October 7-9, 2009
Academia Sinica, Taipei, Taiwan

# GIS in the Humanities and Social Sciences International Conference

Innovating · Collaborating · Sharing

創新・合作・分享

地理資訊科學於人文社會科學研究之
應用與整合國際研討會2009

# Program and Abstract

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# Welcome

Distinguished Guest, Ladies and Gentlemen,

It is our pleasure to present to you the program and proceedings of the GIS (Geographic Information Science) in the Humanities and Social Sciences 2009 International Conference, held at Academia Sinica, Taipei, Taiwan from 7 to 9 October 2009. This conference addresses visions, experiences, and developments for humanists and social scientists to advance their research through GIS applications. It also offers geographic information scientists and engineers an opportunity to explore new interdisciplinary fields from their expertise.

This volume consists of the up to 50 papers presented at the conference that are submitted from 13 countries. All submissions were carefully reviewed by at least 3 members of the Program Committee. The coverage of the contributions is very wide which includes the exemplar projects that have developed GIS in history, archaeology, culture studies, statistics, sociology and other social sciences, and new methodologies and techniques in GIS, etc.

In addition to the papers included in this volume, participants in the conference also heard leading experts presented keynote and invited lectures, and had a chance to see demonstrations of various items of interest. The conference was also preceded by one day of workshops which be held jointly with ECAI. This printed record cannot show all aspects of this highly interactive meeting, but it does convey the depth and breadth of the conference.

We are pleased to work with the Research Center for Humanities and Social Sciences at Academia Sinica, Taiwan, and the Pacific Neighborhood Consortium. We are also gratefully to have sponsorship from the Indiana University Purdue University Indianapolis and the Queens University at Belfast. Our intention has been to offer a brainstorming meeting place for natural/social scientists, engineers and humanists to show and share their creative and collaborative research. We and all participants together have successfully carried out our main theme — innovating, collaboration, sharing — that characterizes this GIS conference different from others.

We are excited to host such a diversified and notable assembly of scholars from all over the world, believe this conference will provide us all with valuable insights and opportunities for future cooperation. Finally, we hope that your stay in Taiwan will be most rewarding, both intellectually and socially.

Your conference organizer,

# About GIS in the Humanities and Social Sciences 2009

The Geographical Information Science (GIS) in the Humanities and Social Sciences 2009 Conference is established on the achievements of the UK Historical GIS 2008 Conference at Essex University. The collaboration among Academia Sinica, Indiana University Purdue University Indianapolis, and Queen's University Belfast makes this conference special to others.

This conference aims to show the applications of GIS in humanities and social sciences and explore possibilities of their future development. It will cover a variety of presentations ranging from several exemplar projects that have developed the GIS applications in humanities or social sciences, temporal GIS, new methodologies and techniques in GIS, GIS in archaeology, historical GIS, GIS in cultural research, GIS in social sciences/social GIS, and spatial statistical analysis in humanities and social sciences. Our conference will provide a great opportunity for the worldwide scholars to discuss these issues and share their experiences.

We are honored to have several leading figures in GIS scholarship in the humanities and social sciences to give keynote and special presentations. They are including Dr. Edward Ayers, University of Richmond, Professor Michael Goodchild, UC Santa Barbara, Dr. Ian Gregory, Lancaster University, Professor Trevor Harris, University of West Virginia, Profess or A. Stewart Fotheringham, National University of Ireland Maynooth, Prof. Donald Janelle, University of California, Santa Barbara, and Dr. Michael Phoenix, ESRI.

We appreciate all institutes and participants who contribute to this GIS conference. It is our pleasure that we have collected up to 50 qualified papers. On the basis of this conference, we hope that we will have more international collaborations on different areas and bring GIS in to a whole new world.

# GIS in the Humanities and Social Science 2009

## General Information

**Name Badges.** Please wear your conference name badge all the time as your badge will admit you to all GISHS 2009 program. Only registered attendees may participate in lectures, coffee breaks, and special events. Special events may also require a separate ticket, which will be given when registering.

**Wireless Access.** Wireless access is available throughout the Building of the Humanities and Social Sciences. If you experience any difficulties accessing the network, the conference staffs will be able to assist you.

**Computers.** We also provide 4 computers around the conference registration area for all participants to check e-mail and print out some materials.

**Transportation.** Buses, taxis, and limousine services are available at the TTY International Airport. The costs are approximately NT$1,500 ~ NT$1,800 to get to Taipei from the TTY Airport by taxi. The rate for taxi in Taipei city is NT$70 for the first 1.25 kilometers and NT$ 5 for each additional 250 meters. A NT$20 surcharge is added between 11p.m. and 6 a.m. In addition, a "waiting surcharge" for each 1 minute and 40 seconds is added to NT$ 5, when the taxi is stopped. Different rates apply in other areas.

**Currency.** The unit of Taiwanese currency is New Taiwan Dollars. Foreign currencies can be exchanged at the airport upon arrival, government-authorized banks and tourist hotels. The exchange rate is quoted around NT$32 to US$1. However, the exchange rate fluctuates daily depending on the foreign currency exchange market.

**Climate.** Most areas of Taiwan enjoy a subtropical climate. The weather is warm and mild all year round, particularly suitable for travel. The temperature is around 22 ~ 27°C in October.

**Electricity.** 110 volts A.C. Plug type.

**Time Zone.** Taiwan is 8 hours ahead of Greenwich Mean Time (GMT).

**Taxes.** A 10% service charge and a 5% value-added tax are usually added to room rates and meals. No tipping is needed when diet in a restaurant.

**Banks.** Banks in Taipei are generally open from Monday to Friday, 9 am to 4 pm. No banks open on Saturday and Sunday.

*Notice: Guest House of Academia Sinica only accepts NT dollars and can only provide very limited foreign exchange service (only US dollars to NT dollars). Please note that the amount of foreign exchange is not guaranteed.*

**Shops.** Shops and stores in Taipei are generally open seven days a week. There is plenty of shopping malls close to the Taipei downtown.

## Shuttle Bus Schedule

| Date | Route | Gathering Place |
|---|---|---|
| **Oct. 7 Wednesday** | **Bus A:**<br>07:50 - 08:15 Cosmo Hotel → Howard Plaza Hotel<br>08:15 - 08:45 Howard Plaza Hotel → Academia Sinica<br>**Bus B:**<br>08:15 - 08:45 City Lake Hotel → Academia Sinica | The lobby of each hotel |
| | 16:15 Academia Sinica → Museum of the Institute of History and Philology<br>**Bus C**<br>18:00 Academia Sinica → City Lake Hotel → Howard Plaza Hotel → Cosmo Hotel<br>**Bus A & Bus B**<br>18:00 - 18:30 Academia Sinica → The Garden Taipei | 2F, The Building for Humanities and Social Sciences, Academia Sinica |
| | **Bus A**<br>20:30 The Garden Taipei → Cosmo Hotel → Howard Plaza Hotel<br>**Bus B**<br>20:30 The Garden Taipei → City Lake Hotel → Academia Sinica Guest House | The lobby of the Garden Taipei |
| **Oct. 8 Thursday** | **Bus A**<br>07:50 - 08:15 Cosmo Hotel → Howard Plaza Hotel<br>08:15 - 08:45 Howard Plaza Hotel → Academia Sinica<br>**Bus B**<br>08:15 - 08:45 City Lake Hotel → Academia Sinica | The lobby of each hotel |
| | **Bus A**<br>18:10 Academia Sinica → Howard Plaza Hotel → Cosmo Hotel<br>**Bus B**<br>18:10 Academia Sinica → City Lake Hotel | 2F, The Building for Humanities and Social Sciences, Academia Sinica |
| **Oct. 9 Friday** | **Bus A**<br>08:10 - 08:35 Cosmo Hotel → Howard Plaza Hotel<br>08:35 - 09:05 Howard Plaza Hotel → Academia Sinica<br>**Bus B**<br>08:35 - 09:05 City Lake Hotel → Academia Sinica | The lobby of each hotel |

| | | |
|---|---|---|
| | **Bus A**<br>17:45 Academia Sinica→ Howard Plaza Hotel → Cosmo Hotel<br>**Bus B**<br>17:45 Academia Sinica→ City Lake Hotel<br>**Bus C & D**<br>18:00 Academia Sinica → Yue Shang Hai | 2F, The Building for Humanities and Social Sciences, Academia Sinica |
| | **Bus C**<br>20:40 Yue Shang Hai → Howard Plaza Hotel → Academia Sinica<br>**Bus D**<br>20:40 Yue Shang Hai → Academia Sinica → City Lake Hotel | The Main Entrance of Yue Shang Hai Restaurant |

## Conference Events

**Visit to the Museum of the Institute of History and Philology, Academia Sinica, Wednesday, October 7**

Time: 17:15 - 18:00

Venue: Museum of Institute of History and Philology, Academia Sinica

Gathering Place: 2F, lobby of the Building for Humanities and Social Sciences

*** Shuttle service will be available between the building for the Humanities and Social Sciences and Museum. Please register in the registration desk in advance by noon, and gather in the lobby (2F) of the building from 17:00 to 17:15. The bus for the Museum will depart at 17:15 on time.*

**Welcome Reception, Wednesday, October 7, The Garden Taipei**

Time: 18:30 - 20:30

Venue: No.2, Xuzhou Rd., Zhongzheng Dist.

台北市 100 中正區徐州路 2 號

Gathering Place: Shuttle buses are waiting in front of conference venue and museum from 17:50 to 18:00.

Self Drive: Parking Ticket of The Garden Taipei will be distributed after the meal. Please contact with our staff on site.

** *Shuttle service will be available form Academia Sinica to the venue. Please gather in the lobby (2F) of the building for the Humanities and Social Sciences and the lobby (1F) of the Museum if you join the Museum visit at 18:00. Buses for the reception venue will depart at 18:00 on time.*

** *Please bring your reception ticket behind your badge to attend.*

Culture Show

During the reception, Diabolo Dance Theatre, a group of young diabolo artists, is invited to perform diabolo dance show. Based on their technical skills and artistic creativity, they sought a new style of performance to take diabolo dance beyond imagination. DDT has performed more than 300 shows in over 20 countries around the world, including at landmark theaters and arenas such as the Taipei National Theater, New York Lincoln Center, Hummingbird Arts Center in Canada, and Aichi

Expo Dome in Japan. We hope you enjoy this unmissable performance from Diabolo Dance Theatre.

**Closing Banquet, Friday, October 9, Yue Shang Hai Restaurant 悅上海 (Invited Only)**

Time: 18:30~ 20:30

Address: No.57, Sec. 2, Dunhua S. Rd., Da-an Dist., Taipei City

台北市大安區敦化南路二段 57 號

Gathering Place: Shuttle buses are waiting in front of conference venue at 18:00.

# Excursions

## Museums

To appreciate and understand the heritage and traditions of Chinese arts and culture, the followings are recommended places.

- ✓ National Palace Museum 故宮博物院
  *Address: No.221, Sec.2, Chih-Shan Rd., Shihlin District*
  *Address in Chinese: 台北市士林區至善路 2 段 221 號*
- ✓ Dr.Sun Yat-sen Memorial Hall 國父紀念館
  *Address: No.505, Sec.4, Ren-Ai. Rd, Da-an District*
  *Address in Chinese: 台北市大安區仁愛路四段 505 號*
- ✓ National Taiwan Democracy Memorial Hall 台灣民主紀念館
  (known as Chang Kai-Shek Memorial Hall 中正紀念堂 in the past)
  *Address: No.21, Jhongshan S. Rd., Jhongjheng District*
  *Address in Chinese: 台北市中正區中山南路 21 號*

**Suggested Areas for Sightseeing by MRT (Please refer to the MRT map)**

- ✓ Tamsui Harbor 淡水
  *( Red line to Danshui station)*
- ✓ Bei-Tou Hot Springs Area 北投溫泉區
  *(Red line to Sinbeitou station)*

**Suggested Night-markets**

For traditional Taiwanese snacks, and souvenir, night-markets are the best place to visit.

- ✓ Shihlin Night-market 士林夜市
  *( MRT red line, Jiantan station)*
- ✓ Ton-Hwa Street Night-market 通化夜市
  *Location: Intersection of Sec. 4, Sinyi Rd. and Ton-Haw St., Taipei*
  *Location in Chinese: 台北市信義路四段及通化街交叉口*

**Suggested Areas for Shopping**

***Sinyi District***

- ✓ Taipei 101 台北 101
  *(MRT blue line, Taipei City Hall station)*
  *Address: No.45, Shifu Rd*
  *Address in Chinese: 台北市市府路 45 號*
- ✓ Shih Kong Mistsukoshi Department Store 新光三越信義新天地

*(MRT blue line, Taipei City Hall station)*
*Address: No.9, Songshou Rd*
*Address in Chinese: 台北市松壽路 9 號*

***East Metro District***

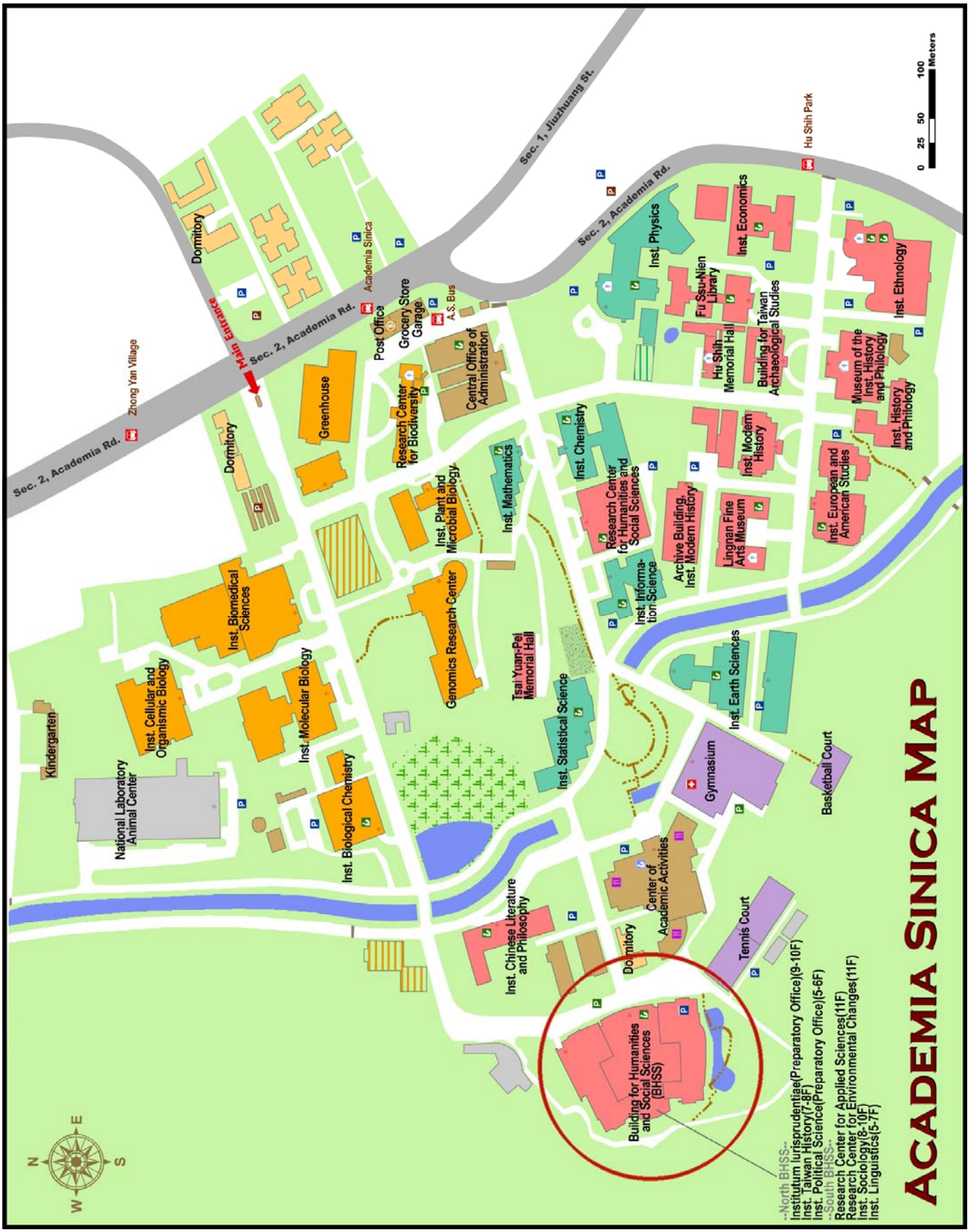
- ✓ Sogo Department Store 太平洋 Sogo 百貨公司
  *(MRT blue line, Zhongxiao Fuxing station)*
  *Address: No.45, Sec. 4, Zhongxiao E. Rd*
  *Address in Chinese: 台北市忠孝東路四段４５號*

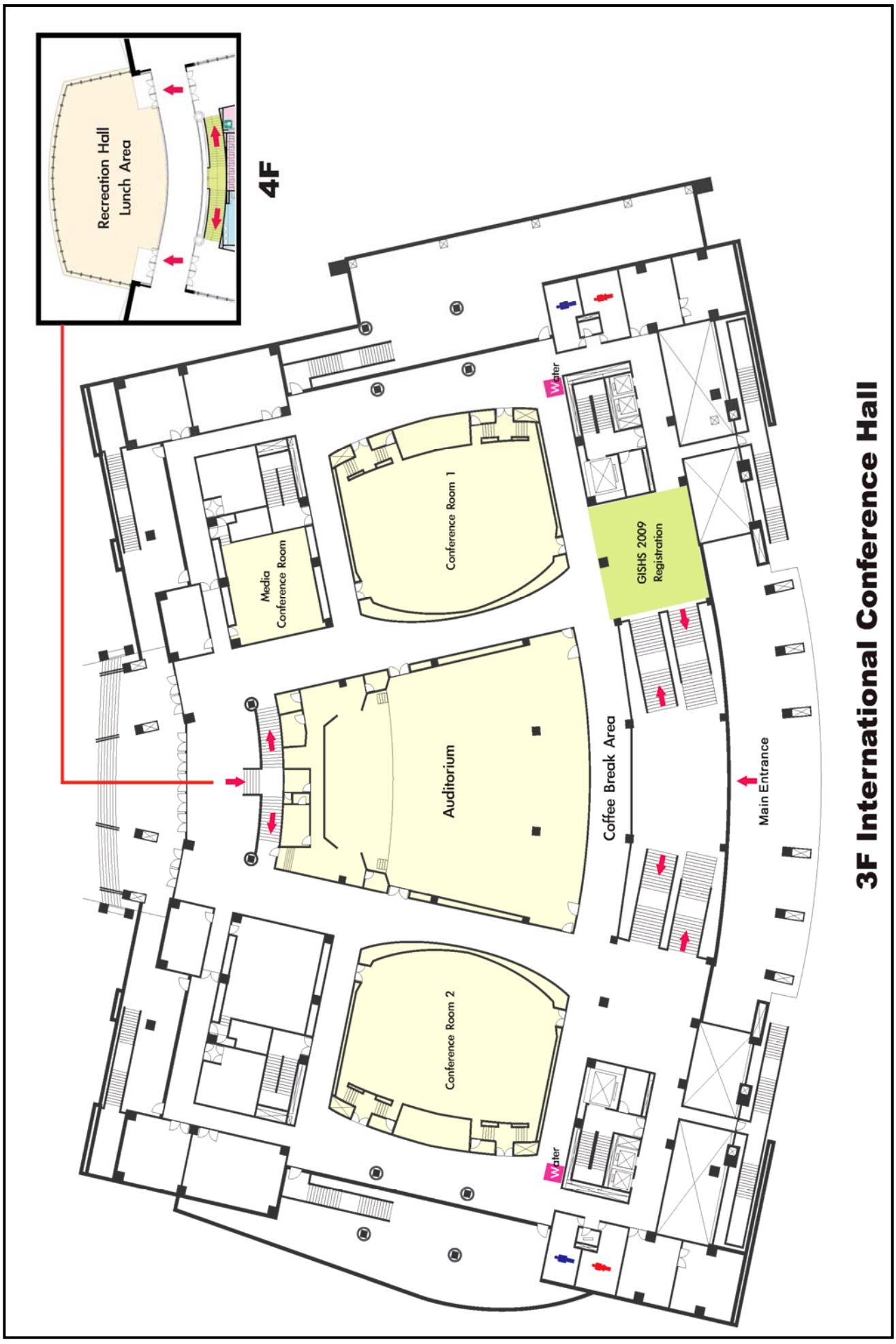
***Others***

- ✓ Miramar Entertainment Park(with fairy-wheel) 美麗華購物中心
  *Address: No.20, Jingye 3rd Rd., Jhongshan District*
  *Address in Chinese: 台北市中山區敬業三路 20 號*

- ✓ Taiwan Handicraft Promotion Center 台灣手工業推廣中心
  *Address: No. 1, Hsu-Chow Rd.*
  *Address in Chinese: 台北市徐州路 1 號*

# Conference Center Map




3F International Conference Hall
4F
Recreation Hall
Lunch Area
Media
Conference Room
Conference Room 1
Conference Room 2
Auditorium
GISHS 2009
Registration
Coffee Break Area
Main Entrance
Water
Water

# About the Area

## Introduction to Taipei City

Taiwan packs an unexpected wealth of diversity. Its topography, culture and vibrant commercial environment make it a unique place for visitors to explore. Taiwan merges the 5000 years of traditional Chinese culture, aboriginal culture and the western influence. High-tech development and many other thriving industries make Taiwan an important and competitive member in Asia Pacific.

Located in northern Taiwan, the beautiful city Taipei is a metropolitan which brings together the traditional and the new, the cutting edge and the conservative. Taipei offers areas of spectacular natural scenery, streets lined with shops selling all kinds of products, shopping malls, bustling night markets, high-quality hotels, and countless restaurants with Chinese gourmet and exotic cuisines.

A noteworthy cultural focal point in Taipei is the ***National Palace Museum***, which houses hundreds of thousands of Chinese antiques and art works. The museum is located in the northern part of the city and is a must-see for lovers of ancient Chinese culture and heritage.

***Taipei 101 building***, the tallest building in Taiwan and the landmark in Taipei, shows the modern and contemporary side of Taipei. The design of Taipei 101 intertwines the traditional Chinese culture and modern innovative technology. The exterior structure derives from the shape of bamboo, which structure is further renovated to prevent any natural disasters that frequently occur in Taiwan, such as earthquakes and typhoon. The fastest elevator in the world built inside the mega-structure takes you up to the 101 Observatory, overlooking the entire Taipei City.

With the wealth of interesting and remarkable activities available in Taipei, and its warm hospitality, visitors are certain to have an unforgettable experience in this amazing city. Taipei is a city that has so many things to offer to its guests, no matter if it is for business or pleasure.

# Optional Tours

## TOUR 1　HALF DAY TAIPEI CITY TOUR　半日台北市區觀光

| MORNING & AFTERNOON TOUR | Tour Stops : | 上午或下午觀光 | 觀光地點 : |
|---|---|---|---|
| Pick-up:<br>AM 08:00~09:00<br>PM 01:00~02:00 | 1. Martyrs' Shrine | 出發時間：<br>AM 08:00~09:00<br>PM 01:00~02:00 | 1. 忠烈祠 |
| At : hotel lobby | 2. National Palace Museum | 集合地點 : 飯店大廳 | 2. 故宮博物院 |
| Duration : 3 hrs | 3. Chiang Kai-Shek Memorial Hall | 觀光時間 : 3 小時 | 3. 中正紀念堂 |
| Tour fare : NT$ 900 | 4. Chinese Temple | 成人費用 : NT$ 900 | 4. 中國寺廟 |
| Child fare : NT$ 700 | 5. Presidential Office (Pass by) | 兒童費用 : NT$ 700 | 5. 總統府 (車內欣賞) |
| | 6. Handicraft Center | | 6. 中國手工藝品中心 |

## TOUR 2　HALF DAY WULAI ABORIGINAL VILLAGE TOUR
## 半日烏來高砂族部落觀光

| AFTERNOON TOUR | Tour Stops : | 下午觀光 | 觀光地點 : |
|---|---|---|---|
| Pick-up :<br>PM 01:00~02:00 | 1. Push-car Ride | 出發時間：<br>PM 01:00~02:00 | 1. 台車 |
| At : hotel lobby | 2. Wulai Waterfall | 集合地點 : 飯店大廳 | 2. 烏來瀑布 |
| Duration : 4 hrs | 3. Aborigine Folk Dance | 觀光時間 : 4 小時 | 3. 原住民民俗舞蹈 |
| Tour fare : NT$ 1,300 | 4. Swallow Lake (Pass by) | 成人費用 : NT$ 1,300 | 4. 燕子湖 (車內欣賞) |
| Child fare : NT$ 1,050 | 5. Chieftain Statue | 兒童費用 : NT$ 1,050 | 5. 酋長塑像 |

## TOUR 3　TAIPEI NIGHT TOUR　台北夜景觀光

| | Tour Stops : | | 觀光地點 ： |
|---|---|---|---|
| Pick-up :<br>PM 06:00~06:30 | 1. Mongolian Bar-B-Q Dinner | 出發時間：<br>PM 06:00~06:30 | 1. 蒙古烤肉晚餐 |
| At : hotel lobby | 2. Lungshan Temple | 集合地點 ： 飯店大廳 | 2. 龍山寺 |
| Duration : 3.5 hrs | 3. Hwashi Night Market | 觀光時間 ：3.5 小時 | 3. 華西街觀光夜市 |
| Tour fare : NT$ 1,300 | 4. Taipei 101 | 成人費用 ：NT$ 1,300 | 4. 101 大樓 |
| Child fare : NT$ 1,300 | ** NOT include entrance ticket to 101 Observatory. | 兒童費用 ：NT$ 1,300 | (不含展望台門票) |

## TOUR 4　HALF DAY NORTHERN COAST TOUR
## 半日基隆港、野柳、北海岸公園觀光

| MORNING TOUR | Tour Stops : | 上午觀光 | 觀光地點 ： |
|---|---|---|---|
| Pick-up :<br>AM 08:00~09:00 | 1. Keelung City | 出發時間 ：<br>AM 08:00~09:00 | 1. 基隆市 |
| At: hotel lobby | 2. Keelung Harbour | 集合地點 ： 飯店大廳 | 2. 基隆港 |
| Duration: 4 hrs | 3. Buddha Statue | 觀光時間：4 小時 | 3. 觀音大士塑像 |
| Tour fare: NT$ 1,000 | 4. Yehliu Scenery | 成人費用 ：NT$ 1,000 | 4. 野柳風景區 |
| Child fare: NT$ 800 | 5. Queen’s Head | 兒童費用 ：NT$ 800 | 5. 女王頭 |

## TOUR 5 HALF DAY FOLK ARTS TOUR 半日民俗藝術觀光

| AFTERNOON TOUR | Tour stops : | 下午觀光 | 觀光地點 ： |
|---|---|---|---|
| Pick-up :<br>PM 13:00~14:00 | 1. Sanhsia Tsu Shih Temple | 出發時間 ：<br>PM 13:00~14:00 | 1. 三峽祖師廟 |
| At: hotel lobby | 2. Old Street Scene in Sanhsia | 集合地點：飯店大廳 | 2. 三峽老街 |
| Duration: 4 hrs | 3. Yingko's Pottery Factory & Show room | 觀光時間 : 4 小時 | 3. 鶯歌陶瓷廠及展示中心 |
| Tour fare: NT$ 1,100 | 4. Pottery Street in Yingko | 成人費用 : NT$ 1,100 | 4. 鶯歌陶瓷街 |
| Child fare: NT$ 900 | | 兒童費用 : NT$ 900 | |

## TOUR 6 Culture Tour (National Center for Traditional Art)
## 文化之旅 (國立傳統藝術中心)

| MORNING TOUR | Tour Stops: | 上午觀光 | 觀光地點: |
|---|---|---|---|
| Pick-up: AM 07:30~08:00 | 1. National Center for Traditional Arts | 出發時間: AM 07:30~08:00 | 1. 國立傳統藝術中心 |
| At: hotel lobby | | 集合地點: 飯店大廳 | |
| Duration: 5hrs | | 觀光時間: 5 小時 | |
| Adult's fare: NT$ 1,800 | | 成人費用: NT$ 1,800 | |
| Children's fare: NT$1,500 | | 兒童費用: NT$ 1,500 | |

## TOUR 7 YANGMINGSHAN NATIONAL PARK & HOT-SPRING TOUR
## 陽明山國家公園及溫泉觀光

| AFTERNOON TOUR | Tour Stops : | 下午觀光 | 觀光地點 ： |
|---|---|---|---|
| Pick-up :<br>PM 01:00~02:00 | 1. Yangmingshan National Park | 出發時間 ：<br>PM 01:00~02:00 | 1. 陽明山國家公園 |
| Duration : 4 hrs | 2. Hot-Spring Bath | 觀光時間 : 4 小時 | 2. 溫泉浴 |
| At : hotel lobby | | 集合地點 ： 飯店大廳 | |
| Tour fare : NT$ 1,300 | | 成人費用 : NT$ 1,300 | |
| Child fare : NT$ 1,050 | | 兒童費用 : NT$ 1,050 | |

## TOUR 8 CHIUFEN VILLAGE & NORTHEAST COAST TOUR
## 九份、東北角海岸觀光

| AFTERNOON TOUR | Tour Stops: | 下午觀光 | 觀光地點: |
|---|---|---|---|
| Pick-up: PM 01:00~01:30 | 1. Chiufen Village | 出發時間: PM 01:00~01:30 | 1. 九份 |
| At: hotel lobby | 2. Chinkuashih Village(Pass by) | 集合地點: 飯店大廳 | 2. 金瓜石 (車內欣賞) |
| Duration: 4 hrs | 3. Pitou Cape | 觀光時間: 4 小時 | 3. 鼻頭角 |
| Adult's fare: NT$ 1,100 | 4. Nanya Rock Formations | 成人費用: NT$ 1,100 | 4. 南雅風化石 |
| Children's fare: NT$ 900 | 5. Bay of Two Colors | 兒童費用: NT$ 900 | 5. 二色灣 (陰陽海) |

**Chiufen Village**

The villages of Chiufen were once centers of gold mining in Taiwan. The gold is gone, but these quaint old villages, built of closely-packed houses clinging to steep mountainsides, continue to offer enchanting scenery and fascinating glimpses into the lifestyles of the past.

**九份**

在清朝光緒年間九份以產金著名。當時曾湧入大量討套淘金客，後因金礦衰竭後，淘金客走了，留在九份的只有沒落與蕭條。直到「悲情城市」、「無言的山丘」等電影在此開始取景，又再度吸引各地觀光客來欣賞山城獨特的四季景色及緬懷台灣古舊之遺跡。

## TOUR 9　TAROKO (MARBLE) GORGE TOUR　花蓮太魯閣(大理石)峽谷觀光

| WHOLE DAY TOUR | Itinerary : |
|---|---|
| Pick-up :<br>AM 06:00~06:30 | Pick-up from hotel－Transfer to Taipei Airport－Arrive at Hualien－Enbus for Taroko －Gorge Gateway－Eternal-Spring Shrine－Swallow Caves－Tunnel of Nine Turns－ Tienhsiang Lodge－Marble Factory－Chi Shing Beach－Stone Sculptural Park －Entrain for Taipei－Transfer to hotel |
| At : hotel lobby | |
| Tour fare : NT$ 4,900 | |
| Child fare : NT$ 4,000 | |

**※ Includes : One way air ticket, one way train ticket, and lunch**

**※ Passport is needed for enplaning**

| **Special Arrangement Available** | |
|---|---|
| **1. Overnight Stay** | **NT$ 5,800 (One way by train)** |
| **2. Single Supplement** | **NT$ 1,000** |

| 1 日觀光 | 旅遊行程 |
|---|---|
| 出發時間 :<br>AM 06:00~06:30 | 從飯店出發－松山機場飛往花蓮－抵達花蓮－太魯閣(大理石)峽谷－長春祠－燕子口－九曲洞－大理石橋－天祥－大理石工廠－七星潭－石雕公園－花蓮火車站－台北車站－送回 |
| 集合地點：飯店大廳 | |
| 成人費用：NT$ 4,900 | |
| 兒童費用：NT$ 4,000 | |

**※包括台北→花蓮機票，花蓮→台北火車票，及午餐**

**※需帶護照**

| **特別安排** | |
|---|---|
| **1. 夜宿花蓮 1 晚** | **NT$ 5,800. (回程搭乘火車)** |
| **2. 住單人房補收** | **NT$ 1,000.** |

## TOUR 10 SUN MOON LAKE, PULI & LUKANG TOUR
## 日月潭、埔里鎮、及鹿港觀光

| 2 DAYS & 1 NIGHT TOUR | Itinerary : | |
|---|---|---|
| Pick-up :<br>AM 08:00~09:00<br>At: hotel lobby | 1st day | Pick-up from hotel－Enbus for Nantou－Sun Moon Lake—Lake bus Tour( Wenwu Temple—Tehua Village—Tse-en Pagoda—Holy Monk Shrine)—Puli ( a cultural & artistic heaven)—Taichung City ( Overnight at Taichung City) |
| Tour fare: NT$ 6,000<br>Child fare: NT$ 4,800 | 2nd day | Taichung City—Lukang historical and cultural town—Entrain or enbus for Taipei-- |

**※ Single Supplement NT$ 1,000 Transfer to hotel**

**※ All included except lunch & dinner**

| 2 日 1 夜觀光 | 旅遊行程 : | |
|---|---|---|
| 出發時間 :<br>AM 08:00~09:00<br>集合地點：飯店大廳 | 第 1 日 | 從飯店出發－乘巴士往南投－日月潭－日月潭環湖觀光 (遊文武廟、德化社、慈恩塔、玄奘寺)－埔里鎮 (文化藝術天堂)—台中 (宿:台中市) |
| 成人費用: NT$ 6,000<br>兒童費用: NT$ 4,800 | 第 2 日 | 台中－鹿港 (歷史文化古蹟巡禮)—乘巴士或火車回台北 |

**※單人房加收 NT$ 1,000**

**※費用不包括午晚餐 (僅含早餐)**

**TOUR 11 TWO-DAY TOUR TO KENTING & KAOHSIUNG with Taiwan High Speed Train Experience 墾丁國家公園及高雄市區 2 日觀光 + 台灣高速鐵路體驗**

| 2 DAYS & 1 NIGHTS TOUR | Itinerary : | |
|---|---|---|
| Pick-up :<br>AM 07:00~08:00<br>At : hotel lobby | 1st day | Pick-up from hotel－Taipei High Speed Rail Station －Entrain for Kaohsiung－Enbus for Maopitou－Oluanpi Light House－Kenting National Park－Kaohsiung (Overnight at Kaohsiung) |
| Tour fare : NT$ 9,800<br>Child fare : NT$ 7,800 | 2nd day | Kaohsiung City Tour (Cheng Ching Lake－Spring & Autumn Pavilions) －The historical site of British Consulate－Kaohsiung High Speed Rail Station－Entrain for Taipei－Arrive Taipei—Transfer to Hotel |

**※ Single Supplement NT$1,000**

**※ All included except lunch & dinner**

| 2 日 1 夜觀光 | 旅遊行程 : | |
|---|---|---|
| 出發時間 :<br>AM 07:00~08:00<br>集合地點 : 飯店大廳 | 第 1 日 | 從飯店出發－台灣高速鐵路台北車站－乘高速火車往高雄－乘巴士往墾丁－貓鼻頭－鵝鑾鼻燈塔－墾丁國家公園－高雄 (宿: 高雄) |
| 成人 : NT$ 9,800<br>兒童 : NT$ 7,800 | 第 2 日 | 高雄市區觀光 (澄清湖、春秋閣、西仔灣英國領事館古蹟)－台灣高速鐵路高雄車站－乘高速火車往台北－抵台北火車站－回送飯店 |

**※ 單人房加收 NT$ 1,000**

**※ 費用不包括午晚餐 (僅含早餐)**

# Specific Program

## Program at a Glance

<table>
<tr><th>10/7</th><th>10/8</th><th colspan="3">10/9</th></tr>
<tr><th>Auditorium</th><th>Conf. Room1</th><th>Conf. Room1</th><th>Conf. Room2</th><th>Media Conf. Rm.</th></tr>
<tr><td>Registration</td><td>Registration</td><td colspan="3">Registration</td></tr>
<tr><td>Joint Opening & Group Photo</td><td>Keynote Speech & Special Talk</td><td>Keynote Speech</td><td>-</td><td>-</td></tr>
<tr><td>Break</td><td>Break</td><td colspan="3">Break</td></tr>
<tr><td>Joint Opening (Keynote Speech)</td><td>Round Table Meeting I</td><td>Session 3 Humanities GIS in Japan - Current Status</td><td>Session 4 Exemplar projects that have developed GIS in the Humanities or Social Sciences - II</td><td>Session 5 Temporal GIS</td></tr>
<tr><td>Lunch</td><td>Lunch</td><td colspan="3">Lunch</td></tr>
<tr><td>Joint Opening (Keynote Speech)</td><td>Session 1 Exemplar projects that have developed GIS in the Humanities or Social Sciences - I</td><td>Session 6 Spatial statistical analysis in the Humanities and Social Sciences</td><td>Session 7 Exemplar projects that have developed GIS in the Humanities or Social Sciences - III</td><td>Session 8 GIS in Specific Research - I</td></tr>
<tr><td>Break</td><td>Break</td><td colspan="3">Break</td></tr>
<tr><td>Keynote Speech & Special Talk</td><td rowspan="2">Session 2 Historical GIS</td><td>Session 9 New technologies in GIS</td><td>Session 10 Exemplar projects that have developed GIS in the Humanities or Social Sciences - IV</td><td>Session 11 GIS in Specific Research - II</td></tr>
<tr><td>ECAI - Experience Share / Visiting</td><td>Round Table Meeting II & Closing</td><td>-</td><td>-</td></tr>
<tr><td>Welcome Reception</td><td></td><td colspan="3">Banquet (Invited Only)</td></tr>
</table>

## Program Schedule

| **Wednesday, October 7th, 2009** | |
|---|---|
| Time | Title |
| 8:00 | **Registration** |
| | **Opening & Keynote Speech (in conjunction with PNC)**<br>**Location: Auditorium** |
| 9:00-9:30 | **Joint Opening** |
| 9:30-9:50 | **Group Photo** |
| 9:50-10:10 | *Break* |
| 10:10-11:00 | **Impact of Digital Archives on Humanities**<br>Ts'ui Jung LIU, Academia Sinica, Taiwan |
| 11:00-11:50 | **Khmer Heritage Research and Documentation at the EFEO: Building a Digitised Corpus of Archaeological and Epigraphical Data**<br>Pierre Yves MANGUIN, EFEO, France |
| 11:50-12:40 | **Game – Native Teachers' Attitude toward Digital Gaming in School**<br>Chuen Tsai SUN, National Chiao-Tung University, Taiwan |
| 12:40-14:00 | *Lunch* |
| 14:00-14:50 | **Keynote Speech – Space, Place, and Time: Mapping Historical Changes**<br>Edward AYERS, University of Richmond, USA |
| 14:50-15:40 | **Maps and Network**<br>Timothy TANGHERLINI, UCLA, USA |
| 15:40-16:00 | *Break* |
| | **GIS in Humanities Social Sciences 2009 Conference**<br>**Chair: Dr. I Chun FAN, Academia Sinica, Taiwan**<br>**Location: Auditorium** |
| 16:00-16:40 | **Keynote Speech – Conceptualizing the Spatial Humanities and Humanities GIS**<br>Trevor HARRIS, West Virginia University, USA |
| 16:40-17:10 | **Special Talk – Spatio-Temporal Approaches to Understanding Human Behaviour and Social Organization**<br>Donald JANELLE, University of California, Santa Barbara, USA |
| 17:10-17:40 | **ECAI - Experience share in Workshop** |
| 17:10-18:00 | Visiting the Museum of the Institute of History and Philology (Optional) |
| 18:30 | **Welcome Reception** |

| **Thursday, October 8th, 2009** | |
|---|---|
| Time | Title |
| 8:00 | **Registration** |
| | **Keynote Speech**<br>**Location: Conference Room 1** |
| 9:00-9:40 | **Keynote Speech – The Changing Face of GIS**<br>Michael GOODCHILD, University of California, Santa Barbara, USA |
| 9:40-10:10 | **Special Talk - The Importance of Spatial Thinking in Social Sciences**<br>Michael PHOENIX, ESRI, USA |
| 10:10-10:30 | *Break* |
| 10:30-11:00 | **Special Talk –Spatial Variations in Population Dynamics: A GIScience and GWR Perspective using a Case Study of Ireland 1841-1851**<br>A. Stewart FOTHERINGHAM, Mary KELLY, Martin CHARLTON, Magda BUESIADA, National University of Ireland, Maynooth, Ireland |
| 11:00-12:00 | **Session: Round Table Meeting I**<br>**Chair: May YUAN, University of Oklahoma, USA**<br>**Location: Conference Room 1** |
| | David J. BODENHAMER, Indiana University Purdue University Indianapolis, USA<br>Paul S. ELL, Queen's University Belfast, UK<br>I Chun FAN, Academia Sinica, Taiwan<br>Donald JANELLE, University of California, Santa Barbara, USA<br>Shih Lung SHAW, University of Tennessee, Knoxville, USA |
| 12:00-13:30 | *Lunch* |
| 13:30-15:30 | **Session 1: Exemplar projects that have developed GIS in the Humanities or Social Sciences – I**<br>**Chair: Bor Wen TSAI, Academia Sinica, Taiwan**<br>**Location: Conference Room 1** |
| | **Soil Erosion of Spatiotemporal Distribution Pattern and Factor Analysis on Teh-Chi Reservoir watershed under Human-Environment Interactions (1956-2008)**<br>Yan Ting LIAU, Kuo Chen CHANG, National Taiwan Normal University, Taiwan<br>**Spatial Accessibility to Health Care Service and Health Outcome for People with Disability**<br>Hsin Chung LIAO, Cleveland State University, USA<br>**Evaluating PPGIS in community development by actor-network**<br>Bor Wen TSAI, Ming Kuang CHUNG, National Taiwan University, Taiwan<br>**Spatial and Temporal Transit of Obesity Epidemic in Taiwan 2001 – 2005: A multilevel spatial model** |

Duan Rung CHEN, Tzai Hung WEN, National Taiwan University, Taiwan
**Disease and Environment: Implications of Clonorchiasis Infection in Taiwan and Mainland China**
Ts'ui Jung LIU, Academia Sinica, Taiwan

15:30-15:50 *Break*

15:50-17:30 **Session 2: Historical GIS**
**Chair: Billy K.L. SO, The Chinese University of Hong Kong, Hong Kong**
**Location: Conference Room 1**

**The Historical Images and Humanism Maps of Eastern Taiwan**
Shyang Woei LIN, National Dong Hwa University, Taiwan
**Spatial analysis of Western medical services in Republican Beijing: A Historical GIS Approach**
Pei Yao ZHANG, Billy K.L. SO, Hui LIN, The Chinese University of Hong Kong, Hong Kong
**Towards a Historical GIS of Europe: State-building processes and comparative spatial statistics in a "Digital Atlas on the History of Europe since 1500"**
Andreas KUNZ, Institute of European History, Mainz, Germany
**GIS Applications and Web Map Service for the 'Monies, Markets, and Finance in China and East Asia 1600-1900'-Project**
Stefan DIEBALL, Hans Joachim ROSNER, Tuebingen University, Germany
**Anthropogenic land use patterns in the Malay peninsula during the British colonial era**
Nor Rasidah HASHIM, Mohd Shahrudin ABDUL MANAN, Universiti Putra Malaysia, Malaysia

| **Friday, October 9th , 2009** | |
|---|---|
| Time | Title |
| 8:30 | **Registration** |
| | **Keynote Speech**<br>**Location: Conference Room 1** |
| 9:20-10:00 | **Keynote Speech – Censuses, Literature and Newspapers: Quantitative and Qualitative Approaches to Studying the Past with GIS**<br>Ian GREGORY, Lancaster University, UK |
| 10:00-10:20 | *Break* |
| 10:20-12:00 | **Session 3: Humanities GIS in Japan – Current Status**<br>**Chair: Shoichiro HARA, Kyoto University, Japan**<br>**Location: Conference Room 1** |
| | **Spatio-temporal Model for Presenting and Analyzing Humanities Research Resources**<br>Masatoshi KUBO, National Museum of Ethnology, Japan<br>**The Construction of the Digital Gazetteer and the Topographical Maps Database based on Humanities GIS**<br>Ikuo OKETANI, Osaka International University, Japan<br>**Tools to Realize Spatiotemporal Analysis in the Humanities**<br>Tatsuki SEKINO, Research Institute for Humanity and Nature, Japan<br>**Humanities GIS in Japan : Current Status, Models and Tools**<br>Shoichiro HARA, Kyoto University, Japan |
| 12:00-13:00 | *Lunch* |
| 10:20-11:40 | **Session 4: Exemplar projects that have developed GIS in the Humanities or Social Sciences – II** |
| | **Chair: Chung Ming HUANG, National Cheng Kung University Tainan, Taiwan** |
| | **Location: Conference Room 2** |
| | **Development and Evaluation of a Map Annotation System Using a Digital Pen - An Example of a Distributional Survey of a Local Shopping Area**<br>Masatoshi ISHIKAWA, Tokyo Sesitoku University, Japan<br>**DEH – An Interactive Mobile Navigation Service for Demodulating and Encoding Heritage**<br>Chung Ming HUANG, Shang Chun LU, National Cheng Kung University, Taiwan<br>~~**Modeling Asian Urban Dynamics: Impacts of Economic Globalization on the Emergence of Desakota Regions in Taipei Metropolitan Area**~~<br>~~Bing Sheng WU, Texas A&M University, USA, Daniel Z. SUI, Ohio State University, U.S.A~~ |

11:40-13:00 *Lunch*

10:20-11:40 **Session 5: Temporal GIS**
**Chair: Shih Lung SHAW, University of Tennessee, Knoxville, USA**
**Location: Media Conference Room**

**A Space-Time GIS for Studying Individual-based Human Activities and Interactions**
Shih Lung SHAW, University of Tennessee, Knoxville, USA

**Design of Tools for Spatio-temporal Data Analysis and Dynamic Visualization in a Web-based GIS**
María José GARCIA-RODRIGUEZ, Adolfo URRUTIA ZAMBRANA, Miguel Angel Bernabé, Technical University of Madrid, Spain

**Normalization of Temporal Expressions in TimeML with a view to the integration into a spatio-temporal GIS**
Marta GUERRERO-NIETO, Adolfo URRUTIA ZAMBRANA, María José GARCIA-RODRIGUEZ, Miguel Ángel BERNABE POVEDA, Technical University of Madrid, Spain

11:40-13:00 *Lunch*

13:00-14:40 **Session 6: Spatial Statistical Analysis in the Humanities and Social Sciences**
**Chair: Ming Daw SU, National Taiwan University,Taiwan**
**Location: Conference Room 1**

**Mapping the Development of Urban Industries**
Hank C.C. HUANG, Taiwan Institute of Economic Research, Taiwan

**Using GIS Network Analysis to Evaluate Spatial Accessibility and Equality of Green Space in Kunming, China**
Xiao Lu ZHOU, Yi Chen WANG, National University of Singapore, Singapore
Han HU, Wuhan University, China

**Chang'an in the Western Han and Tang Dynasties: Spatial Analysis of a Multi-layered Urban Site**
Timothy BAKER JR., Taiwan National Dong Hwa University, Taiwan
Kai Yu CHU, National Taiwan University

**A Grid-Based Multi-layer and Multi-Class Dasymetric Model for Reconstructing spatial Population Distribution**
Mei Chun LIN, Ming Daw SU, National Taiwan University Taiwan

14:40-15:00 *Break*

13:00-14:40 **Session 7: Exemplar projects that have developed GIS in the Humanities or Social Sciences – III**
**Chair: Marc Elgin DELGADO, Vrije Universiteit Brussel, Belgium**
**Location: Conference Room 2**

**Untangling the Associations between Physical Health, Health Care System Distrust, and Self-rated Health for the Elderly: A Geographically Weighted Regression Approach**
Tse Chuan YANG, Stephen MATTHEWS, The Pennsylvania State University, USA
**A Study of Taipei City Public High School District**
Hsueh Cheng CHOU, National Taiwan Normal University, Taiwan
**Potential Analysis of the Population Density Distribution in Southeast Asia**
Michihisa UMEKAWA, Kyoto University, Japan
**Enhancing the "P" in Participatory-GIS projects to improve social and human capitals: The use of FOSS4G tools in community-based resource management**
Marc Elgin M. DELGADO, Frank CANTERS, Vrije Universiteit Brussel, Belgium

14:40-15:00 *Break*

13:00-14:40 **Session 8: GIS in Specific Research- I**
**Chair: Gary LOCK, University of Oxford, UK**
**Location: Media Conference Room**

**Integration of Contemporary Science & Technology and Culture Beliefs - with Mazu Patrols and Pilgrimages for Example**
Tien Yin CHOU, Ching Yun MU, Jeng Feng YANG, Ya Hui HUANG, Feng Chia University, Taiwan
**A Future for GIS in Archaeology:**
**The Integration of Theory and Analysis**
Gary LOCK, John POUNCETT, University of Oxford, UK
**GIS and Landscape Archaeology:**
**The South Cadbury Environs Project**
Gary LOCK, John POUNCETT, University of Oxford, UK
**Digital Time-Travels: Communicating Historical GIS- and TGIS-Information in Museum Environments**
Per STENBORG, University of Gothenburg, Sweden
Jonas TORNBERG, Chalmers University of Technology, Gothenburg, Sweden
Johan LING, University of Gothenburg, Sweden
Mats Söderström, University of Agricultural Sciences, Sweden
Liane THUVANDER, Chalmers University of Technology Gothenburg, Sweden
Chris SEVARA, University of Gothenburg, Sweden
**Linguistic Atlas of Taiwan Project**
Ivy Shang Fang YEH, Warren A. BREWER, Tamkang University, Taiwan

14:40-15:00 *Break*

| | |
|---|---|
| 15:00-16:10 | **Session 9: New Technologies in GIS**<br>**Chair: Chen Chieh Feng, National University of Singapore, Singapore**<br>**Location: Conference Room 1** |
| | **Narrative Geospatial Knowledge about Taiwanese Aboriginal Settlements – A Case Study**<br>Tyng Ruey CHUANG, Chin Lung CHANG, Yi Hong CHANG, Dong Po DENG, Andrea Wei Ching HUANG, Academia Sinica, Taiwan<br>**e-Science in Geospatial Information Science**<br>Eric YEN, ASGC, Taiwan |
| 16:10-16:30 | *Break* |
| 15:00-16:10 | **Session 10: Exemplar projects that have developed GIS in the Humanities or Social Sciences – IV**<br>**Chair: Jinn Guey LAY, National Taiwan University, Taiwan**<br>**Location: Conference Room 2** |
| | **Vulnerability of Norwegian Municipalities to Natural Hazards**<br>Ivar Svare HOLAND, Päivi LUJALA, Jan Ketil Rød, Norwegian University of Science and Technology, Norway<br>**Exploratory Spatial Data Analysis for Identifying Digitalization Factors to Farmers' Associations in Taiwan**<br>Chien Tso CHEN, Hsiu Ping YUEH, National Taiwan University, Taiwan<br>Tzy-Ling CHEN, National Chung sing University, Taiwan<br>Jinn Guey LAY, National Taiwan University, Taiwan<br>**Role of Geography in the Location of Buddhist Sites from Andhra Pradesh: A GIS Perspective**<br>K.P.RAO, University of Hyderabad, India |
| 16:10-:16:30 | *break* |
| 15:00-16:20 | **Session 11: GIS in Specific Research - II**<br>**Chair: Bor Wen TSAI, Academia Sinica, Taiwan**<br>**Location: Media Conference Room** |
| | **Community-based Trail Monitoring Scheme- A Case Study of Shih-pan Trail in Lin-mei**<br>Dau Jye LU, National Taiwan University, Taiwan<br>Yu Fai LEUNG, North Carolina State University, USA<br>Hsiao Tien HSIEH, National Taiwan University, Taiwan<br>**Estimating Accessibility to Natural Resources Using a New Energy-based Travel-Cost Model: An Archaeological Case Study of Jomon Net-fishing in Eastern Japan**<br>Yasuhisa KONDO, University of Tokyo, Japan<br>**Application of Geographic Weighted Regression to Establish Average** |

**Rainfall-altitude Functions Reflecting Spatial Variation**
Ling Fang CHANG, Academia Sinica, Taiwan

16:20-16:30 *Break*

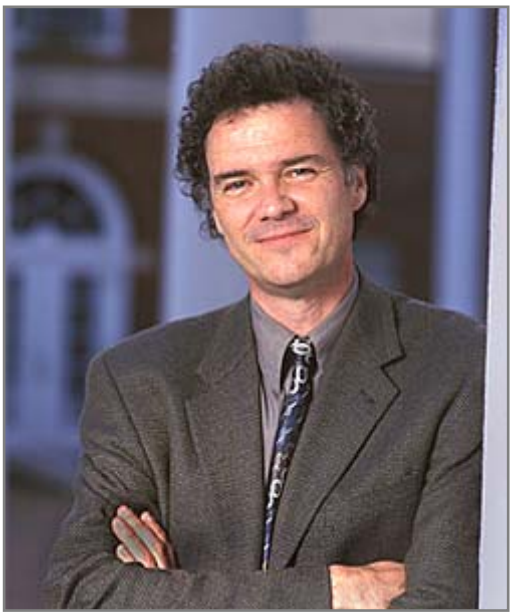
16:30-17:30 **Round Table Meeting II & Closing**
**Chair: Dr. I Chun FAN, Academia Sinica, Taiwan**
**Location: Conference Room 1**

18:30 **Banquet (Invited Only)**

# Keynote Speech and Special Talk

**Keynote Speech**

## Dr. Edward Ayers



Dr. Ayers holds a Ph.D. degree in American Studies from Yale University. After Dr. Ayers served as the Dean of College and Graduate school of Arts and Sciences at the University of Virginia, he has been the president of the University of Richmond in the state of Virginia in the United States since 2007. As a historian of the American South, Dr. Ayers has written and edited ten books. *The Promise of the New South: Life After Reconstruction* was a finalist for both the National Book Award and the Pulitzer Prize. *In the Presence of Mine Enemies: Civil War in the Heart of America* won the Bancroft Prize for distinguished writing in American history and the Beveridge Prize for the best book in English on the history of the Americas since 1492. As a pioneer in digital history, Dr. Ayers created *The Valley of the Shadow: Two Communities in the American Civil War*, a Web site that has attracted millions of users and won major prizes in the teaching of history. Dr. Ayers has received a presidential appointment to the National Council on the Humanities in the United States, served as a Fulbright professor in the Netherlands, and been elected to the American Academy of Arts and Sciences.

## *Abstract*

### Space, Place, and Time: Mapping Historical Changes

The emerging global digital environment holds out exciting new opportunities for geographic understanding. The shared space of the Web permits broad audiences to explore complex representations of change from multiple perspectives and degrees of scale. New tools permits us, moreover, to represent complex social change unfolding over large spaces and long periods of time. It is now possible as well to integrate analytical representations of space with more humanistic understanding of individual places. To demonstrate some of these possibilities, this talk will present dynamic maps of change in the United States over several centuries and will discuss the challenges and opportunities those maps present.

**Keynote Speech**

## Dr. Trevor M. Harris

Dr. Harris is Eberly Distinguished Professor of Geography and Department Chairperson of Geology and Geography at the West Virginia University. Dr. Harris received his BA degree in Geography and history and Ph.D. in Geography from the Hull University. His research interests include geographic information science, GIS and society, critical GIS, participatory GIS, humanities GIS, spatial humanities, virtual GIS, virtual reality, augmented reality, exploratory spatial data analysis, GIS and archaeology and environmental impact assessment. Dr. Harris serves on the editorial boards of *Journal of Applied Geography* and *International Journal for Arts and Humanities Computing*. Dr. Harris has edited several books, including *Spatial and Digital Humanities Series*, and published numerous papers in journals.

## *Abstract*

### Conceptualizing the Spatial Humanities and Humanities GIS

The emergence of the spatial humanities has been spurred by the recognition of the potential contribution of GIS to humanities scholarship. To date this contribution has been heavily focused on mapping applications and limited GIS functionality and has been generally driven by an emphasis on technique and method. For obvious reasons, not least the seeming uncomfortable juxtaposition of a positivist science with humanist traditions, the interface between GIS and the humanities has focused on where the strengths of the disciplines are currently best maximized – the low hanging fruit. This presentation firstly discusses the diverse conceptual and methodological challenges facing the fusion of spatial science and the humanities and the underlying, but often unacknowledged, role of geographical space as a conceptual framework in the humanities. Secondly, the paper explores ways in which these conceptual challenges might be exploited in terms of where the interface between GIS and the humanities and between humanists and GIS scientists might be developed further. Opportunities are outlined in which the data rich humanities and the geographically

oriented spatial sciences might collaborate conceptually, methodologically, and technically in ways that brings closer collaboration between the GIScience and the humanities communities.

**Keynote Speech**

## Dr. Michael Goodchild

Dr. Goodchild is a professor of geography at the University of California, Santa Barbara; Chair of the Executive Committee, National Center for Geographic Information and Analysis (NCGIA); Associate Director of the Alexandria Digital Library Project; and Director of NCGIA's Center for Spatially Integrated Social Science. Dr. Goodchild received his B.A. degree from Cambridge University in Physics in 1965 and his Ph.D. in Geography from McMaster University in 1969. After 19 years at the University of Western Ontario, Dr. Goodchild moved to Santa Barbara in 1988. He was Director of NCGIA from 1991 to 1997. He was elected member of the National Academy of Sciences and Foreign Fellow of the Royal Society of Canada in 2002, and member of the American Academy of Arts and Sciences in 2006. Dr. Goodchild has received honorary doctorates from Laval University (1999), Keele University (2001), McMaster University (2004), and Ryerson University (2004). He was Editor of Geographical Analysis between 1987 and 1990 and Editor of the Methods, Models, and Geographic Information Sciences section of the Annals of the Association of Americal Geographers from 2000 to 2006. He serves on the editorial boards of ten other journals and book series. Dr. Goodchild's current research interests center on geographic information science, spatial analysis, and uncertainty in geographic data.

## *Abstract*

### The Changing Face of GIS

Rapid advances in a number of technologies, and the impact of these advances on the availability and applications of GIS, are driving a fundamental reconsideration of the nature and role of geospatial technology. I address two specific issues: the growth of user-generated content, otherwise known as volunteered geographic information (VGI); and the emergence of the field of critical spatial thinking as a necessary conceptual envelope in a world in which simple GIS functions are available to all. Both topics are significant for applications of GIS in the humanities and social

sciences. I discuss recent research on who contributes VGI, about what topics, and with what quality; and introduce recent work on fundamental spatial concepts at the Center for Spatial Studies at UCSB.

**Keynote Speech**

## Dr. Ian N. Gregory

Dr. Gregory holds a Ph.D. degree in Historical GIS (Geographical Information Systems) from the University of London. After doing an M.S. in GIS at the University of Edinburgh, Dr. Gregory got a one-year contract at Queen Mary, University of London working to create a GIS of some nineteenth century administrative data. Later this evolved into the Great Britain Historical GIS (GBHGIS), a major database that comprises the majority of statistical data from sources such as the census and vital registration data for the nineteenth and twentieth centuries. This took several years to build and over £500,000 of funding. After leaving London, Dr. Gregory worked at the University of Portsmouth and then as the Associate Director of Centre for Data Digitisation and Analysis at the Queens University, Belfast. In September 2006 he moved to Lancaster to lead a new initiative in Digital Humanities. Dr. Gregory is on the editorial boards of the journals: Social Science History and Historical Methods. He is serving his second term as co-chair of the Social Science History Associations's Historical Geography network as well as his first term on their Executive Committee. Finally, Dr. Gregory is on the Institutional Board and Technical Steering Committee of the Electronic Cultural Atlas Initiative.

## *Abstract*

### Censuses, Literature and Newspapers: Quantitative and Qualitative Approaches to Studying the Past with GIS

The use of GIS in historical research has now become widespread such that “Historical GIS” is now an accepted field (see http://www.hgis.org.uk). This has delivered new insights into historical topics as diverse as twentieth century environmental history, nineteenth century demography and medieval land-use. Much of this progress has been built on the early approaches to GIS which saw it as a quantitative tool that was best suited to handling polygon datasets. As a consequence much of the early work was on censuses and similar sources. While there is much to

be commended in this work, quantitative history is a relative small field. If GIS is to move towards being a tool for mainstream history, and indeed spread across the humanities more generally, the ability to handle a much broader range of sources is essential. The most important type of source in much of the humanities is, of course, the text.

In Literary Studies, recent work on the English Lake District showed that it was possible to turn literature of authors such as William Wordsworth, Samuel Taylor Coleridge and Thomas Gray into a GIS using place names. This allowed us to summarise the general patterns contained in different authors' work showing that they had very different conceptions of the place called the Lake District. The approach also allows researchers to explore the geographical aspects of the writing in detail by combining the texts with an interactive map (http://www.lancs.ac.uk/mappingthelakes).

Applying this approach to larger sources can be achieved by using techniques from corpus linguistics This will be demonstrated using an 800,000 word corpus of news-books published in seventeenth century London. These allow us to quickly explore not only where the news-books were talking about but also what they were saying about these places.

Special Talk

## Dr. Donald Janelle

Dr. Janelle is Research Professor and Program Director for the Center for Spatially Integrated Social Science at the University of California Santa Barbara. He was at the University of Western Ontario in London, Canada from 1970 to 2000, serving as the chair of the Department of Geography (1991-96) and as the assistant vice provost for Faculty Affairs (1998-2000). From 1966 to 1969, he was on the geography faculty at the U.S. Air Force Academy. He received a B.A. in Geography from the University of Southwestern Louisiana (now the University of Louisiana) in 1963 and earned M.A. and Ph.D. degrees in Geography from Michigan State University, in 1965 and 1966, respectively. His research specializations are in urban geography, locational conflict behavior, urban-regional spatial-systems development, transportation geography, time geography and human activity patterns, and geographies of telecommunication and information technologies. In 1998, he co-directed (with David Hodge) the NCGIA Varenius Research Conference on *Measuring and Representing Accessibility in the Information Age* and co-edited the resulting book - *Information, Place, and Cyberspace: Issues in Accessibility* (Springer-Verlag, 2000).

## *Abstract*

### Spatio-Temporal Approaches to Understanding Human Behaviour and Social Organization

Special Talk

## Dr. Michael Phoenix

Michael Phoenix has been the Manager of Education Solutions at ESRI Redlands for 15 years. The mission of the ESRI's Education Team is to encourage the spread of spatial literacy by helping universities and schools to get access to the tools of spatial analysis and to help them understand the importance of geographic information science. In that role he has traveled around the world promoting GIS education to many countries, including Japan, India, Poland, Kenya and many other countries. Before coming to ESRI he taught geography and GIS for a number of years at universities in the United States. He has a Ph.D. in Geography from Clark University in Massachusetts, USA. During his long career, he worked in Asia, Latin America and Africa for a variety of organizations including the US Peace Corps, the US Agency for International Development and the United Nations High Commission for Refugees. Recently, he spent one year in Bhutan (2001) as a United Nations Volunteer helping to implement a nation-wide GIS agency. In 2008 he was elected Educator of the Year by the University Consortium for Geographic Information Science for his contribution to GIS education world-wide.

## *Abstract*

### The Importance of Spatial Thinking in Social Sciences

This paper will argue that the inclusion of a spatial dimension to research in the social sciences is both timely and necessary. It literally adds a new dimension to the social sciences.

The inclusion of a spatial dimension in the social sciences was, in the past, limited by access to tools for spatial analysis, sparse digital data of the spatial component, and appropriate techniques for spatial analysis of social processes. All this has changed. We now live in a data rich environment and we need to use all the tools available for making the most of this opportunity.

This paper will also briefly address some of the techniques and processes of spatial

analysis of social data.

***keywords:*** *spatial literacy, education, social science, GIS, spatial analysis, spatial techniques*

Special Talk

## Dr. A. Stewart Fotheringham

A. Stewart Fotheringham is Science Foundation Ireland Research Professor and Director of the National Centre for Geocomputation (NCG) at the National University of Ireland in Maynooth. He previously held positions at the University of Newcastle in the UK, the State University of New York at Buffalo, the University of Florida and Indiana University. He obtained his PhD and MA at McMaster University in Canada and his BSc at Aberdeen University in Scotland. He has been actively involved with large GIS-based initiatives in the US, Canada, the UK and Ireland.Professor Fotheringham's research interests include: the integration of spatial analysis and GIS; spatial statistics; exploratory spatial data analysis; and spatial modeling. His expertise is in the analysis of spatial data and in particular the local modeling of spatial relationships with geographically weighted regression, for which he has co-authored software that has been distributed to a wide variety of agencies and individuals concerned with spatial modeling. He is a founding editor of Transactions in GIS and is on a number of editorial boards. He has co-authored eight books, including Quantitative Geography: Perspectives on Spatial Data Analysis and Geographically Weighted Regression: An Analysis of Spatially Varying Relationships. He has also published over 20 book chapters and over 100 journal articles. He is a co-editor of the recently published 600+ page Handbook of Geographical Information Science published by Blackwell.Professor Fotheringham has presented many keynote addresses at International Conferences and he has organized workshops on Geographically Weighted Regression in many countries.

## *Abstract*

### Spatial Variations in Population Dynamics: A GIScience and GWR Perspective using a Case Study of Ireland 1841-1851

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Population dynamics within Ireland are both highly unusual and highly complex – for instance, the 2006 population is still over 2 million below the 1841 population.

Population change though has not been constant over space or over time. There were dramatic reductions in population during the decade of the 1840s due to the Great Irish Famine but the effects of the Famine were not experienced equally in all parts of the country. Some areas suffered massive population decline whilst other areas experienced population gain. This paper examines spatial variations in population change from a GIScience perspective. It does so in three parts.

The first part of the paper draws on a research project with is concerned with mapping population change in Ireland from 1841 to 1851 at Electoral Division (ED) level. Using EDs, of which there were 3,439 in Ireland in 1851, as the unit of analysis, reveals the spatially uneven impacts of the famine in greater detail than has been seen before. While it is well established that poorer regions in the west and south west of the country suffered more intensive population decline than the more prosperous east and north, mapping population change at ED level reveals that patterns of population change were far more complex than this interpretation suggests. Parts of the west and south experienced low levels of population decrease and some parts experienced population increase while some parts of the north and east experienced significant decrease. We describe the GIS operations that allow population change to be examined at ED level for the first time; previous mappings of the Famine have used relatively crude spatial units such as Baronies, Parishes or even Counties (of which there are only 32).

The second part of this paper displays the spatial variations in population change in a series of cartograms against the backdrop of national population change. Displaying spatial variations in population through time via continuous cartograms can provide an effective visual display of the complexity of population dynamics and the dramatic nature of the change through time although some caveats are discussed in the use of cartograms in this manner.

The third part of this paper, examines the extent to which features of the social and natural landscape, can be identified and statistically analysed as determinants of population change at ED level. Local variables that may have had an impact on the vulnerability or resilience of particular EDs during the famine include distance to urban settlements, relief schemes and workhouses, topography, agricultural practices and industrial development, and distances to the coast, lakes and waterways. Very little work has been carried out using statistical analyses that link population change to features of the social and natural landscape primarily because of the difficulty to gathering data at the national level and because the territorial units used to gather

information in Ireland during the nineteenth century varied from survey to survey. Here we employ three sets of techniques to obtain data on a wide array of explanatory variables. We are fortunate in having access to 1841 census records which include (with some manipulation) information on agricultural practices and land values in each ED, so giving very useful information on land quality and farming practices. The census also contains some limited demographic information. Further demographic and locational information will be obtained from detailed archival research to obtain information on relief schemes and the location of workhouses. Finally, standard GIS operations are employed in conjunction with other spatial databases to obtain data on topography, distance to the coast and lakes and population density.

Having gathered data on a range of explanatory variables an 1841-1851 population change index will be regressed globally on these explanatory variables to identify general patterns in the determinants of population change during the Irish Famine. This will then be followed by a Geographically Weighted Regression to examine if these determinants of population change had spatially varying effects and whether a single model of population growth and decline is too simplistic. For this we will utilise the latest version of the GWR software soon to be released (GWR 4.0) which allows the construction and calibration of semi-parametric GWR models. In this case, the use of GWR 4.0 will provide a novel example of model selection from a set of fixed and spatially varying determinants. Issues examined here include which of the determinants of population change had a constant impact across the county and which factors had a more important role in certain parts of the country than in others. Interpretation of the results in the context of Irish demographics will be given.

This paper will thus contain one of the first applications of the new GWR software and an example of the automatic construction of semi-parametric GWR models which is a novel feature of this version of the software. Hence, although the empirical focus is on an historical database, the geocomputational aspects of this paper will be of general interest.

Given the extent to which GISscience can contribute to a spatially sensitive statistical analysis of the factors that impacted on population change in Ireland during the period 1841 to 1851, the final part of his paper of discusses the relevance of GIscience for historical research in Ireland. On the basis of this we outline how the establishment of a more longitudinal GIscience approach to the study of population dynamics in Ireland from 1841 to the present can contribute to understandings of more contemporary population dynamics in Ireland. Such an analysis can provide us with a

perspective on the geography and rates of post-famine recovery and help to explain how the current population patterns have evolved. While Ireland is fortunate in having a constant unit of census reporting from 1851, the ED, there are approximately over 500 more Electoral Divisions in Ireland now than in 1851. These changing Electoral Division boundaries will need to be incorporated into this project - as will the changing range of variables that impacted upon population change over the past century.

***Acknowledgements***

*The authors are grateful to the Irish Research Council for the Humanities and Social Sciences who have funded this research.*

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# Session 1: Exemplar projects that have developed GIS in the Humanities or Social Sciences – I

# Soil Erosion of Spatiotemporal Distribution Pattern and Factor Analysis on Teh-chi Reservoir watershed under Human-Environment Interactions (1956-2008)

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Long-term estimation of soil erosion is important for detecting environmental impact and reflecting human-environment interactions on high mountain reservoir watershed. According to the theories of social science from human ecology to political ecology, social researchers usually focus on household, or communities to attribute the responsibility of disaster causes to human beings whether there are from living style in local scale or political-economy structure in macro-scale. Nevertheless, in vulnerable mountain watershed these natural environment factors are so changing and unstable that hazards and disasters are intensified and bring about more impacts on the local society.

In this paper, we will use USLE, a commonly adopted soil erosion estimation model, as primary tools to analyze the relationship between land use change and environment impacts on the upper mountain reservoir. A long time span remote sensing data will be used to construct a spatiotemporal model to explore the evolution of spatial patterns of disaster distribution from 1956 to 1995.

This research will try to identify the most important factors in the soil erosion and the distribution pattern over the time and space.

***Keywords:*** *human-environment interactions, spatiotemporal distribution pattern, soil erosion*

# Spatial Accessibility to Health Care Service and Health Outcome for People with Disability

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This analysis determines the importance of spatial accessibility to health care services in health status for people with disability. Using a sample data of 8670 who have limitation of living activities form Ohio Family Health Survey 2008, this analysis tests the relationship between spatial accessibility to health care service and heath status while adjusting for the effects of individual characteristics (age, education, gender, race and income) and health characteristics (health insurance, level of disability, regular examine, smoke). The logistic regression models reveal that: (1) the log of the odds of a person in poor health is negatively related to the spatial accessibility to primary care physician (B = -.384, p = .000), (2) the log of the odds of a person in poor health is negatively related to the spatial accessibility to hospital (B = -.004, p = .002).These results show the importance of spatial accessibility to health acre services in health status for people with disability in Ohio.

***Keywords:*** *Spatial Accessibility, Health Behavior Model for Vulnerable Population, GIS*

# Evaluating PPGIS in community development by actor-network

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PPGIS has been implemented to achieve consensus of public decision-making in local communities in Taiwan. However, assessment of PPGIS effectiveness is still in developing. The actor-network theory (ANT) is a social-technical approach to investigate social construction of science and technology. It has gained great interest by IT researchers. This paper uses ANT to delineate and evaluate the social and technical interactions of a PPGIS project in Meinung community.

The purpose of the Meinung PPGIS project is to draw a common vision of community development by empowering stakeholders whose original views were in great variety. This study traces actor-network interactions through people, organization, institution, and PPGIS technology. The actors and their networks before and after PPGIS implementation are compared.

***Keywords:*** *Public participation Geographic information system, PPGIS, Actor-network theory, ANT*

# Spatial and Temporal Transit of Obesity Epidemic in Taiwan 2001 – 2005: A multilevel spatial model

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Obesity, one of the greatest health problems facing developed countries, has steadily been increasing in Taiwan. This study combines a socioeconomic multilevel approach and spatial analysis to explore the factors associated with individual-level obesity by simultaneously examining individual-level socioeconomic status and neighborhood-level characteristics. Using data drawn from Social Development Survey on Health and Safety collected at year 2001 and 2005, defferent geographic patterns and social-demographic determinants were identified. First, the risk of individual-level obesity is located in affluent neighborhood-clusters in year 2001, yet located in concentrated low-income neighborhood-clusters in year 2005. Second, aboriginal people who live adjacent to affluent neighborhood-clusters in Northern Taiwan are at a risk of obesity at year 2001. In year 2005, however, aboriginal people living in concentrated low-income neighborhood-clusters are likely to a risk of obesity in 2005. The results reveal that neighborhood-based risk of individual-level obesity has changed from year 2001 to 2005, suggesting that the possibility that health outcomes in a given neighborhood may be affected by the features of living residence and neighboring areas. A better understanding of spatial interdependence among neighborhoods can shed light on the estimation of "neighborhood effects"on health.

***Keywords***：*Body mass index, socioeconomic position, multilevel modeling, health inequality, spatial dependence, geographic information system*

# Disease and Environment: Implications of Clonorchiasis Infection in Taiwan and Mainland China

Ts'ui-jung Liu with Maps charted by Yu-ting Lee
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Clonorchiasis is an infectious disease caused by Clonorchis sinensis (Chinese liver fluke) and it is a food-borne zoonosis. The transmission of Clonorchis sinensis forms a cycle among the parasite, the intermediate hosts and the final hosts. Rivers, lakes and ponds provide suitable environment for this parasite to survive, but it is human actions that make this cycle of transmission to run over and over again.

Archaeological excavations in China during 1956-1994 found seven cases of human infections of Clonorchis sinensis in Hubei, Hunan, Guangdong, and Fujian; these cases revealed that Clonorchiasis existed in South China at least from 2,300 years ago. A practice that induced the propagation of Clonorchis sinensis by feeding fresh water fishes with feces could be traced in Chinese history at least back to the mid Northern Song Dynasty (960-1127). Moreover, the custom of eating raw or half-cooked fish had a long tradition in China. This cuisine provides a chance for metacercariae of Clonorchis sinensis to enter human body and induces diseases related to liver and gallbladder. The custom of feeding cats and pigs with fishes also helps in producing animal hosts around the living environment of the people.

In modern world, Clonorchiasis became epidemic in Japan, Korea, China, Taiwan, and Vietnam. In Japan the infection rate reached more than 50% in 1883, but there was no more infection in 1991. In Korea, the infection rate was over 40% in the 1950s, but it was reduced to around 2% during 1982-1992. In the early 21st century, estimations revealed that 3.5 million people around the world were infected, of which 1.5 million were in China.

This paper is attempted to give an overview of Clonorchiasis infections in Taiwan and mainland China with available literature and maps are charted to show variations in different provinces.

# Session 2: Historical GIS

# The Historical Images and Humanism Maps of Eastern Taiwan

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In the researches on Taiwan's historical cultures, most of the relics, heritages, ancient monuments or historical sites have their location space data and possible time range. Overlay and analysis models can be widely applied in GIS, which integrates satellite images, maps and data based on the attributes of time and space, in order to reconstruct the scenes of historical culture and environment. This research collected and integrated the image data of historical culture and maps according to the classification of the following 5 historical periods: "prehistoric period", "period of Holland and Spain", "Chin dynasty", "Japanese colonial period" and "post-war period" (before 1970). A total of 3,750 images were collected, and the explanation of all the images and the filing of GIS database were established. On the exhibition and application platform, the time map of history and humanism under different themes were also established through the connection of the space location of each image in the Internet GIS environment of Google Map. There has been a good foundation of the application of digital collection and GIS with regards to Eastern Taiwan image data. The research result has been expanded to develop the Internet sharing technology, connect the historical images of GIS, and enrich the digital collection of Eastern Taiwan researches.

***Keywords:*** *historical culture and maps, Eastern Taiwan images, Internet GIS*

# Spatial Analysis of Western Medical Services in Republican Beijing: A Historical GIS Approach

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The aim of this paper is to reconstruct spatial phenomena of Western medical services in Beijing city during the Republican period. The analysis is based on a Republican Beijing GIS Dataset in progress. Spatial analytical methods such as hotspot analysis and geographically weighted regression (GWR) are used to explore the spatial patterns of Western medical services and its correlations with traditional Chinese medicine, population, temple and industry-commerce patterns.

***Keywords:*** *historical GIS, spatial analysis, Western medical services, Republican Beijing*

# Towards a Historical GIS of Europe: State-building processes and comparative spatial statistics in a "Digital Atlas on the History of Europe since 1500"

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Since 2008 work on a European GIS has been underway at the Institute of European History, Mainz (Germany), as part of a Digital Atlas on the History of Europe since 1500 which is being put together as an online information system. A first prototype can be visited at http://www.ieg-maps.uni-mainz.de/AtlasEuropa/. The aims of the historical GIS-portions of the Atlas are threefold: 1. Offer an interactive map on the evolution of the European state system since 1815, and – in exemplary fashion – since 1500. 2. Become a generator of maps on selected themes for the thematic section of the Atlas. 3. Become the main base for the statistical portion of the Atlas, thereby offering spatial statistics on a comparative basis for the 100 or so different European countries that existed between 1815 and 2009. The paper will report on the general basis and aims of the EU-Atlas GIS and, secondly, present some first results pertaining to the three areas of GIS-based activity outlined above.

***Keywords:*** *Historical GIS, spatial statistics, Digital Atlas of Europe*

# GIS Applications and Web Map Service for the 'Monies, Markets, and Finance in China and East Asia 1600-1900'-Project

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The paper gives an insight into the applications of Geographic Information Systems (GIS) in the 'Monies, Markets, and Finance in China and East Asia 1600-1900'-Project ("MMF", Research Group FOR 596 of the German Research Foundation).

Research carried out within this interdisciplinary project concentrates on the copper-based monies of Qing China and Tokugawa Japan. The research group is composed of scholars in Chinese studies, Japanese studies, and geography from the universities of Tübingen, Heidelberg and Bochum, in close association with colleagues in other disciplines.

Besides for cartography and GIS data creation for MMF-projects, the geography group uses GIS to locate mines, and to reconstruct historical copper transportation routes. Therefore historical documents, georeferenced maps of various scales and dates, and remote sensing data are used. Furthermore GIS techniques are used for 3D-visualisation and 3D-analyses of the routes. By generating route profiles and calculating the rises and the descents, it was proved that the distance indication in li (里, Chinese Mile) in official Qing-time documents do not give the real length of routes. A li is rather a time measure, considering the difficulty of a route.

GIS data created for all MMF-projects were combined with external data like the China Historical GIS, and topographic maps in the MMF-Web Map Service (WMS). The MMF-WMS was set up with open source products like the UMN-Mapserver, and Mapbender and enables project members and others to use a web-based GIS. Different data layers can be combined by scientists and related to show new coherences.

***Keywords:*** *GIS, Historical Geography, visualization, analyses, web map service*

# Anthropogenic land use patterns in the Malay peninsula during the British colonial era

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Due largely to its strategic location, the Malay peninsula had attracted several power houses during the last few centuries. In this study we focus on the British period, that is, before and through World War 1 and right before World War 2 (1907-1938). This period coincided with a mature phase of the British rule in the peninsula so we traced the physical development of the landscape by studying land use maps made by the land and survey department at the time. Our study is located around the site of an ancient land portage called Penarikan, in the southern inland section of the peninsula.

Firstly, among the findings from the map analysis using common GIS techniques (patch analysis, buffer analysis), are as follows: 1. Between 1907 and 1938, forest area declined by 31% but existed in a greater number of patches in the later years. 2. Along the main rivers, forests were cleared to make way for rice paddies, that is, two-fold increase between 1907 and 1938. 3. The total length of transportation roads increased from 114km in 1907 to 272km in 1938. 4. Since less than 2% of land area was at high elevation (above 300m above sea level), virtually all of land development was taking place in the lowlying areas. Secondly, we note with interest that on the 1907 map the Penarikan site was indicated with "Penari" but that the 1938 map was visibly silent on this historical site. In this paper we include the historical explanation for these land use patterns. We believe that historians would welcome the additional knowledge generated from our GIS map analysis because it augments the written records of the study area.

***Keywords:*** *Historical GIS, Malay Peninsula, Colonial Era*

# Session 3: Humanities GIS in Japan – Current Status

# Spatio-temporal Model for Presenting and Analyzing Humanities Research Resources

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Humanities Researchers deal with wide variety of research resources such as numerical documents, texts, images, moving images, archival papers, and many kinds of objects including ethnographical artifacts, archaeological objects, flora and fauna specimens, etc. An ideal style of the research may to pursue cross-search among every kind of resources in terms of time, space, and thematic keywords. To realize this, diverse expressions of those terms among the research fields must be mediated.

In this presentation, a conceptual model for archiving research resources in terms of time, space, and thematic keywords is shown together with (1) the basic consideration on an ontology covering discipline-oriented expressions from micro-view to macro-view for resolving differences among "culture" of research disciplines, that will help to promote both intra-discipline and inter-discipline researches, (2) and an idea of introducing forum-type cyclic data gathering and utilizing mechanism similar to the creative-commons.

In addition, an application of HuTime, a tool for time-based presentation and analysis, to eco-historical analysis of Yunnan Chronicle, a collection of prefectural historical records in Yunnan Province covering mainly after the World War 2, and several examples of them about interrelations between several events such as disastrous flood, puppy plantation and agricultural policy, etc. are introduced.

***Keywords:*** *GIS, chronicle, time-space integration, micro-macro and interdisciplinary analysis and presentation, ontology, cychronicle = cyclic chronicle*

# The Construction of the Digital Gazetteer and the Topographical Maps Database based on Humanities GIS

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Historical digital gazetteer is essential tool for humanities GIS data organization. Therefore, we developed the database for the index of Dainihon Chimeijisho (The Dictionary of Place Names in Greater Japan ) edited by Togo Yoshida in 1900 (Meiji 30).

The Dainihon Chimeijisho (The Dictionary of Place Names in Greater Japan) provides the detail explanation of the historical investigation and change of place names such as country names, county names, names of mountains, rivers, lakes and harbors. Its first edition was published in 1900. The index contains 53,956 place names in kanji and kana.

Also, the database for the Japanese Historical Gazetteer digitized by providing kanji and kana readings of place names, Romanization of place names, geographical relations of countries, counties, towns and villages, the relations with the current cities, towns, and villages, and latitude and longitude, based on the index of Dainihon Chimeijisho.

Furthermore, we merged Shikinaisya (Shrines registered with Jinmyocho of Engishiki, 2,842 shrines ) and Jiinn (Japanese Temple name, 78,588 temples ) with Dainihon Chimeijisho.

Finally, we constructed the topographical maps database. Two topographical maps called Jinsoku-zu Maps (Kinki region) and Kasei-zu Maps (Kanto region) are part of the first measured maps which cover the entire country. We scanned these maps, overlying the administrative borders, and processed the water areas (rivers and lakes, etc.) and roads, etc. as polygon and line data.

We also provided the place data (counties, towns, villages, aza, Shinto shrines, Buddhist temples, rivers, etc.) on these maps with their longitude of latitude. And then, we stored these place name data (19,356 place names) in the this digital gazetteer. And we made the visual data in the topographical maps database accessible and retrievable on the internet. They can be enlarged, reduced or transfered by Zoomify. We constructed the Japanese Historical Gazetteer using OpenText (DBMS), and record structure is adopted XML.

***Keywords:*** *Digit Gazetteer, Topographical Maps Database, Dainihon Chimeijisho (The Dictionary of Plase Names in Greater Japan), Shikinai-sha (Shrines Registered with Jinmyocho of Engishiki)*

# Tools to Realize Spatiotemporal Analysis in the Humanities

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There are few tools available today to visually analyze temporal information such as that included in geographic information systems (GIS), though the term "spatiotemporal" is often used in geographic information science. HuTime, developed by the H-GIS Research Group in Japan, is a tool that allows temporal information to be visually analyzed, and displays characteristic data as a chronological table and numerical data as a chart along the same temporal axis. There are also functions available to merge two chronological tables and to create new chronological tables of events based on selected criteria.

Various types of spatiotemporal analyses are possible using HuTime in conjunction with HuMap, also developed by the H-GIS Research Group. The development of these spatiotemporal tools makes it possible to use information which has not been available for traditional spatial analysis. For the next stage of development, data for basic chronological table and a dictionary of common names for specific events must be accumulated.

***Keywords:*** *GIS, chronological table, HuTime, HuMap, calendar, visualization*

# Humanities GIS in Japan: Current Status, Models and Tools

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Interdisciplinary researches between the humanities and information sciences have for many years been expected to create a new paradigm. However, a paucity of appropriate information frameworks to describe and process humanities data quantitatively made it difficult to organize the huge amount of humanities resources into databases and to utilize them for visualizing, comparing, and analyzing data objectively and logically.

Time and place are two quantitative attributes of humanities resources, and a huge amount of knowledge about how to use spatiotemporal attributes explicitly and implicitly has been accumulated in this field. Recently, a new information framework to describe and process spatiotemporal attributes has been developed, allowing the creation of a new interdisciplinary paradigm between the humanities and information sciences called spatiotemporal informatics. This paper describes the current status of spatiotemporal informatics in the humanities in Japan, focusing on the spatiotemporal models, tools and metadata developed by the Humanities GIS Research Group (H-GIS), the leading research group in Japan applying spatiotemporal informatics to the humanities.

***Keywords:*** *humanities, GIS, spatiotemporal informatics, metadata, resource sharing systems, HuMap, HuTime, H-GIS*

# Session 4: Exemplar projects that have developed GIS in the Humanities or Social Sciences – II

# Development and Evaluation of a Map Annotation System Using a Digital Pen
## - An Example of a Distributional Survey of a Local Shopping Area-

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Paper is used widely for recording data in fieldworks. To manage and analyze the data recorded on sheets of paper by using computers, field workers first have to digitize them by manual operation. We believe that the operation is not always an easy task. Therefore, we propose a map annotation system, GeoMemo, that uses a digital pen and special paper maps including dot patterns for recording handwritten strokes to digitize annotations on the paper maps efficiently. In this paper, we report an implementation of our proposed system, and also mention the effect of the system on fieldworks

***Keywords:*** *GIS, fieldworks, digital pen*

# DEH – An Interactive Mobile Navigation Service for Demodulating and Encoding Heritage

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Cultural and historical heritage preservation was deployed in the world but lacking creative applications to take humanistic knowledge into human life. Demodulating and Encoding Heritage (DEH) project attempts to construct a creative service which is focus on humanistic attractions navigation and guidance. DEH project designs an architecture with features of humanistic content automatically reinforcement. Based on this architecture, humanistic contents are able to improve via data mining and users' experience sharing. In this project, humanistic-POI navigation system is proposed to lead travelers experiencing context of historical and cultural POI. The multimedia geo-blog proposed a space of touring experience sharing and itineraries reference. In order to fulfill the humanistic content utilization, DEH project designed a well-defined metadata scheme for POI content interpretation and an open cross-platform interface for various applications access. An inference engine supported real-time recommendations of suitable POI and itineraries navigation according to user's situation and preference settings. Through these services, humanistic-content will be preserved and popularized into human life and achieves the objective of humanist education and popularization.

***Keywords:*** *LBS, Humanistic creative service, navigation system, cultural heritage*

# Modeling Asian Urban Dynamics: Impacts of Economic Globalization on the Emergence of Desakota Regions in Taipei Metropolitan Area

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After World War II, Asia countries have undergone an accelerated process of urbanization, which is distinctively different from the Western society, since Asian urbanization is more strongly affected by economic globalization. The desakota model, proposed by McGee and Ginsburg in 1991, focuses on how domestic and local forces drive the specific rural-urban transformation and serve up the dazzling landscape – desakota regions in Asia. However, the McGee-Ginsburg model has failed to recognize the importance of globalization and how it has manifested in the Asian urbanization process. To fill the gap, this study incorporates GIS/ remote sensing technologies and socioeconomic data into cellular automata (CA) simulation to modeling the unique urbanization processes with the influence of economic globalization. Taipei metropolitan area, a rapid urbanizing region that highly interacts with global economy in Asia, is selected to examine this model. The CA simulation model establishes a strong integration between foreign direct investments (FDIs), an indicator representing impacts of globalization, and the Asian urban model through the combination of multi-scale economic factors and micro-scale land-use transformation. Simulation results reveal how urban growth of Taipei metropolis in recent years fits the characterization of the desakota model, and how desakota regions act as the growth generators to interact with city cores and form an extended metropolitan region under rapid growth of FDIs.

***Keywords:*** *GIS, Desakota, Urban modeling, Cellular automat, Globalization, Taipei*

# Session 5: Temporal GIS

# A Space-Time GIS for Studying Individual-based Human Activities and Interactions

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Human activities interact and intertwine to create a complex social system to fulfill our physiological, economic, social and other needs. Recent developments in information and communication technologies (ICT), such as the Internet and mobile phones, have offered people an environment to expand their activities from physical space to virtual space and have introduced important changes to human activity patterns. While transportation is used as the means to move people and goods in physical space, ICT serve as the navigation mode of carrying out activities in virtual space. With the use of ICT, people now can choose between physical space and virtual space to carry out their activities or combine physical and virtual activities to fulfill a particular project. These changes have important implications to both research and business communities. Combined with modern location-aware technologies, it now is feasible and affordable to track human activities and interactions at the individual level in both physical and virtual spaces. Such tracking data can be useful sources to enhance scientific research of better understanding human activity patterns as well as to develop new and innovative applications. This presentation will discuss how we can apply and extend the classical time geography concepts to study individual activities and interactions in a hybrid physical-virtual space. In addition, a space-time geographic information system will be presented to illustrate how we can represent, query, analyze, and visualize individual activities and interactions in a space-and-time context. Potential applications of this research also will be discussed in this presentation.

***Keywords:*** *human activity, time geography, temporal GIS*

# Design of tools for spatio-temporal data analysis and dynamic visualization in a web-based GIS

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A spatio-temporal GIS prototype with analysis tools and dynamic visualization in a web setting has been designed. The context of this work involves the historic aspect for the study of the Dynamic Complexity of Cooperation-Based Self-Organizing Networks in the First Global Age (DynCoopNet Project). Data were extracted from "The Voyages" (www.slavevoyages.org) with the purpose of studying slave trade across the Atlantic Ocean during the 16th-19th centuries. The database is bulky – recording 35,000 voyages – containing information concerning ships, crew, slaves, harbours, departure and arrival dates for every stage of a voyage. Building on this information, a conceptual data model has been generated with the aim of implementing it in a web-based spatio-temporal GIS, supporting queries, editing, analysis and dynamic visualization of trading flows.

GIS are appealing for the study of trade routes although their integration as a historical analysis tool has been unsuccessful due to information storage difficulties, retrieval and relationship among data and lack of queries allowing recognition of behaviour patterns. The traditional GIS, based on the carrying out of spatial queries, allows neither visualization nor analysis of the unfolding events and it does not allow the recognition of behaviour temporal patterns either. Hence, the need for the development of a spatio-temporal GIS.

The process followed for the development of these spatio-temporal tools has consisted of designing a web interface for entering and editing data and also designing a dynamic visualization tool where the trading routes selected by the user in a region or specific period will be represented. It should be pointed out that object-oriented analysis using UML has been employed for tool modelling. The design of the described prototype is considered as the starting point for the development of geoinformatic tools and their further implementation in the web-based spatio-temporal GIS.

***Keywords:*** *GIS, spatio-temporal tools, dynamic visualization*

# Normalization of temporal expressions in TimeML with a view to the integration into a spatio-temporal GIS

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Linguistic annotation applied to the recognition and normalization of temporal expressions in text information has been researched in recent years with the end of promoting the reasoning applied to texts in computer systems. Some research work has suggested ways of normalization of temporal expressions starting from linguistic annotation especially in English. The application of temporal reasoning on databases is a long pursued objective in the setting of GIS. This paper deals with how to incorporate the temporal aspect of natural language into a GIS.

The originality of the research presented is the corpus type (business letters of the Castilian merchant Simón Ruiz), the language used (16th century Castilian) and the annotation containing not only temporal expressions but also events and their mutual relationships. Another contribution is the utilization and review of the temporal annotation system (TimeML) for the Spanish language in view of its great documentary richness in that century.

The selected corpus is tied to the subject matter of the DynCoopNet project1 –study of the trade cooperation dynamic relationships in the 16th-18th centuries. The research basis of this project is the normalization of temporal expressions for their implementation in a spatio-temporal GIS, thus facilitating the tasks of analysis to historians.

TimeML, through semantic annotation, provides definition of temporal expressions and events, as well as their relationships. It also enables structuring of data as a database. The next step has been the TimeML implementation on a database that could be incorporated into a GIS, so as to be able to represent and query the temporal information.

***Keywords:*** *GIS, TimeML, indefinite temporal expressions, temporal database, linguistic annotation*

[1] Project funded by the EUROCODES Programme of the European Science Foundation, Dynamic Complexity of Coperation-Based Self- Organizing Networks in the First Gobal Age (0-HUM2007-31128-E)

# Session 6: Spatial Statistical Analysis in the Humanities and Social Sciences

# Mapping the Development of Urban Industries

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Under the trend of globalization, the boundary of the economic activities among countries has been already replaced by the linkage of the production chain across countries, so that the economic competition which originally happened among countries gradually shifts to the competition among regions or cities simultaneously. Therefore, seeking the target industry should be the priority job while planning the urban economic development policies for a city's governor. But "what" and "where" the target industry is become the first question for local authority as when it wants to develop city's economy. This study makes a detail description on the approach of drawing industry map to help planner to choose the best develop location for target industries. Although some papers have already introduced the industry relevancy and GIS hot spot analysis to draw the industry map. This study uses overlapping analysis combined with shift-share analysis of regional economic theory, to present a new demonstration of urban industries. For conducting the overlapping analysis, the study respectively defines the basic maps of the target industry development of the three layers listed below, they are: industry status map, industry momentum map and industry potential map, all of these three can represent certain characteristics of target industries' development. The study employs the overlapping to identify the potential spots of every industry, as the reference for further policies planning of economic development.

***Keywords:*** *Economic Development, GIS, Industry Cluster*

# Using GIS Network Analysis to Evaluate Spatial Accessibility and Equality of Green Space in Kunming, China

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Urban green space serves as an important amenity, providing a variety of social benefits to citizens. Locations proximate to green space promote the life quality of the citizens by affording them with recreational opportunities, rendering aesthetic enjoyments and improving psycho-physiological health. However, accompanying with the fast urbanization process, large area of the urban green space is converted into impervious land and the distribution of the remnant green space becomes spatially unbalanced. Consequently, to evaluate the spatial accessibility and equality of green space for the residents becomes imperative. In this study, the network analysis in GIS in conjunction with land use and transportation data is used to investigate the green space supply and resident demand. The accessibility to urban green space based on pedestrian walk and public transportation in the beginning of 2009 and the accessibility in the master plan by the end of 2010 are examined in Kunming, China. This study addresses two questions. First, does the green space pattern reflect the social equality that citizens in each part of the city can equally reach these green resources? Second, are there any places still in lack of green space so that further effort could be done to insert green area into the urban environment?

***Keywords:*** *Accessibility, Green Space, Network Analysis, GIS, Spatial Equality*

# Chang'an in the Western Han and Tang Dynasties: Spatial Analysis of a Multi-layered Urban Site

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Chang'an was China's imperial capital during the Western Han and Xin dynasties (206 BCE – 23 CE). Although the city was greatly reduced in importance at this point, the imperial capital returned to this location during the Tang (618 – 907 CE), several kilometers to the southeast from the remains of the earlier walled city. To analyze the urban fabric, I use a schematic reconstruction of the road network outside the city walls to supplement the area within the walls, which is already archaeologically well-documented. This investigation is based on a series of large-scale topographic maps prepared in the 1930's because the land surrounding the Han and Tang cities, has been leveled and almost entirely urbanized within the past three decades. Indications of the earlier roadway system are confirmed by the positions of Western Han city gates, other archaeological sites and landforms. A historical GIS is being prepared to include the area around the Tang city to help distinguish the chronological sequence of the overlaying road systems.

***Keywords:*** *Chang'an, landscape, grid, Han dynasty, historical GIS*

# A Grid-Based Multi-layer and Multi-Class Dasymetric Model for Reconstructing Spatial Population Distribution

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Although population and socioeconomic data are vital for decisions in business or regional planning, the data are usually published in aggregated forms instead of individual points due to privacy concern. Those data are integrated into different statistical dissemination units like census tracts, townships, or counties. These data aggregations not only may distort the spatial pattern of data from the well-known Modifiable Areal Unit Problem (MAUP), but also may make the temporal analysis impossible if the spatial units changes over time. A grid-based multi-layer and multi-class dasymetric model (MLCDM) framework was proposed in this paper which extended the traditional binary dasymetric model to include more ancillary information as they are available. Taichung City in Taiwan was used as case study area to demonstrate the usability and potential improvements of the proposed framework. Results show that error variances between the reconstructed and the true spatial pattern are decreased as more ancillary information are incorporated and the layer of MLCDM get higher. This shows that the MLCDM can properly reconstruct demographic pattern under different data availabilities and budget limitations.

***Keyword*：*Grid-based, population, multi-layer multi-class, dasymetric***

# Session 7: Exemplar projects that have developed GIS in the Humanities or Social Sciences – III

# Untangling the Associations between Physical Health, Health Care System Distrust, and Self-rated Health for the Elderly: A Geographically Weighted Regression Approach

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Recent studies have found an adverse effect of health care system distrust on self-rated health. However, we are aware of no studies that have explored health care system distrust in a spatial framework and as a consequence little is known about whether this effect varies across space. This paper offers a unique application of logistic geographically weighted regression (GWR) to the study of health care service distrust among residents of Philadelphia, USA. The methodology is unique in that we use a spatial randomization approach to convert an individual-level database with zone-based geocodes to point databases that permit the use of GWR. Indeed, we believe this randomization approach has potential for promoting spatial analysis using survey data with zone-based geocodes. Substantively, our analysis suggests that controlling for physical health conditions (an important substantive contribution of our work) eliminates the effect of health care system distrust on self-rated health in a global logistic model but the GWR models provide evidence that the adverse effect of distrust vary, especially for respondents of southwestern Philadelphia. That is, there is non-stationarity with respect to the impact of health care system distrust on self-rated health. We use GWR as an exploratory and explanatory tool, including generating surface maps for outcomes and model predictors.

***Keywords:*** *self-rated health, health care system distrust, geographically weighted regression, spatial randomization, and modifiable areal unit problems*

# A study of Taipei City public high school district

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Taiwan high school use entrance exams to select students for many years. The greatest advantage of the entrance exam is its fairness. How it has been criticized to impact the normal teaching. Therefore, the government is planning to switch to school districts system base on students??home address. However, the school district system also has its problems base on the experience from implementing the elementary school and junior high school district. This study analyzed public schools enrollment data from 1999 to 2003. The research results indicate that except a few prestige high schools, most students enroll to the nearby high school. Students in prestige junior high school performed better than other school in the entrance exam and a higher percentage of students in these prestige junior schools were actually lived outside their school district. These finds support the government? planning on a dual system for high school enrolment. Most students will be assigning to school based on their home location, or they can the entrance exam for the prestige high schools. This study also demonstrates GIS can be a powerful tool for education policy formation and more research are required for a better school enrollment policy.

***Keywords:*** *education policy, school district, spatial analysis*

# Potential Analysis of the Population Density Distribution in Southeast Asia

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Numerical analyses about the population density distributions in the six continental Southeast Asian countries are carried out. From using newly applied "population density potential," quantitative properties for these countries are shown. This new potential means that, for example, how much strength some regions attract the population and the "force" determined by the population density potential is effective. The population density potential is calculated by numerical computation using ICCG scheme to solve partial differential equations. From numerical results, the continental Southeast Countries are categorized two or three groups by the structure of the population density potential. In the Laos and Myanmar models, potential dents without population concentration is discovered. This structure can be only seen from the population density potential analysis. These properties of population density potential may use as one of the index for assortment.

***Keywords:*** *Population density, Continental Southeast Asia, Numerical analysis*

# Enhancing the "P" in Participatory-GIS projects to improve social and human capitals: The use of FOSS4G tools in community-based resource management

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In recent years, emphasis has been placed on the importance of local participation in community-based resource management (CBRM) in order to build and improve social and human capitals. Improving these capitals will enable communities in developing countries, to access resources which they can use to address local problems. Participatory GIS (PGIS) is one such approach which advocates the participation of local stakeholders to generate, analyze and communicate spatial information in managing their local environment. However, the prevailing use of commercial GIS softwares in PGIS projects runs contrary to its participatory nature. In this paper, we will present the most recent outcomes of an on-going activity on the use of Free and Open Source Softwares for Geomatics (FOSS4G) tools to address the GIS needs of the upland municipality of Claveria, Misamis Oriental, in the Philippines. We highlight the participation of local stakeholders on the use of various FOSS4G tools in different stages of the project, not only during data collection and validation, but also during the development and management of geodatabases. In developing the social capital of the community, a network of local stakeholders has been formed to encourage the collaboration and sharing of spatial/non-spatial data and other resources. To build human capital, local stakeholders undergo participatory trainings on using FOSS4G tools. The conduct of participatory trainings and iterative consultation dialogues also ensure genuine local custodianship and ownership of the project outputs. We conclude that using FOSS4G at the community-level enhances participation and improves social and human capitals by involving local people in the life cycle of projects, promoting the appreciation of GIS outputs within their community and supporting spatial learning.

***Keywords:*** *free, open source, FOSS4G, participatory GIS, social and human capitals, community community-based resource management*

# Session 8: GIS in Specific Research- I

# Integration of Contemporary Science & Technology and Culture Beliefs - with Mazu Patrols and Pilgrimages for Example

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The most important event in Taiwan is Mazu patrols and pilgrimages in the 3rd lunar month every year. More than 100 thousand believers from all over the temples compose a very big pilgrimage team. The patrol activities continue and reach the climax on the day of Mazu's birthday (8th day, 3rd lunar month). Up until now, the traditional culture of people going on foot in patrols and pilgrimages can still be seen for Dajia and Baishatun Mazu. The thrilling sight is unrivaled. Through the humanistic view, this paper explores how the contemporary science and technology are combined with Mazu cult and infused into a new stage in terms of traditional beliefs.

In the whole patrol activities, each ceremony must conform to a traditional procedure. Any carelessness is not allowed. It let the whole route be filled with high indetermination. So GPS and photograph lens on Mazu's sedan chair, along with GIS, are used to share the real-time image on the website (http://mazu.gis.tw/). People at the scene can share the whole process with people online through wireless Internet and PDA. Even the believers who can't participate at the scene can enjoy this annual religious event through the internet.

***Keywords:*** *Mazu patrol and pilgrimage, Global Positioning Systems, Geographic Information Systems, Real-time Image, Information Shares*

# A future for GIS in archaeology: the integration of theory and analysis

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This paper reviews aspects of the development and use of GIS in archaeology since its introduction in the late 1980s. A major tension that has developed since that time has been how, and whether, GIS can be used to model the qualitative understandings of past life that are central to post-modernist archaeologies. There is no doubt that GIS has been highly successful within various areas of archaeology as tools for mapping and quantitative analysis although the question remains as to whether that is enough. The main response to this has been attempts to model vision and movement through the use of line-of-sight/viewsheds and least-cost-paths/cost surfaces as ways of understanding past 'perceptions' of landscape. In this paper we critique these approaches and, using the Hillforts of the Ridgeway Project as a case-study for recent work, suggest ways of integrating theory and new forms of analysis. This involves concepts of intentionality, near-, mid- and far-distant vision and the use of cultural markers in the landscape as waypoints. The Hillforts of the Ridgeway Project was a major fieldwork project investigating the development of landscape and the Ridgeway path through later prehistoric and Romano-British times, c.1,000 BC to AD 400, in central southern England.

***Keywords:*** *GIS, archaeological theory, visibility, movement*

# GIS and landscape archaeology: The South Cadbury Environs Project

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Excavations at South Cadbury hillfort, Somerset, England, revealed a long sequence of activity spanning the later prehistoric, Romano-British and post-Roman periods. For the last fifteen years the South Cadbury Environs Project has been investigating the surrounding landscape of the hillfort using extensive geophysical survey, test-pitting and excavation in an attempt to understand the wider developmental context of the hillfort's occupation. The innovative use of GIS and the development of new analytical techniques have been central to this work and two elements are discussed in this paper. The first is the use of Network Analysis to date the complex of linear features, ditches, detailed within the geophysics through the circulation of spot dates from excavation around the 'network'. This has resulted in a proposed phasing which is discussed here together with issues faced in developing the methodology. The second element concerns the modeling of erosion and colluviation, and the implications of this for the understanding of the archaeology. By extrapolating from areas of colluviation known through excavation, it has been possible to develop detailed models across the landscape that highlight the impact of colluvial deposits on the discovery of archaeology in this area.

***Keywords:*** *South Cadbury, GIS, Network Analysis, geophysics, colluviation modeling*

# Digital Time-Travels: Communicating Historical GIS- and TGIS-information in Museum Environments

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Since 2007 the interdisciplinary project Digital Time-Travels: New Strategies for Archaeology and Cultural Heritage Management? (www.time-travels.org) is developing and evaluating new and innovative forms of mediation and communication in cultural heritage management. The composition of the project aims at promoting a balance between different archaeological-historical sciences, natural science, pedagogy and technological research and development (Stenborg 2007a).

The Digital Time-Travels project is financed by the Swedish National Heritage Board as a research and development project. In brief, our work has focused on the following tasks:

1. Production of a 3-component, multi medial simulation model (TGIS) of the natural and cultural landscape development in the Göta River Valley covering the period 12.500 B.P. to the present.
2. Development of methods to make this information accessible also for visually impaired persons (through audile and tactile augmentation of visual impression).
3. Construction of an interactive interface for the communication and mediating of information about particular sites by means of local computer stations
4. Digital and subsequent physical reproduction of archaeological gold artifacts

This paper will outline the design and implementation of these various applications for the mediation and communication of Cultural Heritage information.

***Keywords:*** *animation, audiovisual model, mediation, museum, multi medial model, virtual model, interactivity, visualization, AR*

# Linguistic Atlas of Taiwan Project

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Taiwan linguistics lacks the foundation upon which other, more mature language disciplines have been based: It has no historical-comparative grammars, no etymological dictionaries, and no linguistic atlases, for any of its language varieties. To begin filling in one of the fundamental lacunæ, Brewer's fieldwork project is a small contribution towards a linguistic atlas of Taiwan, a microscopic view of language distribution in which each lexeme is defined, not only by denotation, but also by an inventory of phonetic variants and seven informant background factors (age, sex, language use, ethnicity, education, occupation, and residential history).

Operating mostly on shoestring budgets for two decades, Brewer has collected 1,400 recordings of Southern Min and Hakka interviews; folk narratives supplemented responses to structured questionnaires. For data analysis, only off-the-shelf software and hardware have been used. Twenty years ago, the project started with Word for Windows vs. 2, FoxPro 2.6, and the beta version of ArcView; by now we have advanced to using Excel and – believe it nor not – ArcView 3.3.

Our presentation consists of a survey of the dialect geographical application of GIS software in Taiwan and a discussion of our incredibly slow progress towards a linguistic atlas of the island.

***Keywords:*** *dialect geography, linguistic atlas, Taiwan, Southern Min*

# Session 9: New Technologies in GIS

# Narrative Geospatial Knowledge about Taiwanese Aboriginal Settlements—A Case Study

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In old articles and books about Taiwan aborigines, verbal phrases are often used to describe the current and historical locations of aboriginal settlements. These narrative descriptions form a kind of geospatial knowledge that defies ready quantification and processing. How to represent such narratives so as to allow for understanding the locations of the aboriginal settlements as described, and for reasoning about their geospatial relationships? We address these problems by defining and using a vocabulary for qualitative geospatial expressions. This formal vocabulary is developed based on a careful study of selected texts in ethnography about East-Sedeq Atayal. The vocabulary is then used to represent and reason about narrative geospatial relationships among the aboriginal settlements as described in the texts. As such, the vocabulary can be viewed as a small ontology on geospatial narratives about populated places. The vocabulary is formalized in OWL (Ontology Web Language), and the rules for qualitative geospatial reasoning are expressed in the language SWRL (Semantic Web Rule Language).

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# e-Science in Geospatial Information Science

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Geospatial computation provides an extraordinary perspective to analyze and digest heterogeneous contents, based on dimensions of time and space. Data deluge not just creates more opportunities for geospatial computing and information science, but also reveals impacts of research and application in the future. Primary challenges includes the following – 1) provenance and sustainable access to geospatial materials; 2) mining new knowledge by geospatial resources federation and analysis; 3) new data model and knowledge management. Process automation and reach results in reasonable time are the common requirements but demands for more resources, tools, and algorithms, which are not available. A new infrastructure for the collection, processing, distribution, and display of geospatial data is required. Moreover, the infrastructure also has to integrate homogeneous resources seamlessly to support the on-demand analysis. Many endeavors already focus on the development and deployment of e-Science infrastructure for geospatial researches and applications. In this study, value of applying e-Science paradigm on geospatial information science (GIS) is investigated. Status of global e-Science infrastructure development will be reviewed. Examples of e-Science applications on GIS would be explored.

# Session 10: Exemplar projects that have developed GIS in the Humanities or Social Sciences – IV

# Vulnerability of Norwegian Municipalities to Natural Hazards

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The aim of this analysis is to reveal geographical variability in social vulnerability to natural hazards in Norway. Natural hazards are spatial and social phenomenon – they threaten particular places, and certain people and social groups more than others. A hazard is more likely to be disastrous when people affected are vulnerable (susceptible to harm). The vulnerability of a place is therefore not only determined by its hazard exposure, but also the inhabitants' social vulnerability – the social factors that influences people's susceptibility to harm and ability to respond, and characteristics of the place (e.g. urban/rural).

We adopt S. L. Cutter and her group's method of measuring social vulnerability, where statistical indicators of factors that amplify or reduce vulnerability, are collected and brought together in a factor analysis. The analysis reduces the complexity of the data material, and reveals underlying dimensions of social vulnerability. The result of the analysis is expressed in a social vulnerability index (SoVI). To adapt the method for the Norwegian case, we revisit social vulnerability concepts and commonly used indicators. Furthermore, we discuss methodological issues concerning the adaptation of SoVI, and other viable approaches.

We construct indexes for socioeconomic and built environment vulnerability. The indexes are mapped for visual inspection and interpretation of regional patterns. Using the maps we are able to identify regions with high vulnerability on both indexes or on one of them. Results reveal (with some notable exceptions) a core-periphery pattern of socioeconomic vulnerability and a pattern of built-environment vulnerability where the largest cities and the remotest municipalities come out worst.

***Keywords:*** *Social vulnerability, natural hazards, indicators, factor analysis, GIS, Norway*

# Exploratory Spatial Data Analysis for Identifying Digitalization Factors to Farmers' Associations in Taiwan

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The rapid advancement in information and communication technology has driven all industries to the digital era. Although the level of adaptation varies, agricultural industry in specific is relatively lacking in promptness and willingness toward informationization. To approach this problematic phenomenon, this study concentrates the attention on Farmers' Association, for its role as the key agent to activate agricultural innovations and development in Taiwan. Alternative from the previous studies which employs user data such as attitudes and behaviors as the major resources, this present study focuses on the spatial and institutional features of Farmers' Associations. An exploratory spatial analysis was conducted using geographic information system to find out whether the institutional features, local industry development and the neighborhood farmers' associations will affect the institutional decision and adaption on information service. Census data from the several national surveys including "2005 Survey on NFA Informationization", "2005 Yearbook of Taiwan Farmers' Associations", and "2005 Agricultural, Forestry, Fishery and Husbandry Census" were cited and used with spatial regression model in this present study. Results of this study shown that geographical neighborhood significantly affects the decision and level of institutional informationization, while the development and features of the local industry exerts no significant influence. This study further made suggestions for future research of GIS in agricultural information studies and practical applications.

***Keywords:*** *Digitalization, Farmers' Association, Geographic Information System (GIS), Spatial Analysis, Taiwan*

# Role of Geography in the Location of Buddhist Sites from Andhra Pradesh: A GIS Perspective

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Andhra Pradesh, located in South India, has many Buddhist sites. The present paper analyses the location of these sites in different geographical and chronological frames, utilizing the GIS techniques. The analysis proves 3rd century BC. and 3rd century AD. as the prime period in the Buddhist history of Andhra Pradesh. Terrain analysis shows that a majority of the sites ar in the fertile terrain. Trade also played important role as suggested by the proximity to the trade routes. The influence of the sea trade is suggested by the location of some sites near the coast. Web2.0 techniques were used for terrain and spatial analysis.

***Keywords:*** *Andhra Pradesh, Buddhist, Stupa, Cahitya, Vihara, chronology, agricultural terrain, trade route, coast, Web2.0 techniques*

# Session 11: GIS in Specific Research - II

# Community-based Trail Monitoring Scheme- A Case Study of Shih-pan Trail in Lin-mei

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Trails on public lands are essential infrastructure in support of nature-based tourism and are, in many cases, an important resource for community development. The responsibilities of trail management often rest with government agencies which are perennially challenged by inadequate funding and staffing. Adopting a participatory approach, we worked with the local community organization and the regional forestry agency to build up a community-based trail monitoring scheme in support of sustainable trail management. The Google Earth mapping and visualization program was the main tool we used as a platform for designing monitoring scheme and communicating information with both primary stakeholders. We focused on trail conditions and facilities along the trail route for the monitoring scheme since no baseline data on local ecology or the pressure of tourists were available. Our results reveal that spatial information, such as the images of trail with locations and conditions of facilities shown accurately in Google Earth, played a key role in empowering locals with the capacity to implement the monitoring scheme. There is a great potential to integrate local efforts in managing trails and other tourism/recreation facilities. On the other hand, our results reveal that there was not a stable community mechanism to support the monitoring scheme in Lin-mei, though the volume of tourists had brought plenty of economic opportunities to the community organization. We argue that insufficient management incentives, i.e. participation without genuine empowerment for the community on trail management may have contributed to this situation.

***Keywords:*** *participatory GIS, empowerment, community mechanism, management incentive, community forestry, stakeholders*

# Estimating Accessibility to Natural Resources Using a New Energy-based Travel-Cost Model An Archaeological Case Study of Jomon Net-fishing in Eastern Japan

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The author recently carried out a series of GPS-aided walking experiments in Japan to examine the validity of the present travel-cost models such as Tobler's hiking function, GRASS r.walk module, and van Leusen's metabolic expenditure model. The experiments revealed that the slope of the terrain significantly affected the walking speed, as expected by these models. In addition, the field of view and roadbed conditions influence it, but to a lesser extent. It has also been noted that travels in the past must be evaluated using energy-related units (calories) rather than time-related ones (speed and hours) because time may have been perceived differently in different societies and in different time periods. On the basis of these considerations, a new travel-cost model is developed to determine energetic expenditure from the perspective of three parameters: (1) the weight of a typical traveller, (2) MET values as an indicator of exercise intensity, and (3) the movement time, which is estimated by the slope-dependent functions. Then, the model is applied to an archaeological case study of the net-fishing activities of the Neolithic hunter-gatherer-fishers (Jomon people) in the Tokyo-Yokohama district, East Japan. Site-catchment analyses based on this model successfully illustrates their accessibility to fish resources from the settlements and their "common" territories of fishing activity.

***Keywords:*** *Travel Cost Simulation, Energetic Expenditure, Net-fishing, Jomon Culture, Japan*

# Application of Geographic Weighted Regression to establish average rainfall-altitude functions reflecting spatial variation

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Taiwan is located in the East Asia and in the subtropical zone. Because of its geographical location, climate and topography, there is a lot of rainfall annually in Taiwan. According to studies, it is shown that the average precipitation increase with altitude. The Ordinary Least Squares (OLS) for global regression was used at the beginning to establish the average rainfall-altitude functions in this study. After the model was confirmed through all the needed statistical tests, the Moran's I statistics was then used to examine if there were any spatial autocorrelations in residual. If spatial autocorrelations in residual were present, then the Geographically Weighted Regression (GWR) was applied to solve the problem. The results showed that GWR model improved the R2 increased from 0.15 as in OLS regression to 0.78, demonstrating that GWR provides a better interpreting ability than OLS. Besides, the spatial autocorrelation problem in OLS was already corrected.

***Keywords:*** *average rainfall, altitude, GWR, spatial autocorrelation*