

# Integrated knowledge for temporal analysis - Base chronological tables, index of events and calendar conversion.

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SEKINO, Tatsuki  
(Research Institute for Humanity and Nature)



- ㉓. Basic Chronological Information  
(Three kinds of knowledge for temporal information analysis)
  
- ㉔. Usage of the information
  
  
- ㉕. System Construction



# ⑨. Basic Chronological Information

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Three types of knowledge for temporal  
information analysis

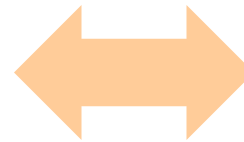
## Basic Chronological Information

- Essential for temporal information analysis
- General and Common for various study and education (business?)

(1) Base Chronological Table

Base Maps

(2) Index of Events



Gazetteers

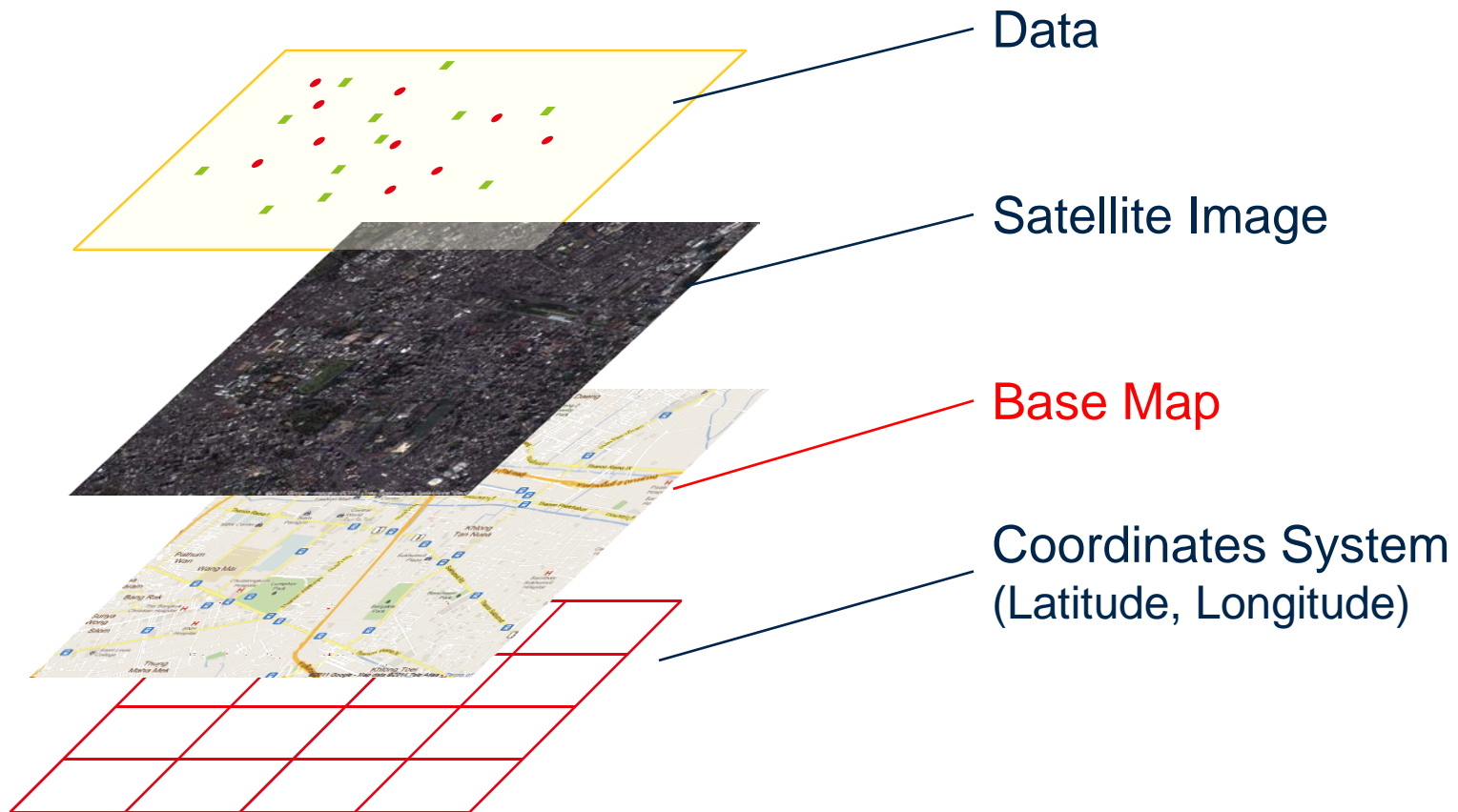
(3) Calendar Conversion

Datum Conversion

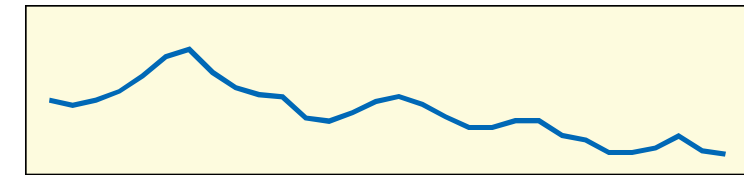
# (1) Base Chronological Table

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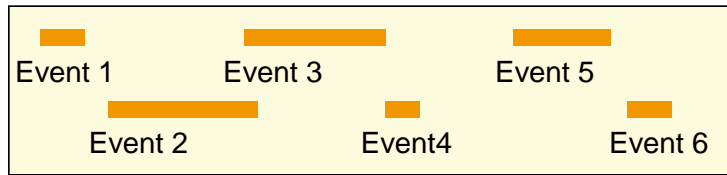
## Base Map for GIS



# (1) Base Chronological Table



Numerical Data)  
(Line Chart)



Character String Data  
(Chronological Table)



Base Chronological Table  
(Eras)



Coordinates System  
(ex Gregorian Calendar)

## Role of base chronological table

- Showing relative position for the focusing events
- Background of the events



# (1) Base Chronological Table

## Variety of base chronological table

(a) Eras (Historical Period)

(b) Major Events

(c) Persons, Organization, Products  
(birth / death, accession / abdication,  
establish / dissolve)



### Example of "(a) Eras" data

1868-1910

พระบาทสมเด็จพระจุลจอมเกล้าเจ้าอยู่หัว Chulalongkorn, Rama V

1910-1925

พระบาทสมเด็จพระมงกุฎเกล้าเจ้าอยู่หัว Vajiravudh, Rama VI

1925-1935

พระบาทสมเด็จพระปกเกล้าเจ้าอยู่หัว Prajadhipok, Rama VII

1935-1946

พระบาทสมเด็จพระเจ้าอยู่หัวอานันทมหิดล Ananda Mahidol, Rama VIII

1946-

พระบาทสมเด็จพระเจ้าอยู่หัวภูมิพลอดุลยเดช Bhumibol Adulyadej, Rama IX

### Example of "(c) Persons" data

- 1948 Korea was divided into North and South Korea.  
朝鮮が南北に分断  
เกาหลีแยกประเทศเป็นเกาหลีเหนือและเกาหลีใต้
- 1965 Singapore became independent from Malaysia.  
シンガポールがマレーシアから分離独立。  
สิงคโปร์ได้รับเอกราชจากมาเลเซีย
- 1975 North and South Vietnam were unified.  
南北ベトナムが統一。  
เวียดนามเหนือรวมกับเวียดนามใต้เป็นประเทศเวียดนาม

## Example of "(b) Major Events" data



Example of the base chronological tables usage  
(Ayutthaya Historical Study Centre)

## (2) Index of Events

### In Case of Spatial Information (Gazetteers)

### Position on the Coordinates System

Bangkok

Bangkok

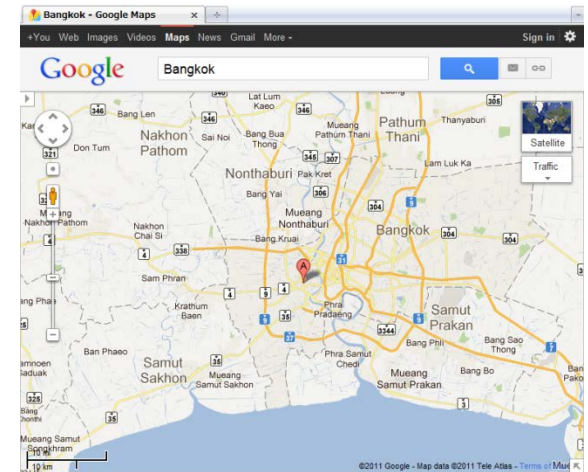
Bangkok

Bangkok

Bangkok

Bangkok

Latitude =  $13^{\circ}45'33.2''$  N  
Longitude =  $100^{\circ}28'29.8''$  E  
(13.759227,100.474949)



The capital  
of Thailand

### Inclusion Property

Asia > South East Asia > Thailand > **Bangkok** > Pathumwan





## (2) Index of Events

### In Case of Temporal Information

### Position on the Coordinates System

東北地方  
太平洋沖地震

2011 Tōhoku  
earthquake and tsunami

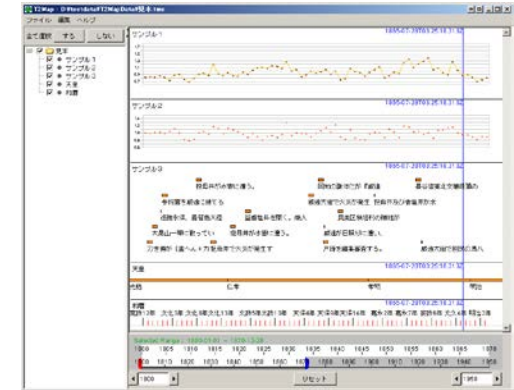
แผ่นดินไหวและคลื่นสึนามิ  
ในโทโฮะกุ พ.ศ. 2554

2011年日本东北地方  
太平洋近海地震

11 March 2011  
14:46:18 (JST)



(2011 -03-11T14:46:18+09:00)

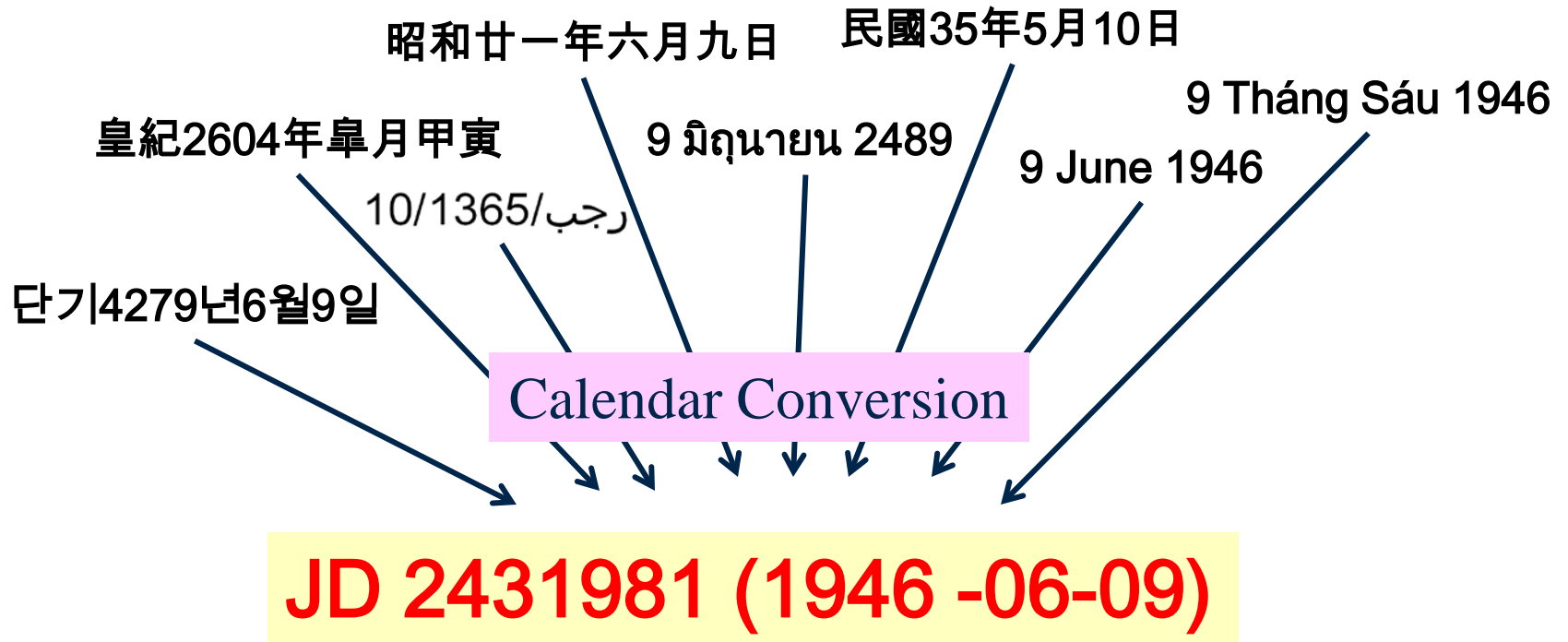


### Inclusion Property

Disaster > Earthquake > 2011 Tōhoku earthquake and tsunami

Vietnam War > Ho Chi Minh Campaign > Fall of Saigon

### (3) Calendar Conversion



#### Common Temporal Axis

#### Julian Date (JD)

The interval of time in days and fractions of a day since January 1, 4713 BC Greenwich noon.

#### Date Time Format

#### ISO 8601 Format

YYYY-MM-DD

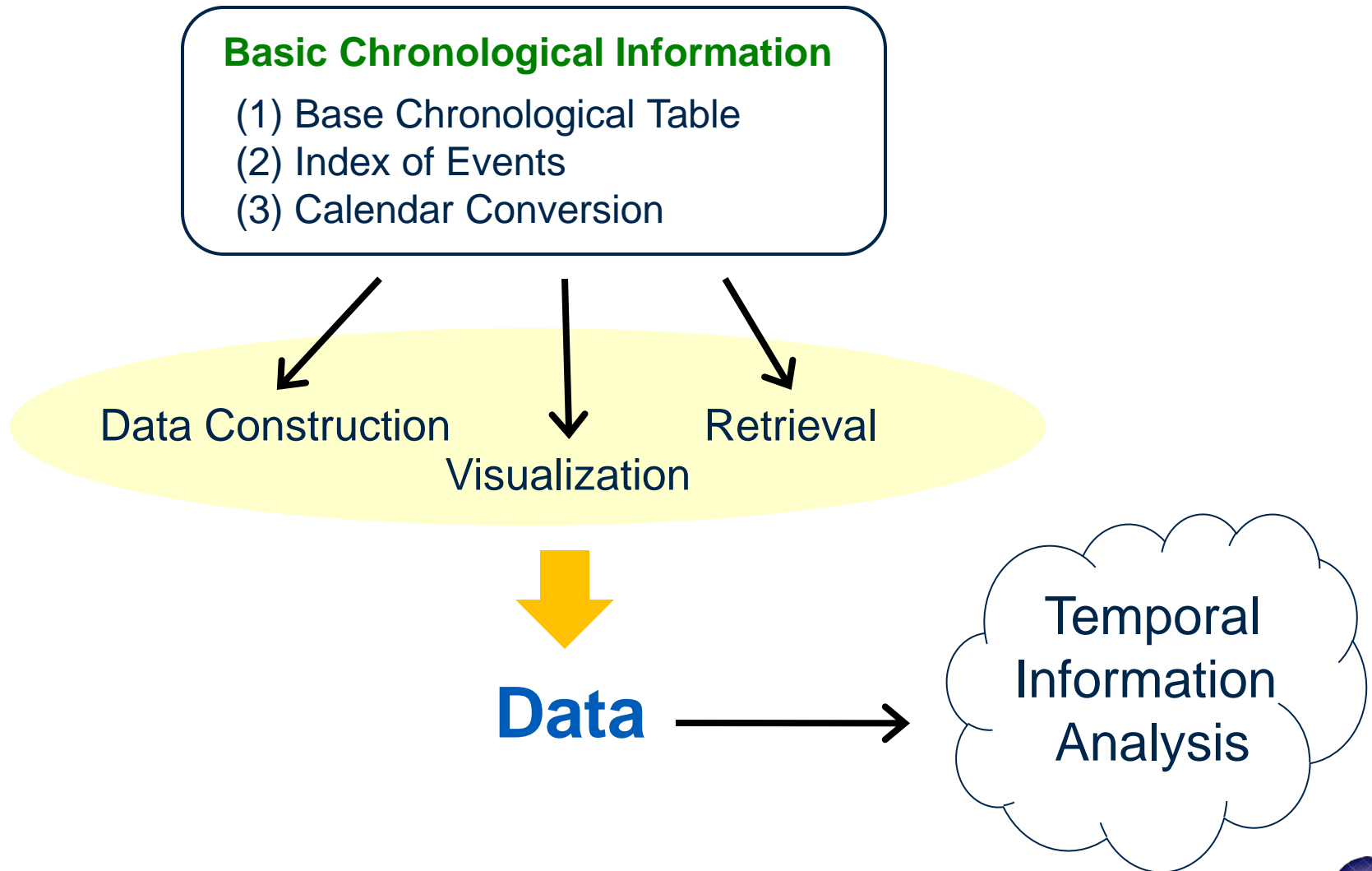
YYYY-MM-DDThh:mm:dd



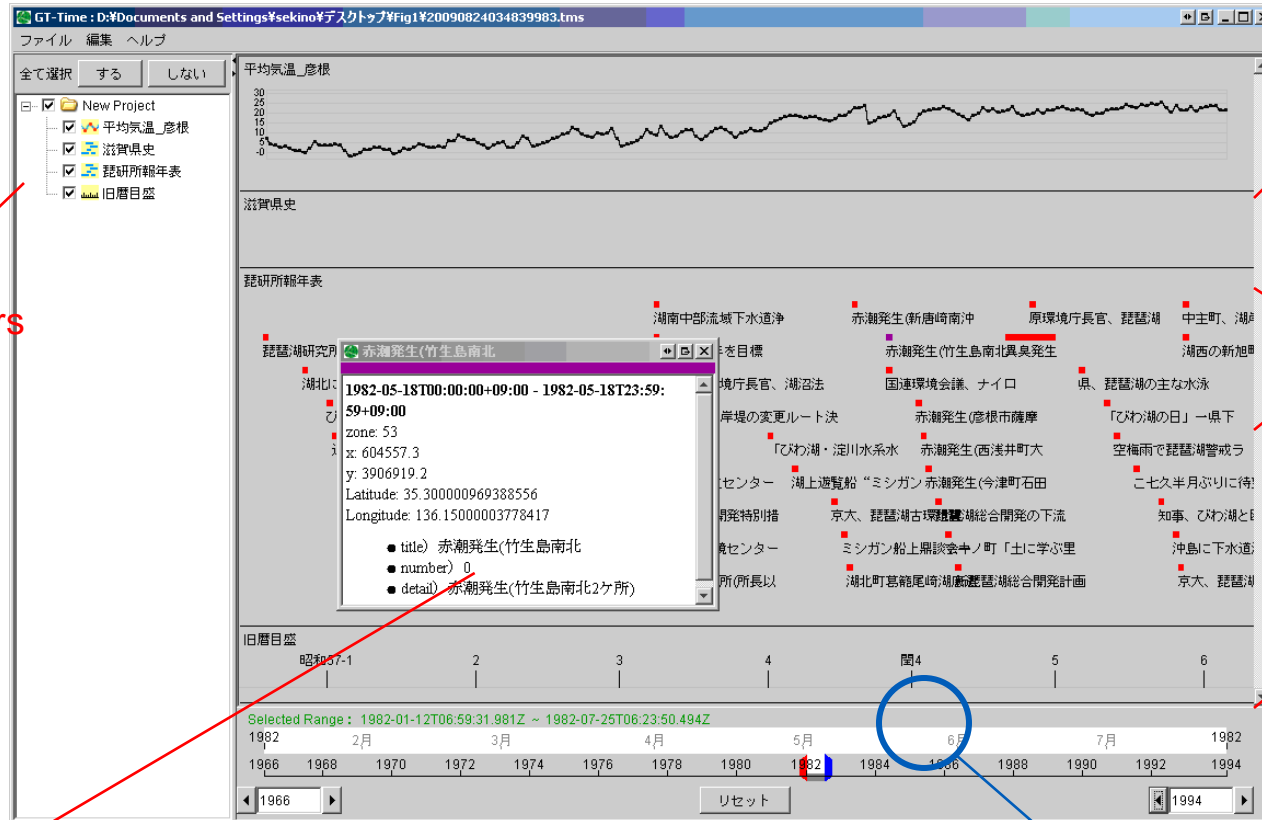
## ๒. Usage of the information

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## How to use the basic chronological information?



# Visualization : HuTime – A tool for visual analysis of temporal information



Layer of Line Chart

Layer of Chronological Tables

Layer of Time Scale

List of Layers

Popup Window (to show detail of an event)

Time Slider (GUI to change displayed temporal range)

leap month

<http://www.chikyu.ac.jp/nihudb/gt-tools/>



- (2) Index of Events
- (3) Calendar Conversion

## Index of Events

Photos  
after "2011 Tōhoku earthquake"

→ date  $\geq$  2011-03-11

Documents written  
during the World War II

→ date  $\geq$  1939-09-01  
date  $<$  1945-09-02



## Calendar Conversion

Web pages created  
before Chinese New Year

→ date  $<$  2011-02-03

Stock prices  
during Ramadan

→ date  $\geq$  2011-08-01  
date  $<$  2011-08-30



# Annotation

(2) Index of Events  
(3) Calendar Conversion

U-Thong Ramathibodi I  
ascended to the throne 1351-03-04

Accession of King Rama I 1782-04-06

Burmese burned Ayutthaya 1767-04

Bangkok  
became the  
capital of  
Thailand  
1782-04-21

Bangkok is the capital, largest urban area and primary city of Thailand. Known in Thai as Krung Thep Maha Nakhon or Krung Thep, meaning "city of angels" for short, it was originally a small trading post on the west bank of the lower Chao Phraya River during the **Ayutthaya Kingdom**. It became the capital in 1768 after **the destruction of Ayutthaya by Burmese invaders**. However, the current **Rattanakosin Kingdom** did not begin until 1782, when **the capital was moved to the east bank of the river by Rama I** following the **death of King Taksin**. The city is more formally called "Phra Nakhon", referring to the original boundaries of the 18th century, while the name Krungthep Mahanakorn includes the urban areas which have since grown. Still most Thais and foreigners generally call the city by its original name of Bangkok. (from Wikipedia)

Taksin the Great  
from 1734-04-17  
to 1782-04-07

Buddha Yodfa Chulaloke  
from 1736-09-07  
to 1809-09-07



# Linkage between Time and Space

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## Basic Chronological Information

- (1) Base Chronological Table
- (2) Index of Events
- (3) Calendar Conversion

## Basic Geographical Information

- Gazetteers  
Base Maps

Temporal  
Analysis

Spatiotemporal  
Analysis

Data for temporal analysis

Data for spatial analysis

## Spatiotemporal analysis and visualization

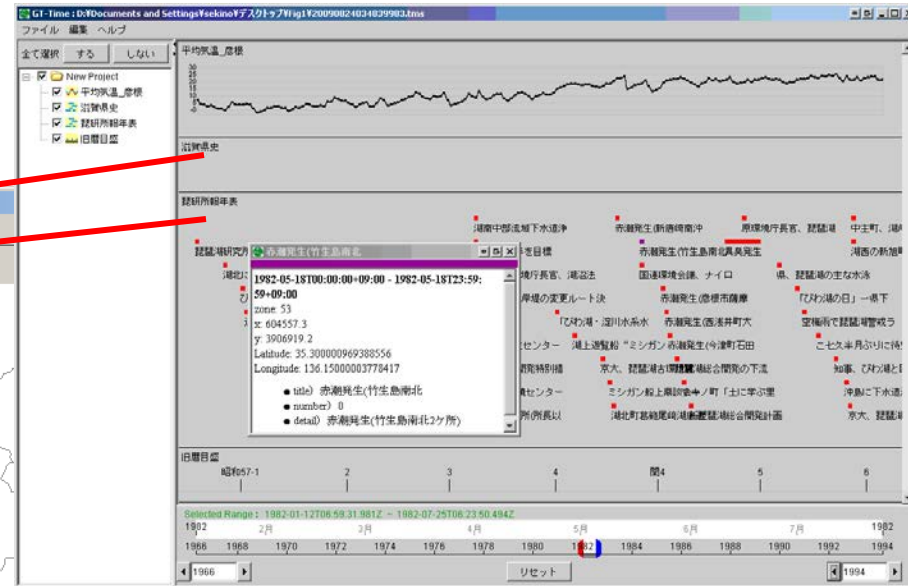
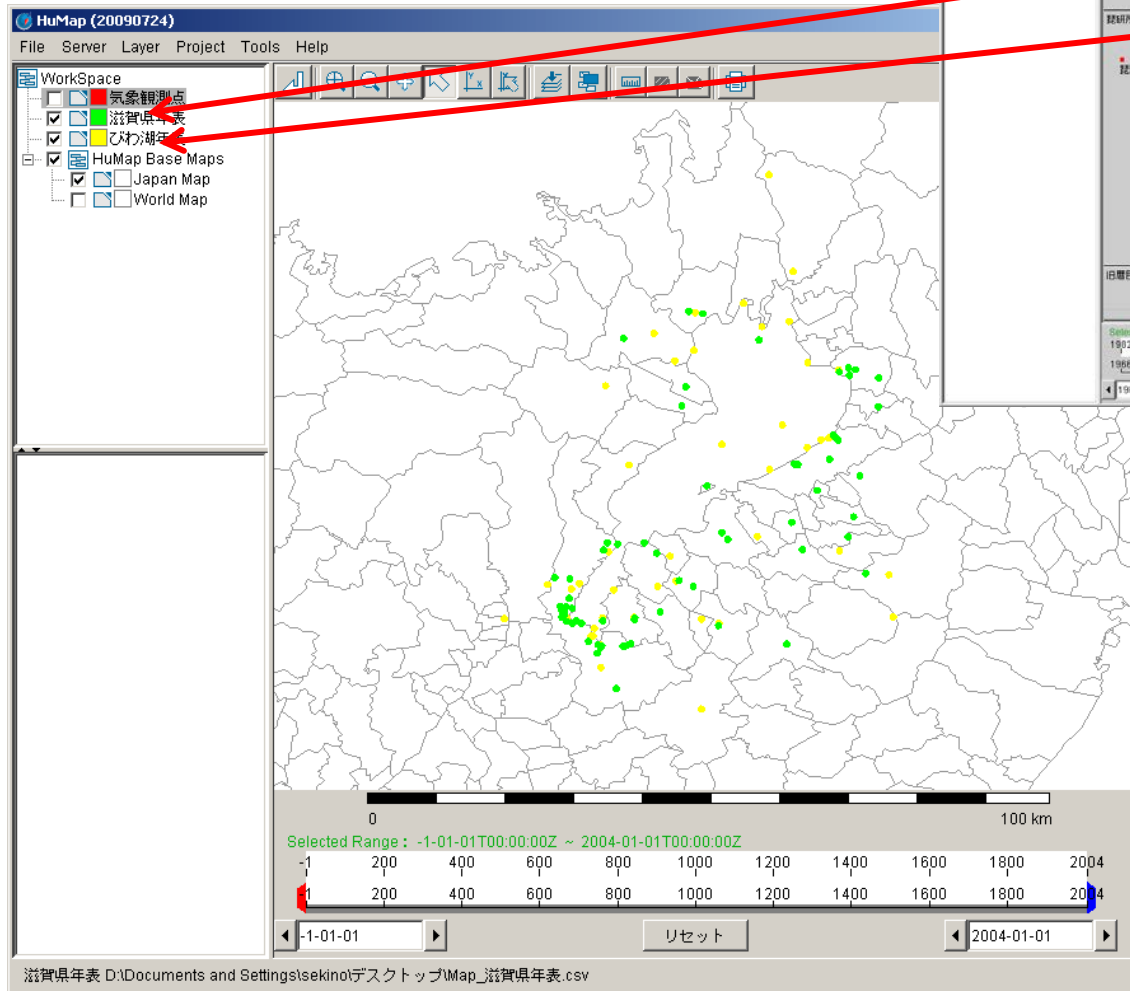
- Temporal variation in spatial distribution
- Spatial variation in temporal change





# Spatiotemporal analysis on HuTime and HuMap

Spatial distribution of the events from chronological tables



HuTime

HuMap



## 3. System Construction

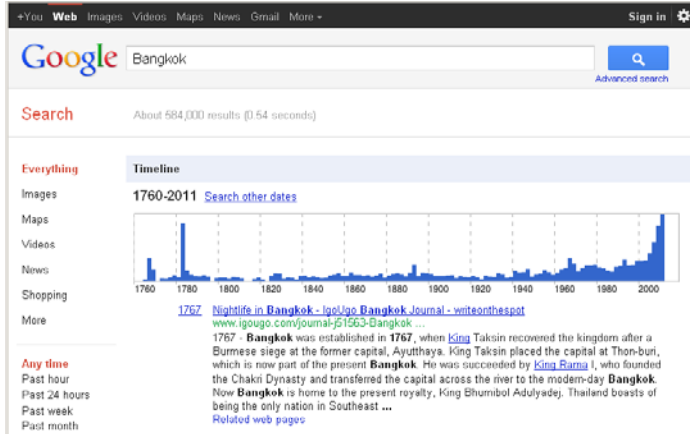
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# Existent basic chronological information

## Examples

### Basic Chronological Table Index of Events



Google TimeLine

### Calendar Conversion

The screenshot shows the Kanreki (換暦) website, which is a calendar conversion tool. It features a table with input fields for various calendars and conversion buttons. The table includes fields for 和暦 (Japanese Calendar), グレゴリオ暦 (Gregorian Calendar), ユリウス暦 (Julian Calendar), ユリウス日 (Julian Day), 南朝元号 (Nancho Genna), 北朝元号 (Hokuchō Genna), 干支年 (Ganji Year), 干支日 (Ganji Day), 六曜 (Rokuyō), and 曜日 (Day of the Week). To the right of the table, there is a list of conversion rules and instructions in Japanese.

Kanreki (換暦)

## Issues

### Flexibility

The data cannot be used for other software or services.

### Integration and Linkage

Basic chronological information is not linked each other.



## Requirement

### Information and function should be used through public API

- Web pages
- Software
- DLL → Add-In of Excel? (for Calendar Exchange)

### Information should be supplied various (standardized) format

- CSV
- KML → for Google Earth?
- XML → for HuTime?
- RDF, Topic Maps

## Multilingual

## Use Case

## Data Collection

- History textbooks for secondary education
- Subject Headings for library

## System Design

- API
- Data Structure

## *Give me comments*

- How do you use the basic chronological Information?
- Do you know any appropriate data source for the information?  
(books, documents, web pages)



Textbooks for secondary education (Japan)

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Thank you for your attention.

Tatsuki SEKINO

**HuTime (GT-Time):** Temporal information Analysis software  
<http://www.chikyu.ac.jp/nihudb/gt-tools/GT-Time.html>

