NCAR NEWSLETTER

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Space Shuttle Program in Planning Stage

Space Shuttle, a complex, many-faceted program including both manned and unmanned projects, offers a wide scope for the imaginative design of observational and test facilities for the atmospheric sciences. The NASA-sponsored Space Shuttle is on the planning boards now and is scheduled for operation in the 1980s.

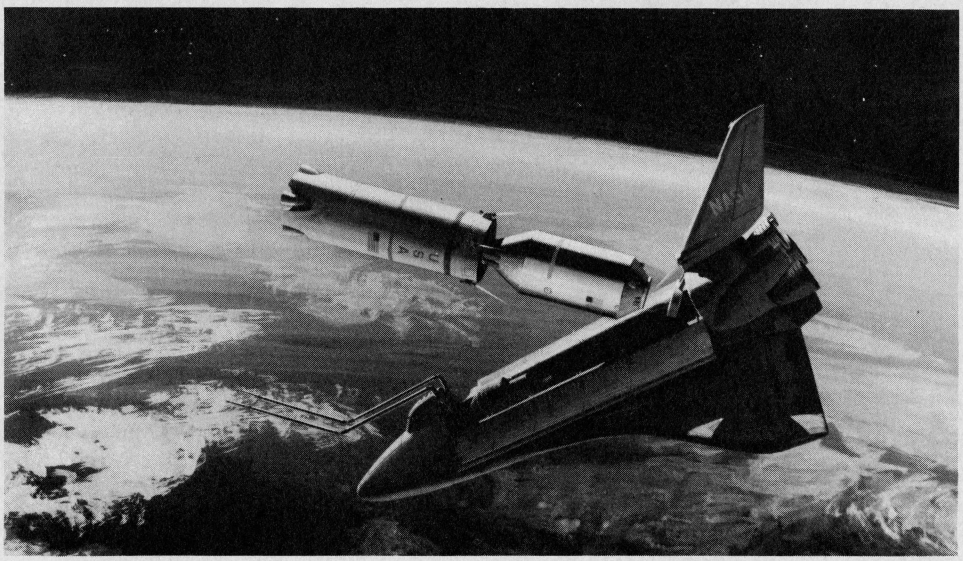
Experiments will be planned to go aboard modular "Space Labs"——standard payload carriers to be designed and constructed by the European Space Research Organization. Each Space Lab will have a pressurized cabin capable of holding one to four persons as well as external platforms or pallets for scientific equipment. The labs will fly on the Space Shuttle in earth orbit for times varying from seven to 30 days and will carry payloads of up to 5,000 kg.

NASA plans include a single Space Lab module to be called AMPS (Atmosphere, Magnetosphere, and Plasmas in Space). It is seen as a general-purpose facility that can be the basis for many remote atmospheric and magnetospheric studies of the 1980s. John Gille of NCAR's Upper Atmosphere Project has been selected to serve on an AMPS working group concerned primarily with remote sensing instruments and lasers. The other members of the group have not all been chosen yet. Gille notes that NASA is establishing channels for input in the Space Shuttle effort. In addition, Gille will be happy to serve as a channel for ideas, suggestions, or questions on planning, experiments, or actual space hardware.

A NASA steering committee composed of members from all over the world will coordinate the efforts of four AMPS working groups, organized around various categories of instrumentation, whose chairpersons will be selected by NASA. The groups will be responsible for definition of AMPS scientific missions, description and specification of instrumentation, guidelines for participation by scientists in actual observations and experiments, and finding areas in which further technological research and development are needed.

According to Gille, the long-term AMPS program poses the problem of creating a facility flexible enough to be appropriate for studies that will not begin for nearly a decade. Commenting on the possibilities of the program, Gille observes that "The capabilities of a large manned platform in space open the way to important advances in measuring temperatures, winds, and trace gas concentrations in the upper atmosphere. We could also make very accurate measurements of the earth's radiation budget and effects related to departures from local thermodynamic equilibrium."

Persons interested in further information or wishing to explore the possibilities of future interaction with AMPS facilities should call Gille at NCAR ext. 351.



Artist's concept of Space Shuttle. Space Tug is pulling satellite payload away from mother ship.

Participation Invited in Nucleus Counter Tests

Researchers with nucleus counters appropriate for stratospheric flight measurements are invited to explore the possibility of participating in a laboratory intercomparison test with two similar instruments. The measurements will be made with instruments suitable for use on aircraft or balloons. Richard Cadle of the Upper Atmosphere Project has scheduled the test for late July to determine how consistently various instruments can measure the concentrations of stratospheric particles less than 0.1 μm in radius. The surface-to-mass ratios of these particles may make them effective catalytic agents for ozone destruction processes, and their increase in the stratosphere may significantly influence the radiation balance.

The two instruments now scheduled for testing are a condensation nucleus counter (developed by Gerhard Langer, NCAR), which operates by counting droplets acoustically and has been shown to function effectively (unattended) in high altitude flights aboard the NCAR Sabreliner aircraft, and a similar counter (developed by James Rosen, University of Wyoming), which also counts individual particles. If this instrument performs consistently under laboratory conditions, Cadle and Rosen hope to flight test it in the stratosphere. Other instruments will add to the range and scope of the laboratory test.

Interested researchers should call Cadle at NCAR ext. 243 to discuss the possibility of joining the July laboratory tests.

TWERLE Data Will Be Gathered

Data from the Tropical Wind, Energy Conversion, and Reference Level Experiment (TWERLE) should be available to university researchers beginning in April or May 1975. A joint experiment of NCAR, NASA-Goddard Space Flight Center, and the University of Wisconsin, TWERLE is intended to:

- Measure winds from the drift of constant-level balloons in the tropical

NCAR's mailing address for correspondence with all staff members is:
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Most NCAR telephone extensions can be reached via FTS by dialing (303) 494-5 plus the extension; however, some extensions can only be reached through the switchboard, (303) 494-5151. From commercial telephones, call the switchboard and ask for the extension. This information is noted with the name of the NCAR contact.

regions and at southern hemisphere mid-latitudes at 150 mb (about 13.8 km);

- Measure both the air motion relative to isobaric surfaces and the conversion of potential to kinetic energy of the atmosphere by comparing pressure and absolute altitude;

- Provide a direct measurement of temperature, pressure, and absolute altitude that can serve as a reference point in adjusting the indirect temperature soundings made from meteorological satellites such as the Nimbus F.

The launching of the Nimbus F satellite, which had been scheduled for this June, is now planned for November. The launching of mid-latitude balloons from Christchurch, New Zealand, should begin in December and January and finish in April or May 1975. The launching of balloons for the tropical part of TWERLE will extend from mid-May to the end of August 1975 and is tentatively scheduled from three sites: Pago Pago, American Samoa; Accra, Ghana; and A[illegible]sion Island in the South Atlantic (a British colony).

Balloons launched from mid-latitudes are more likely to reach the calmer conditions of the stratosphere and have a longer lifetime than those launched in the tropics. Consequently, some of these balloons will still be in the air during the tropical phase in June, July, and August, when the maximum amount of information will be gathered. Some balloons launched between May and August will still be in the air after August.

Synoptic daily pressure, temperature, and altitude data primarily for use by operational meteorological agencies will go out over the WWW (World Weather Watch) circuit via such distribution services as the NMC (National Meteorological Center). The data will be further processed at NCAR to produce a complete reduction for use by research scientists. University scientists interested in using the data in this processed form can obtain them through Paul Julian at NCAR ext. 352.

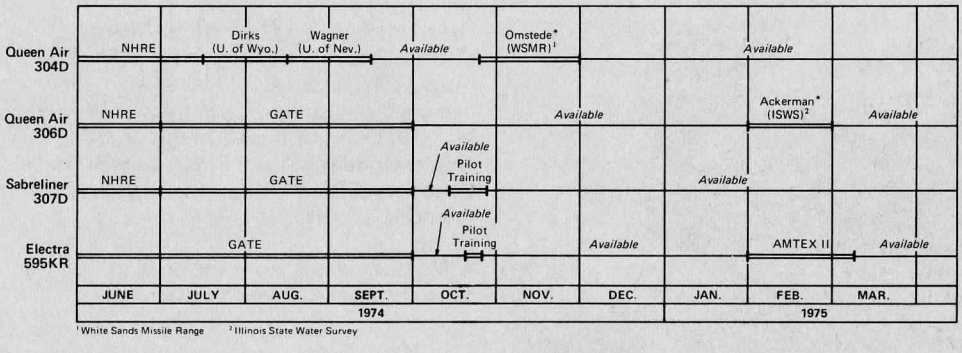
Queen Air Equipped with Air-Motion Sensing System

NCAR's Beechcraft Queen Air N306D aircraft has been equipped with an air-motion sensing system consisting of an inertial navigation system (INS) and a gust probe. The Queen Air will be available for use by the university community after October 1.

The INS measures the aircraft's velocity relative to the earth and the gust probe measures the aircraft's velocity relative to the airstream. The design of the system calls for 16 samples per sec with spatial resolution of approximately 10 m and time resolution of approximately 0.1 sec. The Queen Air is serving as a replacement for the NCAR de Havilland Buffalo.

The INS is a Litton model LTN - 51 mounted inside the cabin near the center of gravity of the aircraft. A 10.8-cm-diameter aluminum boom extends 2.5 m in front of the aircraft and is designed to support the 4.5 - kg gust-probe package at the tip. The gust-probe package is identical to the one developed by Donald Lenschow of the Research Aviation Facility for use on the NCAR Electra.

The Queen Air's air-motion sensing system will be tested in the National Hail Research Experiment until July 1, when it will be used in the GARP Atlantic Tropical Experiment. Requests for use of the aircraft should be submitted to John Hinkelman at the NCAR address. The requests will be considered by the Research Aviation Facility Advisory Panel and recommendations for funding will be made by the panel to Atmospheric Technology Division acting director Wesley Melahn.



NCAR aircraft schedule indicating to which university project or scientist each aircraft is committed and when, beginning in June 1974; schedule also shows when each aircraft is available. Asterisks show tentative scheduling; final decisions have been deferred until fall. The blocks of time for each program incorporate the actual research flights as well as aircraft engineering (where required), instrumentation check-out, maintenance, and ferry to the field location.

Rep[illegible]t on Project SESAME Submitted

A program of intensive research on severe storms and their mesoscale environments tentatively entitled Project SESAME (Severe Environmental Storms and Mesoscale Experiment) is under consideration by NOAA (National Oceanic and Atmospheric Administration). The practical and scientific importance of the severe-storm problem combined with new technologies of remote and direct atmospheric probing, numerical simulation, and data processing point to the need for this research.

A report on SESAME has been submitted to NOAA by a joint NOAA–NCAR planning group chaired by Douglas Lilly of NCAR. It calls for a field observational phase closely coordinated with numerical modeling work. While the details of the interagency cooperation are not yet worked out, university scientists are welcome to read and comment on the report, which is available through Lilly at NCAR ext. 492.

September Seminar Topic Chosen

"Flare-Related Magnetic Field Dynamics" is the topic selected by the NCAR High Altitude Observatory in cooperation with the Sacramento Peak Observatory for this year's September Seminar. The purpose of the seminar, a working conference with limited attendance, is to review existing knowledge about a selected subject and to stimulate new observational and theoretical research. Each day of the seminar will be devoted to a specific theme, with a keynote paper preceding open discussions.

Quantitative work on flare-related magnetic field dynamics has been hindered by the difficulty of translating magnetographic data into a suitable form for computer analysis. But the recent development of complex codes for large computers to analyze such data and the completion of several new magnetographs promise to open an era of quantitative research on one of the most important and interesting problems in astrophysics.

Recently constructed magnetographs at the Sacramento Peak, Kitt Peak, and Aerospace Observatories can produce digitized measurements of active-region magnetic and velocity fields with significantly broad and frequent coverage to allow both synoptic research and research on rare events. Skylab observations should also

contribute significantly to the effort to map the magnetic fields associated with flaring regions.

Flare-Produced Shock Waves in the Corona and in Interplanetary Space, the proceedings of the 1972 September Seminar, is available through G. William Curtis at HAO. He can be reached by dialing NCAR ext. 381 and asking for HAO ext. 24.

HAO Research Associateships Awarded

Three university professors have accepted summer research associateships at NCAR's High Altitude Observatory. Nearly 100 persons applied for this new program, which provides faculty from small colleges with limited research facilities opportunities for cooperative research in solar physics, solar-terrestrial physics, and related atmospheric sciences.

The three recipients are:

- *William D. Davis, Montgomery College, Rockville, Maryland*. Davis will work with HAO's Dean Smith on understanding the turbulent electric fields that may be generated in solar flares. Davis also plans to consult with HAO staff on problems encountered in interpreting solar spectra.

- *George Skadron, Drake University, Des Moines, Iowa*. Skadron will work with Tom Holzer on the effects of ion temperature and inertia in the fluid treatment of the Hall instability of a weakly ionized plasma. He is also interested in ionospheric wave phenomena, the transport of energetic charged particles through magnetic turbulence to their acceleration in solar flares, and energetic particle propagation in the magnetosphere.

- *Julius Feit, Queensborough Community College, Bayside, New York*. Feit will work with Arthur Hundhausen in developing a theory concerning the nature of the interplanetary diffusion coefficient for solar cosmic rays from structures or processes occurring in the solar wind.

Persons interested in future opportunities in this program should request informational materials from G. William Curtis by calling NCAR ext. 381 and asking for HAO ext. 24.

1974-75 ASP Fellows Chosen

The Advanced Study Program has announced the selection of 23 Postdoctoral and Senior Postdoctoral Fellows for 1974 - 75, including two from foreign institutions. Eleven (names shown with asterisks) are being supported in part or entirely by their home institutions.

The Senior Postdoctoral Fellows are Terry Ashworth* (Department of Physics, South Dakota School of Mines and Technology), Maurice L. Blackmon* (Department of Physics, Syracuse University), Wan-Cheng Chiu* (Department of Meteorology, University of Hawaii), Michael H. Glantz (Department of Government and Law, Lafayette College, Easton, Pennsylvania), Terence J. Hughes* (Department of Geological Sciences, University of Maine), Dennis K. Kreid (College of Engineering, Tennessee Technology University), Thomas S. Lundgren* (Department of Aerospace Engineering and Mechanics, University of Minnesota), William Charles Macklin* (Department of Physics, The University of Western Australia), Gerald R. North* (Department of Physics, University of Missouri), Kenneth E. Torrance* (College of Engineering, Cornell University), J. M. Wallace* (Department of Atmospheric Sciences, University of Washington), and George Zyskind* (Statistical Laboratory and Department of Statistics, Iowa State University).

The Postdoctoral Fellows are Jane E. Bunin (Department of EPO Biology, University of Colorado), Michael H. Hart (Hale Observatories, Pasadena, California), Douglas Kendall (Biophysics Research Division, University of Michigan), Richard I. Klein (Joint Institute for Laboratory Astrophysics, University of Colorado, Boulder), Ronald G. Pinnick (Department of Physics and Astronomy, University of Wyoming), Eric J. Pitcher (Department of Aerospace Engineering and Atmospheric Science, University of Michigan), Harvey A. Rose (Department of Physics, Harvard University), Russell C. Schnell (Department of Atmospheric Resources, University of Wyoming), Ulrich Schumann* (Gesellschaft fur Kernforschung, Karlsruhe, Germany), J. Dana Thompson (Department of Meteorology, Florida State University), Jill Williams (Institute for Arctic and Alpine Research, University of Colorado), and Richard W. Zurek (Department of Atmospheric Sciences, University of Washington).

The interests of the 23 Fellows cover a broad spectrum of atmospheric science problems. Their studies in modeling alone will include areas such as compressible convection, coupled atmosphere-ocean-cryosphere, general circulation, stochastic-dynamic prediction, planetary boundary layer, atmospheric tides, ocean circulation, urban heat islands, and climate.

Experimental and field studies will include growth of hailstones, vertical wind tunnel experiments, decaying vegetation as ice nuclei, interaction of atmosphere and biosphere, light scattering, stratospheric sampling, and laser-doppler measurements of turbulence. Other subjects to be pursued include the political implications of climate change and weather modification, developing course material for teaching atmospheric sciences, and finishing a meteorological text.

The Postdoctoral Fellowship Program is designed to enrich research and teaching in the atmospheric sciences by bringing into the field highly qualified Ph.D. physicists, astrophysicists, oceanographers, chemists, applied mathematicians, and engineers, as well as certain social scientists. The program is also intended to enhance the capability of Ph.D. scientists already involved in atmospheric research. All ASP Fellows are encouraged to form and strengthen long-term associations with NCAR beyond the fellowship year through continued use of the research facilities and collaborative research with NCAR project staff.

NCAR Engineers Register Mailed to Universities

An *NCAR Engineers Register*, listing all NCAR staff with engineering experience and their particular areas of expertise, was mailed in April to UCAR university Members Representatives, to the chairpersons of atmospheric science or meteorology departments of major universities, and internally at NCAR. The purpose of the *Register* is to facilitate communication among NCAR engineers and scientists and their university colleagues. Additional copies are available from Billie Wheat at NCAR ext. 392.

Klystron Tubes Are Available

The Field Observing Facility has acquired a substantial number of Klystron tubes (model VA - 87B) from GSA (General Services Administration) surplus that are available for distribution to universities operating FPS - 18 radars. Requests——including a short justification——should be mailed to Robert Serafin at NCAR.