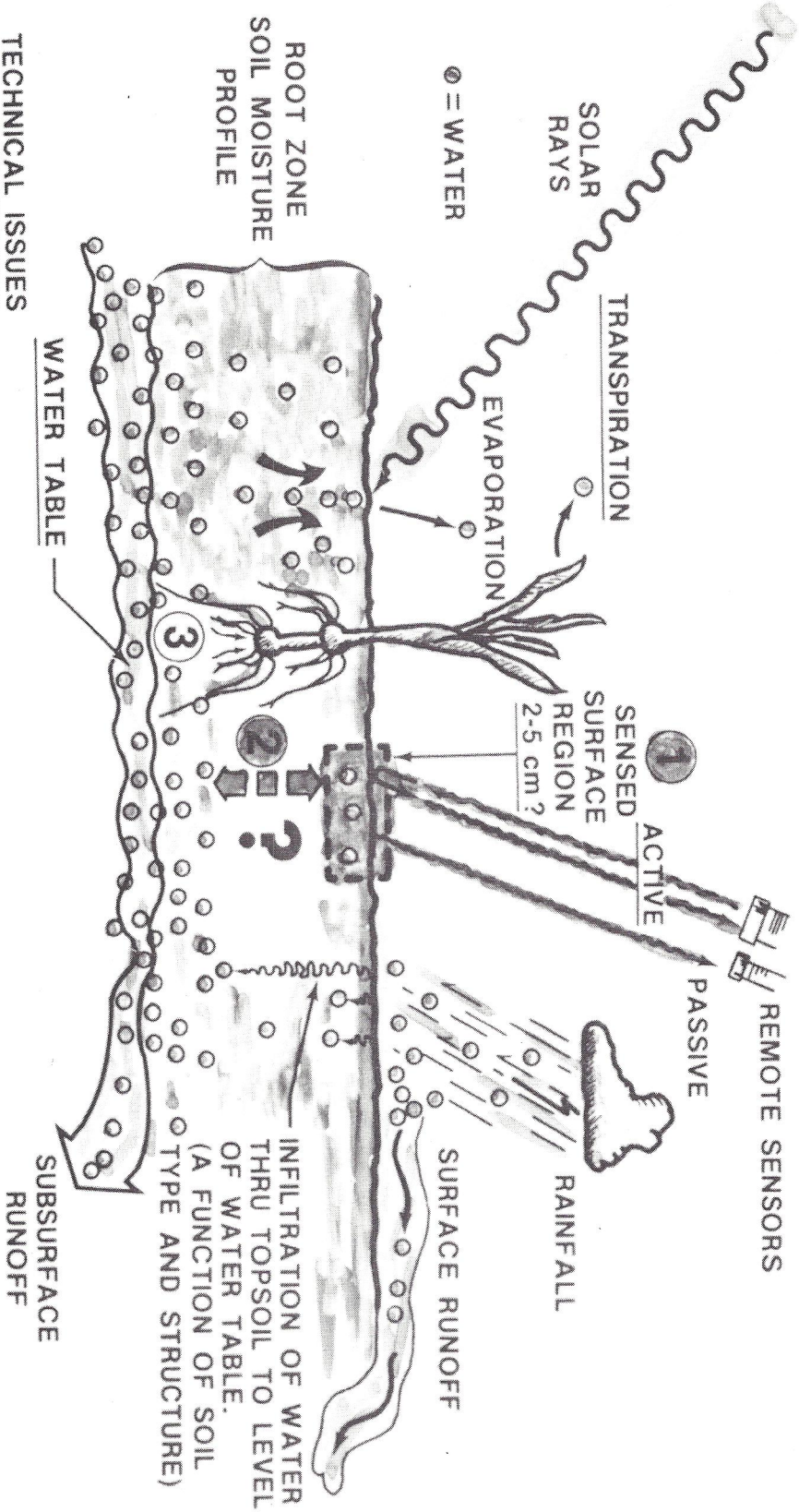
OBJECTIVE:

DEVELOP, APPLY, EVALUATE TECHNOLOGY TO ESTIMATE SOIL MOISTURE PROFILES FROM REMOTELY SENSED AND GROUND SENSOR DATA, FOR AGRICULTURAL AND WATER RESOURCES INFORMATION NEEDS

TASKS:

- DETERMINE THE BEST COMBINATION OF SENSORS THAT CAN REMOTELY SENSE SOIL MOISTURE INFORMATION
- DETERMINE THE MEASUREMENT ACCURACY OF THE SOIL MOISTURE SENSORS
- DETERMINE THE SPATIAL AND TEMPORAL VARIABILITY OF SOIL MOISTURE
- DETERMINE THE FEASIBILITY OF RELATING REMOTELY SENSED SURFACE SOIL MOISTURE TO THE ROOT ZONE
- EVALUATE THE IMPROVEMENT AFFORDED BY INCORPORATING REMOTELY-SENSED SOIL MOISTURE INFORMATION IN APPLICATION MODELS SUCH AS CROP YIELD FORECAST AND RUNOFF PREDICTION
- EVALUATE EXISTING IN-PLACE SENSOR TECHNIQUES FOR POSSIBLE USE WITH DATA COLLECTION PLATFORMS AND AS A GROUND MEASUREMENT SENSOR IN SUPPORT OF REMOTE SENSING EXPERIMENTS
- EVALUATE OTHER TECHNICAL ISSUES THAT APPEAR, SUCH AS MAPPING FROZEN SOIL AND OBSERVATION OF SALINE SEEPS

AGRICULTURAL SOIL MOISTURE AND REMOTE SENSING



- TECHNICAL ISSUES**
- 1 EXTRACTION OF SOIL MOISTURE AND DEPTH INFORMATION FROM REMOTELY SENSED SURFACE REGION
 - 2 MODEL ROOT ZONE SOIL MOISTURE PROFILE
 - 3 DEMONSTRATE THAT REMOTELY DETERMINED ROOT ZONE SOIL MOISTURE IS AN IMPROVED REPLACEMENT OF CONVENTIONAL MOISTURE DATA IN CROP YIELD MODELS

NASA-S-79-1704

YIELD MODEL DEVELOPMENT

OBJECTIVE: TO DEVELOP MATHEMATICAL MODELS USING ENVIRONMENTAL AND PLANT MEASUREMENT CHARACTERISTICS THAT REPRESENT THE YIELD POTENTIAL OF A CROP AT AN AGGREGATE UNIT LEVEL (STATE, REGIONAL, NATIONAL)

- TASKS:**
- INTEGRATE GROUND, SATELLITE, AND SUPPORTING UPPER AIR ANALYSIS TO DESCRIBE WEATHER EVENTS AND THEIR EFFECT ON CROP GROWTH
 - DERIVE YIELD FORECASTS FROM AREA-SPECIFIC STATISTICAL REGRESSION - TYPE MODELS
 - CONDUCT DAILY MEASUREMENTS OF AVAILABLE SOLAR ENERGY
 - SURFACE TEMPERATURES OVER LAND WILL BE USED IN REGRESSION EQUATIONS TO DETERMINE MIN/MAX CANOPY TEMPERATURES
 - CONDUCT DETAILED EXPERIMENTS FOR DETERMINING INPUT VARIABLES AFFECTING PLANT PROCESSES
 - INTEGRATE YIELD FORECASTING AND ESTIMATING METHODOLOGY WITH AREA ESTIMATION TO PROVIDE PRODUCTION FORECASTS AND ESTIMATES
 - DETERMINE FEASIBILITY OF OPERATIONALLY IMPLEMENTING COMPONENTS AND MODELS THROUGH ALL PHASES OF THE YIELD MODELING ACTIVITIES

NASA-S-79-1707

RENEWABLE RESOURCES INVENTORY PROJECT

OBJECTIVE: TO DEVELOP, TEST, AND EVALUATE METHODS AND TECHNIQUES FOR APPLYING NEW REMOTE SENSING TECHNOLOGY TO THE INVENTORY MONITORING, AND MANAGEMENT OF FOREST AND RANGELAND RENEWABLE RESOURCES

- TASKS:**
- REGIONAL AND LARGE AREA RENEWABLE RESOURCES INVENTORY IN THE FOLLOWING AREAS
 - A MULTIRESOURCE INVENTORY METHODS PILOT TEST USING LANDSAT TECHNOLOGY WHICH EVALUATES NEW ANALYSIS TECHNIQUES
 - TECHNOLOGY ASSESSMENT OF AIRCRAFT SCANNER, THE THEMATIC MAPPER, LARGE FORMAT CAMERA SYSTEM, AND OTHER ADVANCED SYSTEMS
 - DETECTION, CLASSIFICATION, AND MEASUREMENT OF DISTURBANCES SUCH AS INSECTS, DISEASE, DROUGHT, FLOOD, FIRE, CLEARCUTS, AND CONTROLLED BURNS
 - CLASSIFICATION MODELING AND MEASUREMENT OF RENEWABLE RESOURCES
 - DETERMINATION OF SITE SUITABILITY AND LAND MANAGEMENT PLANNING



NASA-S-79-1708

CONSERVATION

OBJECTIVE: DEVELOP, TEST AND EVALUATE AN INTEGRATED SATELLITE/AIRCRAFT/GROUND DATA CAPABILITY TO SUPPLY ACCURATE INFORMATION ON CONSERVATION PRACTICES

- TASKS:
- DEMONSTRATE CAPABILITY TO INVENTORY THE CONSERVATION PRACTICES PRESENTLY IN USE, AND IDENTIFY AREAS IN WHICH CONSERVATIONS PRACTICES ARE NEEDED
 - DEMONSTRATE PROCEDURES AND CAPABILITIES FOR IMPROVED DETERMINATION OF RUNOFF THROUGH THE USE OF HYDRO-MODELS THAT BETTER UTILIZE REMOTELY-SENSED INFORMATION
 - DEVELOP TECHNIQUES TO DETERMINE THE PHYSICAL CHARACTERISTICS OF THE SNOWPACK; i.e., SNOWMELT, FREE WATER, SNOW DEPTH, DENSITY AND WATER EQUIVALENT
 - EVALUATE THE USEFULNESS OF THERMAL INFRARED AND MICROWAVE DATA FROM SATELLITE SENSORS TO DETERMINE SOIL MOISTURE CONTENT, FOR USE IN HYDRO-MODELS

NASA-S-79-1709

POLLUTION

OBJECTIVE:

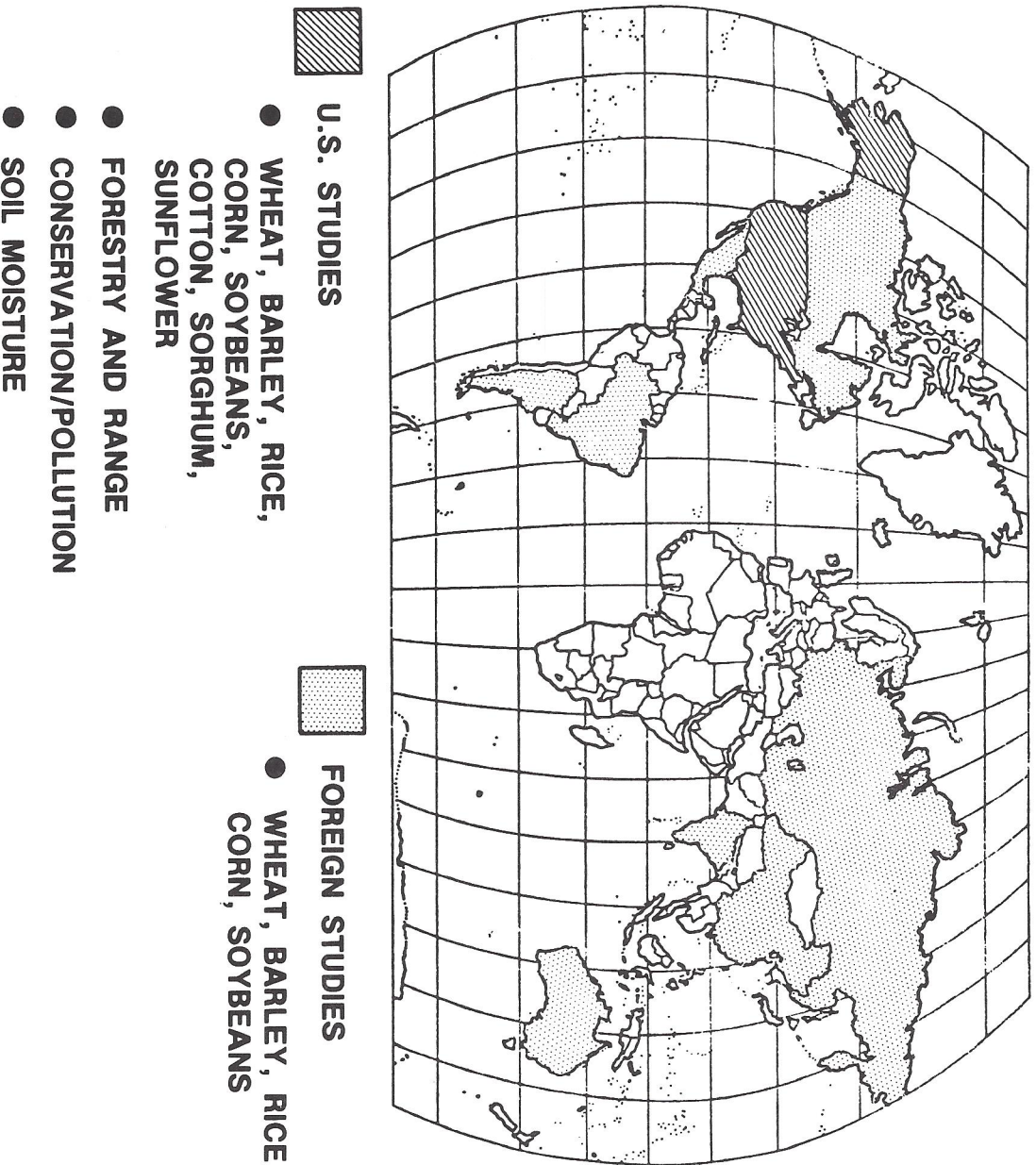
TO PROVIDE AN ASSESSMENT OF THE EFFECTIVENESS OF AGRICULTURAL AND FORESTRY PRACTICES WITHIN THE U. S. THROUGH THE APPLICATION OF MODELS IN AN INTEGRATED SYSTEM USING REMOTE AND GROUND DATA

TASKS:

- DEMONSTRATE A QUANTITATIVE ASSESSMENT OF SEDIMENT RUNOFF IN SELECTED TEST AREAS WHERE VARIOUS AGRICULTURAL PRACTICES ARE KNOWN AND CONTROLLED AND WHERE EXTENSIVE GROUND MONITORING EXISTS
- DEMONSTRATE THE CAPABILITY TO DETECT CERTAIN GASEOUS AND PARTICULATE AIR POLLUTANTS AND THEIR IMPACTS ON AGRICULTURAL AND FORESTRY RESOURCES

NASA-S-79-10827A

AGRISTARS STUDY AREAS (1980-1985)



IMPROVE THE QUALITY OF WORLDWIDE AGRICULTURAL INFORMATION THROUGH REMOTE SENSING

