The final working report for AC21-Project from China Team

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1. The final work activating report for AC21-Project

The date (year-month-day)	**Project activating timelines**
2008-3-1	The project had set up an international research team and a database from China, Australia，Vietnam and Philippines in Nanjing University, China.
2008-3-9	The project team in Nanjing University had been workshop and trained the ten young scientists on advanced methods of remote sensing technology and GIS and urban landscape pattern analysis in 9-13.
2009-2-5	Our project wrote the application pre- proposal book and set up the plan to the AC12.
2009-2-16	Our project had sent the official application proposal on the AC12 and two Appendix documents to the AC12.
2009-5-15	The project team began to collect some data and research materials on the proposal works in China .
2009-8-25	Dr. huang in China visited the Sydney University and gave the scientific lectures on the global change and Food Safety and collected and observed a serial of scientific data and information in China and Australia.
2009-11-17	Given the very busy of two Prof. Kennedy & Prof. Jonathan, they let Prof. David Goodmanhad of the Sydney University had visited the Nanjing University and given a lecture “Sino-Australian Academic Seminar on Food Safety Affected by Global Warming” and set up a bridge for the two University in food safety cooperation as well as the broader study of food safety system
2009-11-18	Prof Jianlong Li had joined the international meeting “the Global Warmer and Food Safety Studies Workshop in Nov.18-21 in National Central University, Teiwen, China.” and given a lecture the title““Analysis on urban land-use changes and its impacts on food security in Chine using modified CA model”.

2. The final detailed financial report for AC21-Project

(1) Collecting data and fieldwork fares at each of two countries: $1,200;

(2) Communicating fares (2 countries×200): $ 400;

(3) Travel round expenses of Dr. Huang and Prof. Li: $ 2,600

(4) Accommodation& Diem: $600:

(5) Printing and Copy: $300;

The total of financial fund: $5,100.

3. The final project result report for AC21-Project

With the development of the society and improvement of technology, people's food consumption is turning to quality and safety with its quantity improving. Meanwhile, food safety has already gone beyond the national boundaries and becomes a global problem with the acceleration of globalization. Recent trends in global food production, processing, distribution and preparation are creating an increasing demand for food safety research. Improving the food quality safety level is also one of the important things that our country is urged to resolve, Food safety is now a top concern of government at all levels and the society. Now, Australia, U.S. , Japan and other developed countries are representative of advanced food safety level. They have effective and harmonious supervision system, comprehensive and easily operational system of laws、regulations and standards; They possess the most advanced and complete testing technical system, implement the processing and animal disease control、pesticide-residue and Veterinary drugs control、the circumstance and contamination control、pathogenic microbial control、the third country food market access management and control, emphasize the whole course supervision from the farm to the fork, reinforce the food producer and merchandiser's own responsibility of ensuring food safety; the enterprises implement the HACCP certification, strength the self-control such as voluntary product recall; their governments reduce the excessively detailed legal restriction, stress on the consistent and harmonious of food policy. It is clear that China should enhance the food safety level by using the references of foreign experience and advanced operation.

In order to reach these aims of Sino-Australian Food Safety Academic Seminar, our team had made some works as bellows in 4-12, 2009:

(1) collected and observed a serial of scientific data and information in China and Australia;
(2) built scientific capacity through setting a international disciplinary team, a database and educating scientists；
(3) visited China and Australia each other and had given some Academic Seminar in two university teachers;
(4) provided an integrated technical report of the different actuality, policy and education on food safety between China and Australia in the future.
(5) written one paper and sent an international APN proposal book for the future

researches;

(6) set up a bridge for the two countries in food safety cooperation as well as the broader study of food safety system.

Therefore, our team had mostly finished work tasks for AC21 project and reached the final aims of our project. At last, we are pleased to thanks for the **AC21 Special Project Fund and Secretariat very much.**

4. Sending two papers to the AC21 secretarial :

4.1. The Temporal and Spatial Variation of the Microclimate and the Heat Island Effect in Urban Landscape Biotope under Global Air Warming

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Abstract

For the time being, one of the most important research fields on the urban climate and urban ecology and environment focuses on the effect of urban heat island (UHI). In order to integrate urban microclimatic pattern, heat island intensity, impact of land cover and vegetation cooling on UHI in a more comprehensive way, as well as to study the scales impact of observations, and to detect and quantify the air temperature distribution of Nanjing and its impact factor, and to develop vegetation cooling models, in this paper, comprehensive plan and observation on the microclimate of biotope in Nanjing, has been conducted deliberatedly. We, using these observation data and taking advantage of the pertinent information derived from the remote sensing images by GIS technology, focus on the analysis of distribution of microclimate in biotope and urban heat island effect in Nanjing as well as the

vegetation corridors' cooling effect at different scales. The major results are as follows.

(1). During from July to September, 2005, the microclimate of four types of land cover, namely urban bare concrete cover, urban woods or the shade of trees, urban water areas and urban lawn had significant differences among different observational spots. In general, the air temperature of these land covers complied with the order during daytime: urban bare terra > urban lawn > urban water areas > urban woods or the shade of trees, with reversed order during night when the temperatures of the lawn became the lowest. Compared with the bare terra or cement cover, the other three types showed the effect of dropping air temperature ranging between about 0.2 ~ 2.9 ℃. There were some instantaneously dynamic characteristics in detailed temporal series among these four covers in different observational sites. Therefore, a marked heterogeneity in a smaller ground cover scale could be detected from the microclimatic spatial pattern. The UHI effect could be detected obviously by the air temperature difference between urban and surrounding areas. The average UHI intensity during the monitoring period was between 0.5 ~ 3.5 ℃; however, there was also significant day-to-day variability. A strong UHI effect usually occurred around midnight; while about 2-3 h after sunrise, the UHI began to decrease till midday time; and during 13:00 ~ 15:00, the UHI had a sudden increase then decreased again; however after sunset, a peak UHT was frequently observed during 18:00~21:00. Clearly, our results manifested that the nocturnal horizontal temperature gradient was somewhat different from that reported in other large cities. By means of the normalization standard deviation (NSD), this paper provides a concise and comprehensive understanding of the temporal and spatial microclimatic dynamic of these four kinds of urban cover in four observational sites, and revealed the cause and effect of the urban heat island. Finally, the environmental quality of the four urban observational sites was assessed with the meteorological comfortable index.

(2). Along the east direction, in the morning, the air temperature measured at the shade of the *Platanus oritentalis* trees decreased with temperature range of 1.8 ~ 2.5 ℃, especially when it crossed into the Purple Mountain area, thus cool cliff appeared. At 14:00, the temperature decay trend still took place, and the temperature

range occurred in the intersection was about 2.2 ℃ occurred in the shade of trees. In the evening, the temperature range in the intersections was 1.5 ℃ ~ 3.2 ℃. Radiating from city center along the other three directions, this decay trend of air temperature seemed to be insignificant, and the temperature ranges were also smaller than those along the eastern direction. The largest temperature range of 2.6 ℃ measured at the crossing roads was found in the southbound sites, and it was 0.9 ℃ in the westbound sites and 1.7 ℃ in the northbound sites; they were all derived from the nighttime. Regarding the east direction, the distance coefficients b showed that the cooling effect was the largest (0.29 ℃/km) at 19:00, then at 14:00 h (0.167 ℃/km) and 08:00 h (0.161 ℃/km). For the other directions, the similar case occurred, but the cooling effect was lower. The coefficients b of the four directions indicated that the east direction had the largest cooling effect or the trend of decreasing air temperatures, then the south direction and the north direction, while the west direction did not show the cooling effect. During daytime, several isolated hot areas were observed next to cooler ones, indicating a negative UHI. The air temperature distributions of the vegetation corridors at mesoscale in the evening were similar to those at micro-scale at noon. The influence of the Purple Mountain was very obvious with the maximum cooling effect up to 3.0 ℃/100 m at microscale and 0.29 ℃/km at mesoscale. This research indicated that the pattern of the UHI in Nanjing is a function of the climatic conditions, the effect of the Purple Mountain, the local topography and the urban characteristics such as land uses, vegetation, building density, traffic loads, construction materials and anthropogenic heat sources, which should be taken into account for urban planning and ecologically comfortable residence. The results have further relevance for environmental implications in global warming, especially in a city of chimney place along the Yangtze River.

(3). By synchronous observation on the air temperature and wind speed of the ground and the fifth, twelfth as well as twenty fourth roof of the apartment block in Nanjing University which locate in the city center surrounded by lots of high buildings, the diurnal changes of microclimate in urban buildings was studied. The air temperature would decrease with the height increase of the buildings when it was observed in sunny day with wind, while in sunny day without wind, the air

temperature would decrease before the sunset, and the air temperature would increase after sunset. These two typical dynamic changes would be disturbed and even be disappeared when it was under other weather conditions such as raining, cloudy days. The wind speed would increase with the height of the buildings when it was observed in sunny day, but the wind speed in the ground was various because of the varied disturbing conditions such as running vehicles. The air temperature at the height of 0.5 m is usually > the air temperature at the height of 1.5 m, but this situation would reverse when the day is cloudy during hot weather. The air temperature indoor is stable, but the air temperature outdoor, disturbed by instant weather conditions, is various.

(4). The results derived form three Landsat/TM images of Nanjing in 1988, 2000 and 2002 showed the quantity of urban green space in Nanjing increased by 9.6%, with the number of patches decreasing, average area increasing, landscape shape being simplified, landscape aggregating and fragmentation being declined between 1988 and 2000. However, the results were different between forest type and agricultural type: the area of agriculture type increased by 12.6%, and expanded increasingly outside the city zone and showed a low fragmentation; the area of forest type decreased by 3.6%, while the patches with little area reduced greatly, landscape shape became more simple, the large forest patches were distributed more isolated, and the fragmentation also reduced. However, between 2000 and 2002, the area of forest type reduced by 0.63%, and the large area patches disappeared. The most important reason for the changes was the intense process of urbanization; also the policies and the aim of city development, and the natural conditions.

Key words: Urban heat island effect; Cause and mechanism of heat island; Global air warming; Observation on climate of the biotope in city; Comfortable index; Analysis on the urban landscape and biotope.

4. 2. Quantificational analysis on cultivated land safety in Zhangjiagang city based on BP-MC network

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Abstract: In recent, cultivated land was occupied continually, which had threaten the grain safety of city. Remote sensing is a powerful tool for protecting cultivated land by means of accurate inspecting the urban expansion and land use cover and change in time. Combined with the principle of general Monte Carlo, the relationship between cultivated land, road, urban expansion, GDP and industry economic structure were analyzed deeply using BP artificial neural network based on TM remote sensing images, land use map and yearbook of Zhangjiagang city in several years. The results demonstrated that the cultivated land area decreased about 2.5% per year in the past ten years, however the general agriculture output had a small rebound after 2002, this due to the government optimized policy to land use and restructure of agriculture and industry. The expansion trends of Zhangjiagang city was the spread of multi-core along the road. Cultivated land within 2 km far from the main road and city zone was most likely to change to the urban area, especially within 500 meters. The rapid development of economic resulted in an increased transformation probability of cultivated land to urban land. However, transformation probability decreased gradually with the balance between urban land and cultivated land. So the relationship between transformation probability and GDP present an inverted “U” curve. Finally, BP-MC network deal with training set of large quantity pixels, this avoids artificial neural network step into the local minimum point, and it is an effective method to analyze the drive factors of urban expansion quantitatively.

Key words: back propagation, neural network, land use, Monte Carlo, urban expansion, decrease of cultivated land。