IHOP_2002 Newsletter
January 2003

The purpose of the IHOP_2002 Newsletter is to provide the IHOP community with information on IHOP announcements, meetings, article submissions, instrument/data findings, etc. The newsletter will be produced on a quarterly basis.

If you would like to contribute, please send your submissions to tignor@ucar.edu. Figures and images are always appreciated

Upcoming Events:

IHOP_2002 Spring Science Workshop
24-26 March 2002 - Boulder, Colorado

IUGG 2003 General Assembly
30 June-11 July - Sapporo, Japan
http://www.iamas.org

Summary of Atmospheric Boundary Layer Workshop
by Fei Chen & Peggy LeMone, NCAR

Approximately 20 scientists involved in the characterization of surface-atmosphere interactions and their contributions to water-vapor fluxes and heterogeneity met at NCAR on 5-6 August 2002 to update the availability and quality of the surface, aircraft, sounding, S-Pol radar, and supplementary data from IHOP; assess the user requirements for those data; determine the steps needed for obtaining data required for running land-surface models that were not measured; and to explore collaborations in data development and research. Participants came from NCAR, JOSS, the University of Colorado, Oregon State University, Pennsylvania State University, the University of Wisconsin, North Carolina State University, and Colorado Research Associates. The workshop was convened by Fei Chen and Peggy LeMone, NCAR. Representatives from JOSS provided information of data availability and helped participants plan their contributions to the IHOP dataset.

IHOP/NCAR/CU
SURFACE, SOIL & VEGETATION NETWORK
by Fei Chen & Peggy LeMone, NCAR

Overview

Ten flux-tower stations were strategically located along three boundary-layer-mission flight tracks (western, central, and eastern flight legs, as seen on Fig. 1) and over various land-use types that include winter wheat, grassland, sparsely vegetated surface, and bare ground. In addition to the differences in land-use types, the prolonged drought in the Oklahoma panhandle intensified the gradient in surface evaporation between the dry and sparsely vegetated in the panhandle and wet prairie lands in eastern Kansas.

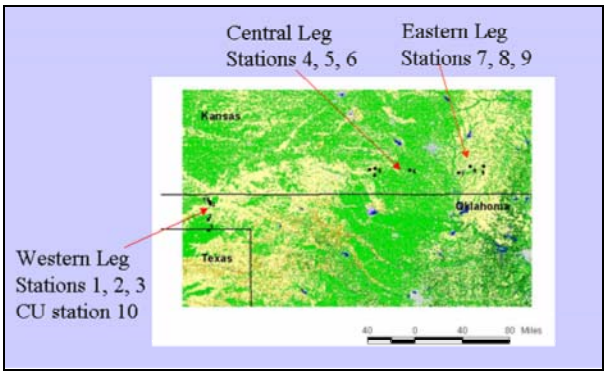

Fig. 1. Location of IHOP/NCAR/CU flux-tower stations

Nine of these ten flux stations were enhanced by adding soil and vegetation sensors. One profile of soil moisture and temperature sensors was installed at seven stations, and three profiles of soil sensors were deployed for each of the two 'super' stations (1 and 9) to investigate the heterogeneity within a site. For each profile, soil moisture and temperature sensors were installed at six soil depths (with the deepest layer at about 90 cm). Decagon ECH2O Dielectric Aquameters and Campbell Heat dissipation Matric Water Potential (C229) were used to measure soil moisture and soil water tension. Licor LAI-2000, Cropscan MSRSYS5 radiometer, Licor LI-1600 Porometers, and Infred-Red Thermocouple were employed to measure leaf area index, NDVI, stomatal resistance, and temperature profile within canopy, respectively, on the weekly basis. The measurement at those surface stations will provide a full array of surface and near-surface data, CO2 concentration at two stations, soil moisture and temperature at six soil depths for each station, various soil properties, weekly measurement of vegetation parameters, and the diurnal cycle of stomatal resistance at a few selected sites.

Preliminary Results

The ATD group, led by Tom Horst, has been working on the quality-control of surface-tower observations, which was particularly daunting for the water vapor flux. This also involved corrections to <w'tc'> and <w'kh2o'>. The corrected 5-minute dataset are available for download at:
http://www.atd.ucar.edu/rtf/projects/ihop_2002/isff/report.shtml#DataDownload

Note that the five-minute fluxes are computed relative to the five-minute means; to obtain "total" fluxes, it is necessary to add the product of the five-minute means of w ant kh2o or w and tc. The next step is to calculate half-hour-average of surface heat fluxes, wind, temperature, humidity, and surface radiative fluxes.

Vegetation and soil characterization data including photos, LAI, and MSR measurements have been processed and are now available at: http://www.rap.ucar.edu/projects/land/IHOP/index.htm

Richard Cuenca, at Oregon State University, is leading the effort to use individually calibrated formulation to derive volumetric soil moisture from the ECH2O measurements for 13 soil profiles installed at nine stations. The next step is to process measurements obtained from Campbell Heat dissipation Matric Water Potential (C229) probes.

Fig. 2 shows large contrast in the rainfall accumulation among western and eastern stations. In general, the western leg is drier than the central and eastern leg during the IHOP field experiment. Also observed is the large variation in rainfall and evaporation at stations located at the same flight leg. Note that even though the soil was wet at three eastern stations, significant evaporation only occurred after late-May (for station 9) and mid-June (for stations 7 and 8). The dominant land-use type for eastern leg is grassland. This type of surface evaporation evolution may be largely due to the seasonal variation of vegetation characteristics. Showing on Fig. 3 is the weekly measurement of leaf area index (LAI) at a wheat site (station 5) and at a grass site (station 8). LAI was measured along a transect, which is typically 50 to 100 feet long at each station. The wheat was at its peak growing season at the beginning of the experiment, but the grass was dormant at the beginning but experienced a rapid greening process in late may. This explains the late surge of evaporation at station 8. However, it seems, from the preliminary results, that other processes, in addition to rainfall and vegetation greening, also influence the evolution of surface evaporation and plant transpiration.

In summary, this comprehensive and unique surface, soil, and vegetation data set will be useful to investigate temporal and spatial distribution of surface water vapor during vegetation growing season. Continuous measurements of soil moisture content, soil water tension (potential), and soil temperature profiles at six soil depths, together with weekly vegetation and stomatal canopy resistance will help improve soil hydraulic conductivity and vegetation parameterization schemes used in land surface models.

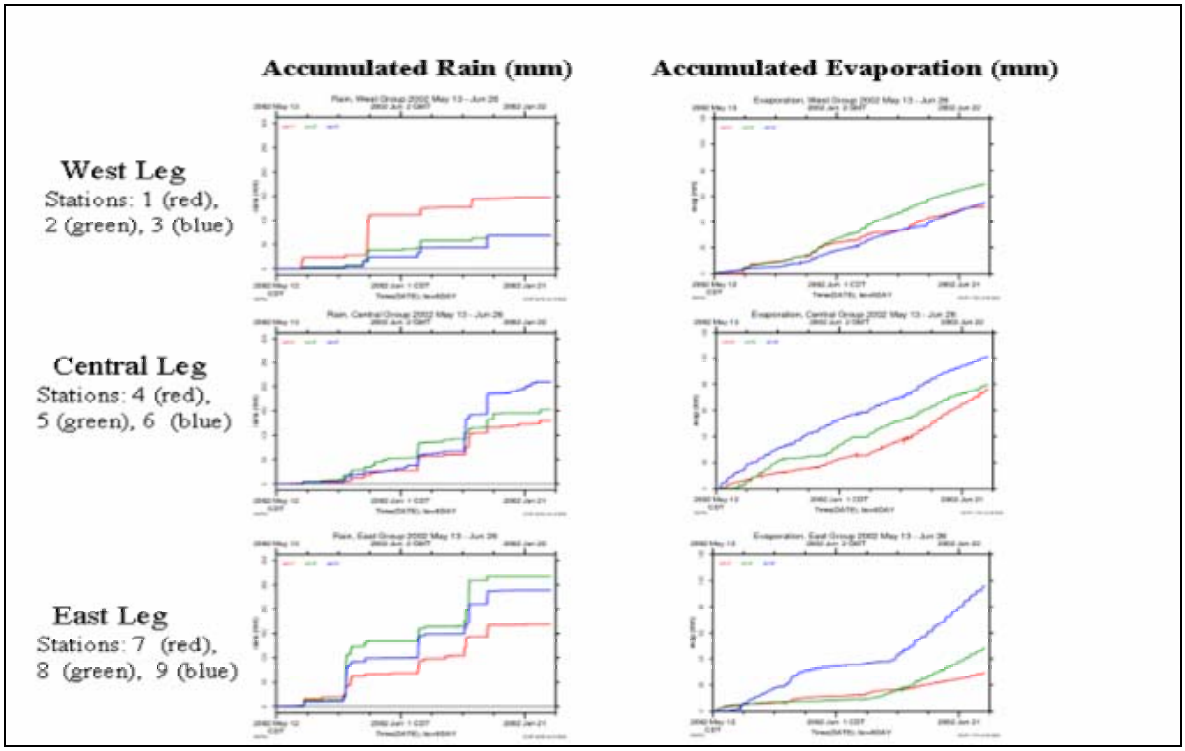

Fig. 2: Comparison of accumulated rain and surface evaporation measured at stations 1-9. Note that results shown here are based on raw data, which have not been quality controlled.

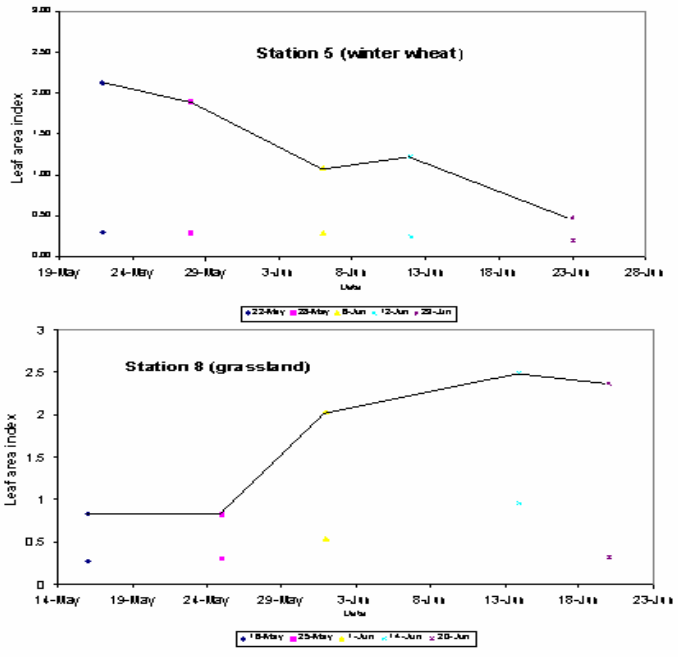

Fig. 3: Leaf area index (LAI) measured at stations 5 and 6. The line represents the averaged along a transect at the station, while the dots represent the standard deviation of these measurements along the transect for a given time.

Summary of First IHOP-FRA Mtg.
by Cyrille Flamant, CNRS

The first post field phase IHOP-FRA meeting was held in Paris on 10 and 11 September 2002 under the hospices of Service d'Aéronomie at the University Pierre et Marie Curie. It gathered 17 French scientists (including 6 PhD students) and a distinguished NCAR visitor, Dave Parsons, on his way back from the QPF meeting in Reading, UK. Among the 17 scientists (not including Dave), 9 had participated in the experiment via the LEANDRE II, GPS or modelling effort.

The objectives of the meeting were to: (i) present the general objectives of IHOP and highlight what was accomplished during the field phase, (ii) briefly recall the ovjectives and focus of IHOP-FRA as defined in the proposals to the funding programs of CNRS, (iii) present the status of the LEANDRE II and GPS data acquired during IHOP, (iv) define the priority IOPs of interest to the 3 groups (LEANDRE, GPS, modelling) composing IHOP-FRA, (v) present the ongoing activities conducted in connection with IHOP, and (vi) discuss the content of the 2 PhDs dedicated to the analysis of IHOP data (PhD students: F. Couvreux and K. Lhomme).

DATA STATUS

LEANDRE II: C. Flamant presented the status of the LEANDRE II data. On-board the NRL P-3, LEANDRE II collected 142 h of data breaking down as:

- Boundary-Layer Heterogeneity - 7 missions for a total of 35 h 28 min.
- Boundary-Layer Evolution - 3 missions for a total of 21 h 16 min.
- Convective Initiation - 12 missions for a total of 73 h 18 min.
- Evening Low-Level Jet - 2 missions for a total of 11 h 19 min.

Out of the 24 missions, 12 LEANDRE II datasets were identified as being of high quality:

- Boundary-Layer Heterogeneity - 27 and 29 May 2002, 7 June 2002
- Boundary-Layer Evolution - 14, 21 and 25 June 2002
- Convective Initiation - 10, 12, 15, 19 June 2002
- Evening Low-Level Jet - 8 and 20 June 2002

The LEANDRE II data will be reprocessed by K. Lhomme and C. Flamant (CNRS), as well as T. Weckwerth and C. Pettet (NCAR).

GPS: J. van Baelen presented the status of the GPS data acquired by the 7 stations operated jointly by CNRS and Meteo-France to complement the existing GPS networks. The seven stations are summarized:

BLAC	Blackwell	36.7544° N	97.2539° W
BREC	Breckenridge	36.4119° N	97.6942° W
BURB	Burbank	36.6342° N	96.8111° W
GUTH	Guthrie	35.8489° N	97.4800° W
MEDF	Medford	36.7922° N	97.7456° W
OILT	Oilton	36.0314° N	96.4972° W
REDR	Redrock	36.3536° N	97.1531° W

All stations have acquired data from 13 May to 25 June 2002, with the exception of BURB (which started the acquisition on 18 May) and OILT (which stopped acquiring data on 18 June. The data will be processed with the GAMIT software by J. van Baelen.

PRIORITY IOPs

One priority IOP has been selected for each type of mission (on the basis of the 12 successful missions performed by LEANDRE II). Members of the LEANDREII, GPS and modeling gropus agreed on following IHOPs:

- Boundary-Layer Heterogeneity - 29 May 2002
- Boundary-Layer Evolution - 14 June 2002
- Convective Initiation - 12 June 2002
- Evening Low-Level Jet - 20 June 2002

Summary of Convective Initiation Workshop
by Tammy Weckwerth, NCAR

An IHOP_2002 CI workshop, hosted by Belay Demoz at the Joint Center for Earth Systems Technology (JCET) at the University of Maryland - Baltimore County, was conducted 30 September - 1 October 2002. There were 32 attendees, including representatives of most of the IHOP_2002 instruments as well many of the IHOP_2002 researchers intending to do CI analyses. Please see http://www.atd.ucar.edu/dir_off/projects/2002/IHOP.html for a list of attendees.

The goals of the workshop were to i) obtain updates on the status of the various IHOP_2002 datasets, ii) present preliminary scientific analyses and priority days and iii) foster further collaborations. The meeting commenced with the IHOP_2002 instrument representatives who presented data summaries, preliminary analyses, problems and data availability plans. These presentations were followed by those of the CI scientists who discussed their preliminary research plans and objectives, priority days, datasets required, planned collaborations and requests for thesis/dissertation 'protection.' Many of the presentations are available at the above web site. A spreadsheet of the research plans was prepared during the presentations thereby identifying potential conflicts. The majority of these potential conflicts have since been resolved to the satisfaction of all of those involved. The meeting was highly successful with all three stated goals.

Convective Initiation Presentations:

http://www.atd.ucar.edu/dir_off/projects/2002/IHOPci/IHOP_CI_presentations.html

Data Management & Access
by Steve Williams, UCAR/JOSS

The IHOP Data Management activities are being coordinated by UCAR's Joint Office for Science Support (JOSS). These activities include: (1) collection, post processing, and quality assurance of operational data; (2) replacing missing data not obtained in the field from back-up and other sources; (3) ingesting these operational data sets and field catalog products into the JOSS Data Management System (CODIAC) for dissemination; (4) coordinate data access with the other Archive Centers to ensure additional operational data are made available via distributed archives; and (5) obtain preliminary and final research data sets and metadata from the IHOP_2002 investigators. To organize these activities JOSS maintains IHOP Data Management WWW pages located at: http://www.joss.ucar.edu/ihop/dm/ . These pages (also linked from the IHOP "Home" Page) provides access to IHOP data, documentation, on-line field catalog products, data submission/guidelines, collaborating project data archives, and other relevant data related links. The "Data Access" link from this page (or located directly at: http://www.joss.ucar.edu/ihop/dm/archive/) consists of a master table of all IHOP data sets with links to distributed data sources (including documentation). As data sets become available, this table is updated providing an easy "one-stop" access to all IHOP_2002 data sets.

To improve data access from disparate sources of data (in various formats and time intervals), JOSS plans to produce both surface and upper air sounding composite data sets. The surface composite data set will involve: (1) the collection of all operational/research surface network data from all available sources; (2) extraction of common standard meteorological parameters; (3) conversion of all data to a common format and time stamp; (4) provision of uniform quality control; and (5) generation of final composite data sets at various time resolutions (i.e. 1-min and hourly). In addition, separate composites of in-situ precipitation data (15-min, hourly, and daily) will be generated. Similar to the process outlined above for surface data, two upper air composites will be generated from operational and research rawinsonde data. These include: (1) All soundings in highest vertical resolution; and (2) All soundings interpolated to 5-mb levels (important for use in model ingest and initialization). All of these surface and upper air composites will be available through the IHOP "Data Access" table described above. The major advantage of creating these surface and upper air composite data sets is cost efficiency thus eliminating the requirement of each investigator to individually re-process and reformat separate network data sets. Plus, these composites will contribute to the formation of a possible merged 4D water vapor product.