International Tundra Experiment Update - November 1993 (No. 5)

ITEX in operation

During the past summer ITEX was installed in its final shape at many of the sites already iden-tified. Full-scale operation of Level 1 experimen-tation with open-top chambers has now been established at Latnjajaure (Sweden), Kilpisjärvi (Finland), and most of the Canadian sites, and implementation has started with a few chambers at the U.S. sites and in Taimyr and the Ragoschnij Peninsula, Anadyr, the easternmost Russian site. Large sets of ITEX Corners are in operation on Disko Island (W Greenland), Taimyr (Russia), and Bidmer (Swiss Alps), and there are additional corners at the Finnish and Swedish sites. New ITEX sites have been added that are at various stages of implementation, such as Finse in the high mountains of southern Norway, the field station of the university of Zurich in central Swit-zerland, and a site in upland Kamchatka in the Far East. From a small set of enthusiasts working on pilot studies at pioneer sites a few years ago, ITEX is now very rapidly developing into a full-blown research program, already operational at a cir-cumpolar level.

CANTEX, the increasingly active Canadian branch of ITEX, will be holding their Annual Meeting on November 20, 1993, at Erindale Col-lege, University of Toronto, under the chairman-ship of Josef Svoboda. The CANTEX program has proliferated from an ITEX nucleus to include re-search on microclimate, UV-B, permafrost, nut-rient cycling, and arctic insects. Several new sites to be established will be discussed. There is a noticeable emphasis on collaboration with the scientists of the International Permafrost Assoc-iation (IPA), an initiative of mutual benefit and recommended for other ITEX countries as well. Twenty-seven participants were invited to this meeting, most of which have confirmed – an amazing number!

The international conference "Global Change and Arctic Terrestrial Ecosystems", hosted by the Norwegian Institute for Nature Research (NINA) in collaboration with IGBP-GCTE, and held at Oppdal in central Norway, 21–26 August 1993, was another great forward step for ITEX. Even though there was no official ITEX meeting in connection with the conference, a lot of active ITEXers from most of the participant countries met and informally discussed ITEX matters. Some of the presented papers emanated from research at ITEX sites, either as direct products of the central research program or as ITEX-related research. The purpose and organization of ITEX was presented in a poster by the Swedish ITEX team.

The last issue of the MAB Northern Sciences Network Newsletter (No. 14, October 1993) pro-vides a wealth of information for ITEX collabora-tors. The contents include an extensive list (with maps and contact directions) of northern terrestrial research sites (Slaughter et al.) which will be very useful to all tundra ecologists, conference reports, informative reports from the field activities in Taimyr, and a presentation of the Danish Polar Center, the new home for the MAB NSN Secretariat and with ITEX living next-door.

Results begin to build up from the ITEX field operations, and the next international meeting (The 5th ITEX Workshop, St. Petersburg, March 1994; see below) will be the project's next mile-stone. The first data sets from temperature enhan-cement manipulations, using the designs defined in the ITEX Manual, will be presented, and the species-specific working groups will process the results into scientific papers. Even though we, with few exceptions, have only short-term read-ings so far, there are some striking similarities in the results coming in from remote parts of the Arctic. I hope to see a large number of progressive ITEXers at the promising St. Petersburg meeting!

Ulf Molau, chair

Report on the Oppdal Conference

The conference "Global Change and Arctic Terrestrial Ecosystems", hosted by the Norwe-

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gian Institute for Nature Research (NINA), was arran-ged in Oppdal, Norway, 21–26 August, 1993. The meeting gathered 153 participants from fifteen countries, with the strongest representation from the United States, Canada, Russia, and Scandi-navia. Scientifically as well as technically, the conference appears to have been very successful. The symposium work-shops covered broad topics like future research needs in arctic terrestrial ecology in the sce-nario of climate change and organization of the scientific community at the international level. Through their active partici-pation in all discussion, the presence of the twenty Russian scientists added substantially to the out-come of the meeting, and we feel that the confe-renece was an important step in improving the East-West collaboration in arctic terrestrial ecology, and particularly within the GCTE (Global Change and Terrestrial Ecology) program.

The results of the conference will be made public in several ways. Invited papers will be pub-lished after peer review by one of the international publishers under the editorship of the conference president, Walt Oechel. Contributed papers and poster ab-stracts will be published in another vo-lume. Workshop reports and recommendations will be published as a report from NINA, and the Executive Summary will be used to revise the IASC Research Plan on Global Change.

Reported by Jarle I. Holten
Conference Co-ordinator

Canadian ITEX Activities in 1993

ITEX-related research continued at two of the Canadian sites this past summer (Alexandra Fiord and Baker Lake). Unfortu-nately, the Hot Weather Creek site on Ellesmere Island was not monitored because health problems prevented Sylvia Edlund from getting into the field. We hope to have measurments from Hot Weather Creek again next year. A new site is planned for Churc-hill, Manitoba, and should be operating next summer with help from Josef Svoboda, Peter Scott and Bob Jefferies. This will give us sites in the Low, Mid and High Arctic. Each site will have tundra warming experiments (open-top chambers) and snow melt studies. We still hope to establish a site in the MacKenzie Delta region of the western Arctic.

ALEXANDRA FIORD

The second full season of ITEX research at Alexandra Fiord, Ellesmere Island, was extremely successful. Plants were measured in paired con-trols and OTCs, that have been established in four major plant communities, from snowmelt (1-14 June) to the end of August. A new site (Level 2) was established in a polar semi-desert community. We followed phenology and growth of 11 species (total of ca. 900 plants) every four days in the expe-rimental plots. The weather was considerably bet-ter than in 1992, which contributed to our success.

Species

Salix arctica - Michael Jones (Ph.D. student) con-tinued to follow the responses of male and female plants in warming experiments estab-lished in both wet and dry communities. The plants show both advanced phenology and increased growth in the OTCs. Rates of net photosynthesis were again measured on *Salix* (and other species) in and out of the OTCs during early July, with the help of Ellen MacDonald, University of Alberta. Seeds were collected from plants in experimental plots, and planted in germination plots in a factorial design for habitat, provenance and treatment (+ or – a smaller OTC over the germination plot). The bulk of this project will be completed next season with harvests of tagged plants for biomass and nutrient allocation studies. Michael is currently running a controlled environment experiment with increased temperature and 2xCO_2.

Cassiope tetragona - Jill Johnstone (M.Sc. student) completed her fieldwork this past season and is hoping to finish her thesis by September, 1994. She has two years of re-sponses of *Cassiope* to the OTCs and in a snowmelt manipulation. Her preliminary results show that *Cassiope* is a relati-vely conservative species with slightly advanced phenology and increased growth, but did show increases in flowering rate. She collected

tagged shoots to use in retrospective growth analyses. The growth will be calibrated with climate data collected at Alexandra Fiord for the past 12 years. Germination experiments were also established in one of the mesic sites for *Cassiope*.

In addition, the following species were measured in at least one community in the Alexan-dra Fiord lowland during the 1993 season: *Dryas integrifolia, Oxyria digyna, Papaver lapponicum, Carex membranacea, Eriophorum angustifolium, Carex misandra, Luzula arctica, L. confusa*, and *Arctagrostis latifolia*.

Seeds of *Dryas, Oxyria*, and *Papaver* were collected from plots in three sites, and planted in germination experiments. These will be evaluated next year.

Climate Data and OTC Performance

A full year of temperature and snow depth was recorded at one of the intensive study sites. Problems at another site were remedied and, along with the new site (see below), we have three sites fully instrumented for continuous tempera-ture measurements from replicated thermocouples in OTCs and controls. The data show that the OTCs work well, increasing the mean surface tem-perature by 2-5 C. Snow melt in some OTCs was accel-erated somewhat (0-3 days), but on the whole both accumulation and melt rates were similar to controls. Only one OTC, out of nearly 60, had any noticeable damage over the winter, and it was not permanent.

New Initiatives

As mentioned above, germination experi-ments are now established in two sites to investi-gate the effects of the OTCs on germinability. A smaller version of our OTC is used in these expe-riments. These studies are combined with measu-rements of seed set in the major species.

Also, as mentioned, a polar semi-desert site was established on the plateau above the low-land (500 m). The site has a sharp unconformity between granitic and dolomitic substrates, and OTCs and controls were established on both. An automatic climate station monitors thermocouples placed in 3 plot-pairs on each lithology. Tagged plants of *Saxifraga oppositifolia* are measured on both substrates, with *Salix arctica* on granite and *Dryas integrifolia* on dolomite.

Experimental plots were established to investigate the effect of warming on the herbivory of *Salix arctica* by the woolly bear caterpillar (*Gynophora groenlandica*). The experiments will be conducted next season.

Funding and Personnel

This is the second year of a three year grant to G. Henry for this research from the Natu-ral Sciences and Engineering Research Council of Canada. Additional funding is provided to gradu-ate students and assistants through the Northern Scientific Training Program of the Canadian De-partment of Indian Affairs and Northern Develop-ment. The invaluable logistical support is provi-ded by the Polar Continental Shelf Project.

This year's crew consisted of graduate students Michael Jones and Jill Johnstone, and undergraduate field assistants: Rosalind Barring-ton Leigh, Marge Meijer, Shawn Francis, and Pat Williston. The intensive, repetitive measurements require a very dedicated and "fun loving" group of research-ers, and I was lucky to have this crew in the field.

BAKER LAKE

Josef Svoboda again monitored tagged plants of *Dryas integrifolia, Cassiope tetragona*, and *Saxifraga tricuspidata* in a large snow bank area near the village. Josef's son Andrew followed the plants and snow melt from late June to late July. Josef and Richard Staniforth (University of Winni-peg) established three OTCs at the site in August. We hope to put in more OTCs next season. The site is near a weather station at Baker Lake, and the Cana-dian Atmospheric Environment Service is putting in an automatic climate station close to the site.

Reported by Greg Henry

Progress in Northern Fennoscandia

In May 1993 the first ITEX Open-Tops Cham-bers (OTCs) were installed at the Swedish site, Latnjajaure. The growing season

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in northern Fennoscandia started earlier than ever in the nine-ties with a warm period in May, but was later somewhat retarded by a cold June. The July and August mean temperatures were well above ave-rage for the last four years, and the summer as a whole was about 1°C above normal.

In addition to the 20 ITEX Corners installed around *Salix herbacea* plants in 1992, there are now 32 OTCs at Latnjajaure. The species manipulated in 1993 were *Cassiope tetragona, Dryas octopetala, Eriophorum vaginatum, Ranunculus nivalis, Salix herbacea*, and *Saxifraga oppositifolia*. After this sea-son, a general result of short-term manipulation appeared: In evergreen and wintergreen species, the phenology was speeded up significantly with enhanced temperature, but there was no effect on vegetative growth. The opposite applied for the deciduous species (*Ranunculus* and *Salix*), with little effect on phenology but a significant increase in vegetative growth. The equipment worked very well, and the OTCs elevated the ground sur-face temperature a little more than 2°C above ambient. For soil temperature at 5 cm depth, the amelioration was 0.5 – 1°C depending on the moisture of the site. We saw no negative effects of the treatment except a decreased seed set in wind-pollinated species (i.e., *Eriophorum*).

At the end of the 1993 season, our pilot study with large sheets of ground-cover fabric, started in June 1991, was closed down, and the terrain looks nice and clean again (OTCs cause less aestethical disturbance!). The effects of this 3-year treatment on the plants were very obvious. We have a gene-ral feeling that the phenology was speeded up in all plant species under cover, but this was difficult to assess without disturbing the system. Destruc-tive sampling at the end of the two last seasons showed a massive increase in leaf biomass in the deciduous species, whereas evergreens stayed almost unaffected by the 2–3°C temperature en-hancement caused by the covers. In the cold sum-mer of 1992 (July mean temperature was +5.8°C) the increase in leaf dry weight in *Vaccinium uliginosum* was as much as 148 %, but in the more normal season of 1993 (July mean +8.5°C) the increase was only 36 %, still highly significant. In *Salix herbacea*, the increase in leaf dry weight in the experiment was 47 % in 1992, also highly signifi-cant. For the evergreen *Empetrum hermaphro-diticum* the increase was only 13 % in 1992 (low significance) and a similarly low increase was recorded in *Cassiope tetragona*. The fresh weight of ripe *Empetrum* berries, however, increased with 107 % in the cover plots in 1993.

A pilot study using standard gardening cold-frames (glass/aluminum) was removed during 1993 since the frames all crashed during the win-ter. *Ranunculus nivalis* growing in cold-frames (3°C increase) in 1992 produced nutlets that were 64 % heavier than in untreated control plots, and their relative germination rate was almost twice as high (91 % increase). In *Polygonum viviparum* the increase in bulbil fresh weight was 26 %, but the increase in relative germination rate as high as 168%!

At the Finnish ITEX site Kilpisjärvi 30 OTCs were installed on the mountain of Pikku-Malla by Kari Laine and collaborators, including tempera-ture manipulation on *Dryas octopetala* and *Salix herbacea*. ITEX Corners were installed already in 1992 around plants of *Salix herbacea* and *Saxifraga oppositifolia* (20 corners each). A small climate station with a data logger has been established at the site. There are also ten OTCs on *Vaccinium myrtillus* just above the timber-line, and an addi-tional set at the subalpine Kevo site. Urban Nordenhäll (Sweden) was for the second year running parallel experiments on *Salix herbacea* at Kilpisjärvi (low alpine) and Latnjajaure (middle alpine) for his Ph.D. thesis.

Reported by Ulf Molau

An Alpine ITEX Network

This past season an alpine network of ITEX sites has begun to crystallize. This is particularly welcome since alpine tundra in some respects differ from the proper Arctic (e.g., solar angles, annual temperature variation, precipitation, etc.), even though many of the species are shared. In addition to the well established site at Niwot Ridge in the Colorado Alpine, there is now a site in the central Swiss Alps, "Bidmer" at the Furka Pass (2,500 m.s.m.), run by Mathias Diemer and Chris-tian Körner at the University of Basel. The 1993 activities involved temperature manipulation on *Carex curvula* using ITEX Corners, but OTCs will be added in 1994. This sedge is a suitable target species since the leaves are evergreen and the annual growth increments easy to measure non-destructively. So far the main activity at this site has been *in situ* manipulations with

CO_2 enrich-ment in another kind of OTCs.

The next new alpine site is located at the Finse Field Station at ca. 1,200 m altitude on the high plateau of Hardangervidda in south central Nor-way. Finse is a small railway station on the very summit of the Oslo–Bergen railroad, a very snow-rich area. A full-blown climate station was instal-led this autumn and the first OTCs will appear in early June 1994. The site is run by Inger Nordal and students (University of Oslo) and Ørjan Tot-land (University of Bergen).

Finally, there are plans for another site in the Swiss Alps by botanists at the University of Zu-rich. Professor J. Schneller and his students (Felix Gugerli, *Saxifraga oppositifolia*, and Martin Bauert, *Polygonum viviparum*) will implement an ITEX site at their high altitude field station in 1994. It would be valuable to have sites in other parts of the Alps as well as in East Asia, perhaps the high tropical mountains, and in the Southern Hemisphere in the future. Naturally, common species cannot be used in such an alpine network, but we would encou-rage use of target plants belonging to some com-mon "functional types"

Reported by Ulf Molau

ITEX goes to Chukotka

In the summer of 1993 ITEX was established in the vicinity of Anadyr in the Russian Far East. Vladimir Razzhivin (St. Petersburg) and Ulf Molau (Sweden) went there together in July and worked in the field together with staff from the Chukotka Scientific Center (Anadyr) in order to identify suitable ITEX sites. The weather was nice (also for billions of mosquitoes) and we visited many po-tential areas during some hectic days. We finally identified one primary site, the Ragoschnij Penin-sula, located on the N side of the Anadyr Gulf 30 km W of town. There are no roads, but the area is easily accessible by boat. The Ragoschnij site con-sists of beautiful undisturbed rolling *Eriophorum* tussock tundra. There is a small field station be-longing to the Science Center, now being restored for a long-term permafrost monitoring project un-der the leadership of Dr. Anatolij Kutov, Anadyr. This close collaboration between ITEX and permafrost researchers ensures permanency of the site operation. A few OTCs were erected for manipu-lation of *Eriophorum vaginatum* during our stay, and more will be completed little by little, inclu-ded some OTCs devoted for monitoring the im-pact on permafrost and the depth of the active layer. A potential second site in drier mountain tundra, suitable for experimentation on *Cassiope tetragona* and *Dryas punctata*, was identified about 10 km south of Anadyr towards the Mt. Dionisija. We sincerely thank Anatolij Kutov and the staff of the Science Center for their help and hospitality, and for the delicious salmon soup.

Reported by Ulf Molau and Vladimir Razzhivin

ITEX at Lake Taimyr in Siberia

"Blizni Research Station" is one of the northernmost field stations in the world. It was estab-lished on the northern bank of Lake Taimyr, cent-ral North Siberia, in the summer of 1993, and is now a well established ITEX site, with ITEX Cor-ners around *Cassiope*, *Dryas*, and *Papaver*.

Late in the season we (Karen Christensen and Per Mølgaard) had the great opportunity to join an expedition to the Taimyr Peninsula in northern Siberia. The participants were primarily mycolo-gists and the organization was governed by Viktor Mukhin from the Academy of Sciences in Ekate-rinburg and Henning Knudsen from the Botanical Museum in Copenhagen. The entire group consis-ted of fourteen people, four of which visited the Lake Taimyr Research Station.

We arrived 18 August, unfortunately the day after the last resident botanist had left. However, we were welcomed by the remaining two scien-tists at the station, Andrei Ivanov (geophysicist and head of the station) and Igor Suetov (geo-morphologist). Their hospitality was outstanding and we had all the help we needed for establishing our ITEX Corners around *Papaver* plants. To-gether with Corners already established around *Cassiope* and *Dryas* by Nadya Matveyeva from the Komarov Institute in St. Petersburg, this makes the Lake Taimyr Station one of the major ITEX sites already from the first year of the station's existence.

Meteorological observations are carried out at the Polar Station 10 km west of the "Blizni Re-search Station", where Sergei Banderich has been in charge the last ten years. Every six hours he reads his instruments, and

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immediately after-wards the results are transmitted by telegraph to central data processing. For the last four years he has been on duty without a single day off in this remote part of the world, where he lives with his wife and a four-year-old daughter. Also at this place we met the most memorable hospitality.

In the evenings at the "Blizni Station" we were delighted with the famous, air-dried Taimyr sal-mon and other freshwater fish, and in the most charming way Andrei entertained us with his guitar-accompanied folk songs. We left on the 22 of August after a few hectic and chilly field days, the same day as the station was closed down for the winter. Frost and snow arrived accordingly.

Khatanga in the southeastern part of Taimyr was our main base during the expedition, and from there we had access to the northernmost forest in Siberia (and in the whole world). Here some snow-related investigations on plant growth are carried out by Mukhtar Naurzbaev, now also an ITEXer. He and his wife Nataly were of great help with the logistics during our stay in Khatan-ga. During the last twenty years Nataly has car-ried out a caribou survey on the 600,000 wild rain-deer living in the Taimyr area, and she has a most valuable knowledge of the nature reserves of Taimyr.

We feel so much indebted to our hosts and wish in this way to acknowledge their kindness, help, and generosity that we met in Taimyr.

Reported by Per Mølgaard

The 1994 Tundra Expedition

SWEDARCTIC, the Swedish Arctic Research Programme is in collaboration with the Russian Academy of Sciences arranging a major ship-ba-sed expedition focusing on the ecology of the Rus-sian tundra during the summer of 1994. The ves-sel, M/S Akademik Fedorov, previously used in a number of Antarctic expeditions, will leave St. Petersburg in mid-May and first go to Gothenburg in Sweden, where scientific equipment will be taken on board. The route of the 1994 Tundra Expedition will largely follow the famous route of Nordenskiöld during the Vega expedition 1878–79 (the Northeast Passage) along the north coast of Russia, from the Kola Peninsula in the west to the Chukchi Peninsula in the east. There will be two helicopters on board the ship and, according to the plan, field work will be carried out at 18 different sites for periods of 2–3 days each. The expedition will be made in three legs with Khatanga in Taimyr as the main switch-point (leg 1 [June] Kola–Khatanga, leg 2 [July] Khatanga–Chukchi–Khatan-ga, leg 3 [August] Khatanga-Kola). A total of about 30 Swedish and 25 Russian scientists will join each leg, but only a handfull of people will go all the way. The scientific team is dominated by zoologists and plant ecologists, and ITEX and ITEX-related research is among the major issues. Besides of the Russian (N. Matveyeva, V. Razz-hivin, and L. Zanokha, all from the Komarov Institute, St. Petersburg) and Swedish ITEXers (I. S. Jónsdóttir, A. Lindskog, M. Havström, U. Molau, J. Alatalo, U. Nordenhäll, and M. Stenström, all from the University of Gothenburg), there will be ITEX representation from Denmark (S. Jonas-son) and the U.K. (T. V. Callaghan). A training camp was held for the Swedish participants in Arvidsjaur in northern Sweden in September, and workshops for the scientific programs have been held in Sweden and in Russia. The expedition is SWEDARCTIC's largest commitment ever. For more information, please contact Inga Svala Jóns-dóttir (new address, see below), who is in charge of co-ordinating research programs in plant eco-logy.

Ulf Molau

The ITEX Movie

From a fund for financiation of science infor-mation and communication, Ulf Molau (Dept. of Systematic Botany) and Torbjörn Rosander, pro-ducer at the Unit for Audivisual Education and Production, both at the University of Gothenburg, have received just above US$ 10,000 to produce an ITEX video. The purpose is to make a 20–30 min video presentation of ITEX in general (purpose, structure), the arctic Global Change scenario, and the activities at Latnjajaure, the Swedish ITEX site, including some results. Modern technique will be employed that allows merging of data graphics (maps, plots, histograms, etc.) and live pictures from the field. The collaboration between the two university units is also an audivision research pro-ject of its own: How to produce low-budget-non-junk video presenta-

tions of scientific programs. The shooting will take place at Latnjajaure in the start of the 1994 growing season (late May and early June) and in mid-August. Professional spea-kers will be used, and there will probably be two versions (English and Swedish). The video tape is intended for a wide range of target groups and levels, including decision-makers, teaching in eco-logy and environmental sciences, poster sessions at symposia, science magazines and TV programs, and international organizations and funding bod-ies. Hopefully, a first version will be ready by next winter. If you have any bright ideas or thoughts regarding scope or contents of the "ITEX Movie", please contact Ulf Molau (and if you want to be a movie star you know when to visit Latnja ...).

Materials for Open-Top Chambers

The material recommended for OTC construc-tion in the ITEX Manual, Sun-Lite HP fiberglass, has turned out to be difficult to obtain in some countries, for instance in Scandinavia and Russia. For suggestions about alternative materials and construction details, contact Urban Nordenhäll, Dept. of Systematic Botany, Carl Skottsbergs Gata 22, S-413 19 Göteborg, fax +46-31-773-2677, e-mail sysdept@systbot.gu.se

The Fifth ITEX Workshop, 1994, in Russia

The Fifth ITEX Workshop will be arranged by Nadya Matveyeva and Vladimir Razzhivin, Ko-marov Botanical Institute, in St. Petersburg 16–18 March, 1994 (with arrival on the 15th). Important points on the agenda are progress reports, a re-view of the present climate at the ITEX sites, re-ports on results from the species-specific working groups appointed at the Oulu meeting (December, 1992), revision and improvement of the Manual, collaboration with MAB, IASC, and other organi-zations, and a revision of the constitution of the Steering Committee. After one season of practical test, the ITEX Manual needs updating and some addenda. Certain selected response variables have shown to be poor tools or difficult to apply in the field, and there is a demand for an additional chapter on calibration of meteorological instruments. The registration fee will be US$ 150 (75 for students). Kari Laine (Oulu) will charter a Finnish bus from Helsinki to St. Petersburg and back, which could be useful for other foreign participants as well. We expect a massive inter-national participation in this important workshop, where the first ITEX results are to be communi-cated.

The ITEX workshop will be succeeded by the Arctic Vegetation Map Workshop (21–25 March, 1994) arranged by Boris Yurtsev (Komarov Bota-nical Institute, St. Petersburg) and Skip Walker (INSTAAR, Boulder, CO, U.S.A.).

Other Meetings and News

16 - 21 February, 1994. Circumpolar Ecosys-tems in Winter 3 (CEW-3). Churchill, Manitoba, Canada, Contact: CEW-3, Churchill Northern Studies Centre, P.O. Box 610, Churchill, Manitoba, R0B 0E0, Canada.

22 - 25 March, 1994. Polar Tech ’94. An inter-national conference on development and commer-cial utilization of technologies in polar regions. Luleå, Sweden. Contact: Lena Allheim Karbin, CENTEK, Luleå University of Technology, S-951 87 Luleå, Sweden.

16 – 20 May, 1994. Third Circumpolar Sympo-sium on Remote Sensing of Arctic Environments. Fairbanks, Alaska, USA. Contact: Ken Dean, Uni-versity of Alaska Fairbanks (fax 907/474-7290; e-mail kdean@geewiz.gi.alaska.edu).

23 – 27 May, 1994. First GCTE Science Con-ference. Woods Hole, Massachusetts, USA. Con-tact: Will Steffen, GCTE Project Office, CSIRO, PO Box 84, Lyneham ACT 2602, Australia (fax +61-6-241-2362, e-mail wls@cbr.dwe.csiro.au).

3 – 8 July, 1994. Bipolar Information Initiatives: The Needs of Polar Research. 15th Po-lar Libraries Colloquy, Cambridge, U.K. Contact: William Mills, Scott Polar Research

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Other meetings, continued . . .

Institute (fax 02-23-336549, e-mail wjm@uk.ac.cam.phx).

20 – 24 August, 1994. VI International Con-gress of Ecology (INTECOL): Ecological Progess to Meet the Challenge of Environmental Change. Manchester, United Kingdom. Contact: Dept. of Environmental Biology, The University of Man-chester, Manchester MI3 9PL, U.K.

5 – 9 September, 1994. Second International Conference on Arctic Margins (ICAM). Magadan, Russia. Contact: Dennis Thurston, Anchorage, Alaska (fax 907/271-6565).

Dr. **Patrick J. Webber**, member of the Steering Committee and former ITEX chair, has taken a leave-of-absence from the Kellogg Biological Sta-tion in Michigan and joined the NSF Office of Polar Programs in Washington as the Director of the Arctic System Science (ARCSS) Program. His new address is: National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230, USA; phone (703)306-1029, fax (703)306-0139, e-mail pwebber@nsf.gov

Dr. **Ingibjörg Svala Jónsdóttir**, ITEX country representative for Iceland, has moved from the University of Lund to Göteborg in Sweden, where she has been appointed as lecturer in ecology. Her permanent new address is: Dept. of Systematic Botany, Carl Skottsbergs Gata 22, S-413 19 Göteborg, Sweden; phone +46-31-773-2663, fax +46-31-773-2677, e-mail svala@gemini.ldc.lu.se

Dr. **Ulf Molau**, ITEX chair at present, has not moved, but the phone and fax numbers have been changed: new phone no. +46-31-773-2665 and fax +46-31-773-2677. He has also (finally) got an e-mail address: ulf.molau@systbot.gu.se

The **MAB NSN** (Northern Sciences Network) Secretariat will, according to the agreement on rotation, be relocated to the Danish Polar Center in Copenhagen (same address as the ITEX Secre-tariat) from 1 December, 1993. Henning Thing (DPC) will be responsible of the new secretariat, and we thank Anna-Liisa Sippola for all her effort and achievements during the Rovaniemi epocha (1989–93). The new e-mail address to the NSN Secretariat will be dapcnsn@pop.denet.dk, other-wise the address is the same as that of the ITEX Secretariat.

We will circulate the next update in spring 1994. Please mail ITEX Manual addenda, project updates, prospects for funding, notes on methods and field experiences, upcoming events and mee-tings, description of field sites, etc., to the ITEX secretariat, Danish Polar Center, Strandgade 100, Build.1, DK-1401 Copenhagen K, Denmark (FAX +45-32-880101), or directly to Ulf Molau, Dept. of Systematic Botany. Carl Skottsbergs Gata 22, S-413 19 Göteborg, Sweden, phone +46-31-773-2665, FAX +46-31-773-2677, or e-mail ulf.molau@systbot.gu.se.

Please share this bulletin with others and tell them that they may contact Danish Polar Center for information. ITEX encourages all tundra specialists and students to become involved.