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Introduction and BMS

Kentaro Yamada
Graduate School of Environmental Studies,
Nagoya University

Meiko Triton

Yamada, Kentaro

1966-71 BA and MS at Nagoya University

1972-76 Maryland, USA

1976- Fatigue of steel members

1985 Australia, PSSC

Monash, Sydney, Queensland

1988- Bridge rehabilitation

Arch, box girder, plate girder, truss, orthotropic steel deck, etc.

Introduction

1. **Bridge Management system**
2. Inspection, evaluation and maintenance
3. Fatigue of steel members
4. Stress measurement and Bridge Weigh-in-Motion
5. Retrofitting, example of orthotropic steel deck
6. Corrosion and anti-corrosion measure

1. Introduction
2. Japan and myself
3. Example of Japanese bridges, and their maintenance
4. Needs for systematic Bridge Management System
5. BMS

Bridge Collapse

1967.12.15: Silver Bridge (Pa., USA)

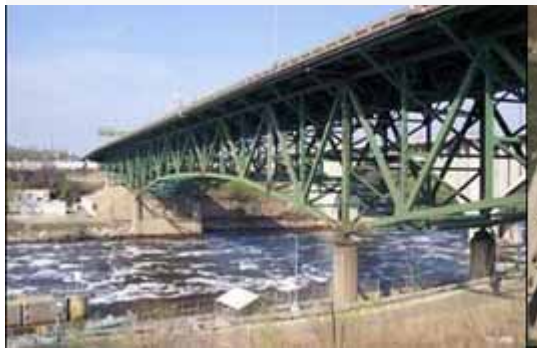
1994.10.21: Seongsu Bridge (Seoul, Korea)

1999.3.4: Aigi-Ohashi Bridge (Gifu, Japan)

2007.6.20: Kisogawa Bridge (Mie, Japan)

2007.8.31: Honjyo Bridge (Akita, Japan)

2007.8.1: I-35W Bridge (Mn, USA)



Example of Japanese bridges, and their maintenance

Ise Ohasi Bridge 1934

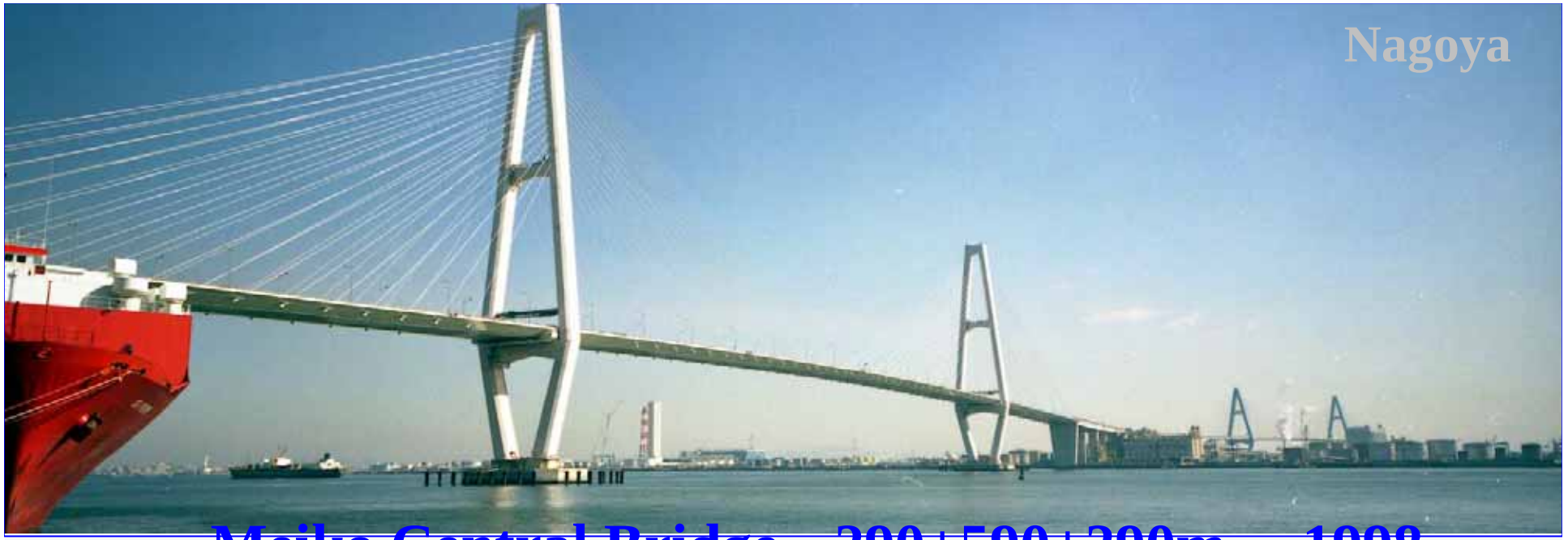
High Strength Steel Wire for Bridge Cables

Akashi Kaikyo Bridge: Opened in 1998

明石海峡大橋

Akashi Kaikyo Bridge : Opened in 1998

960+1991+960.3m

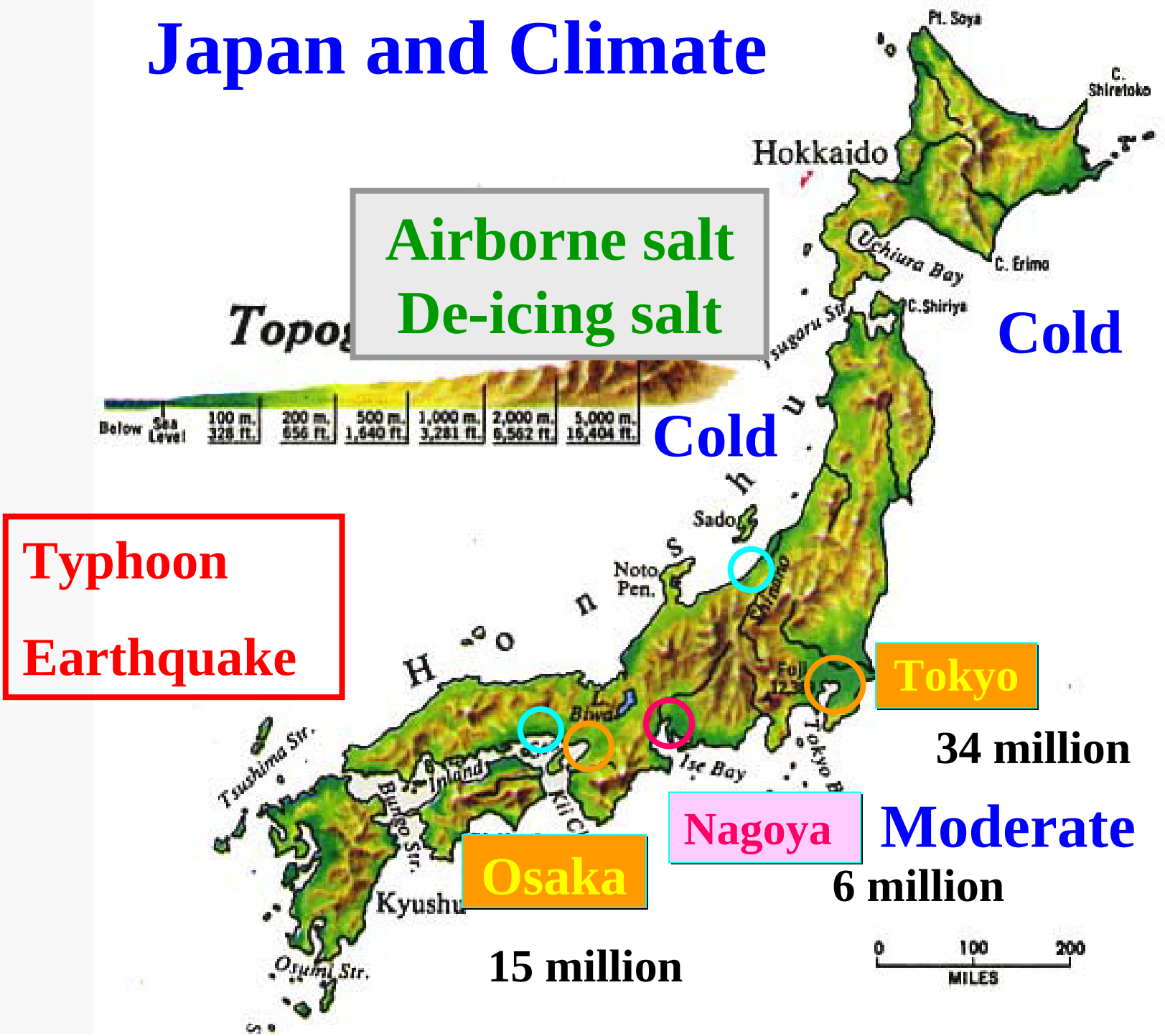


Meiko Central Bridge 290+590+290m 1998

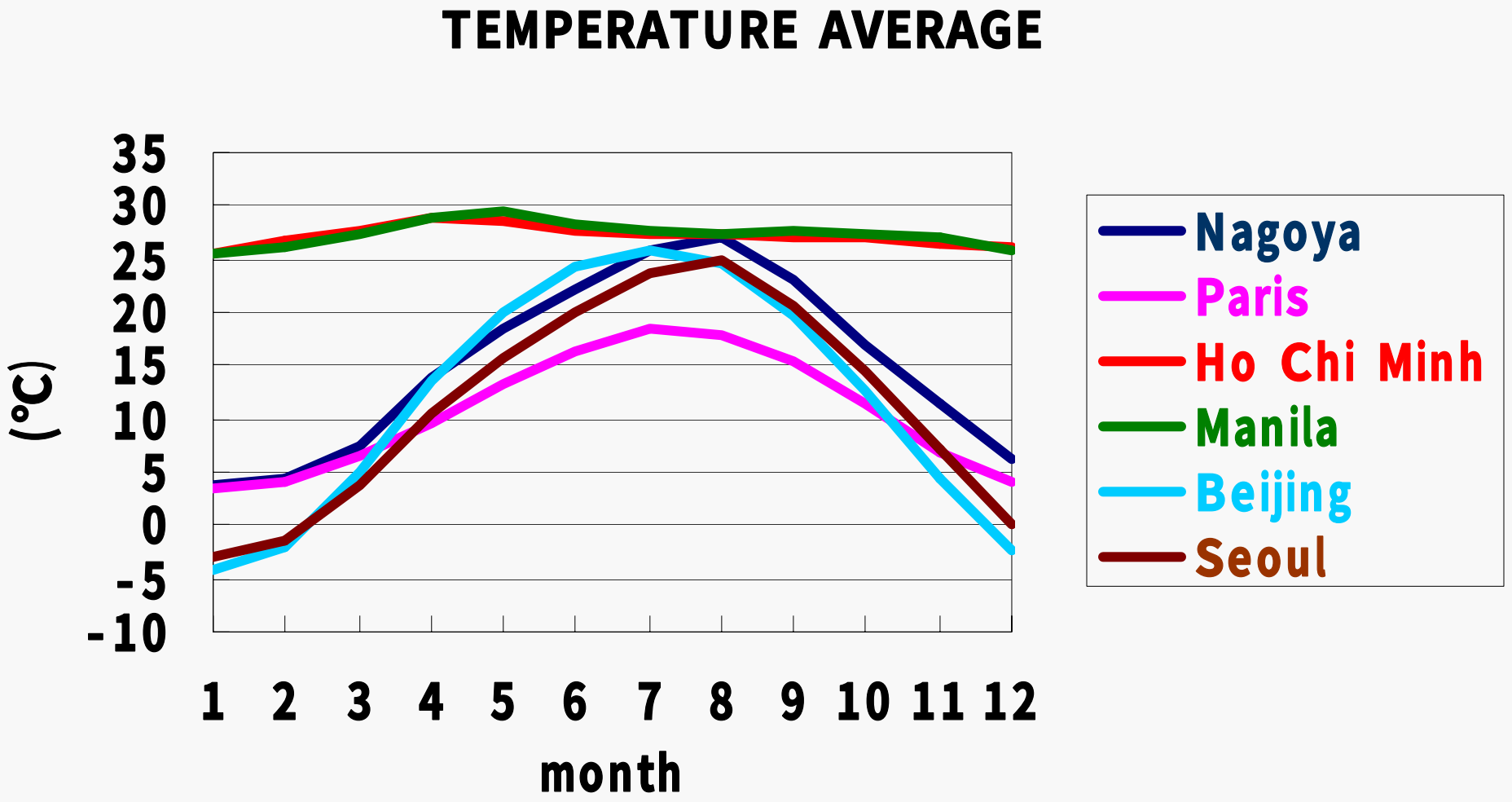
Meiko West Bridge 175+405+175m 1985, 1998


Centrair
Open in February 17, 2005
Aichi Expo. 2005

Japan and Climate

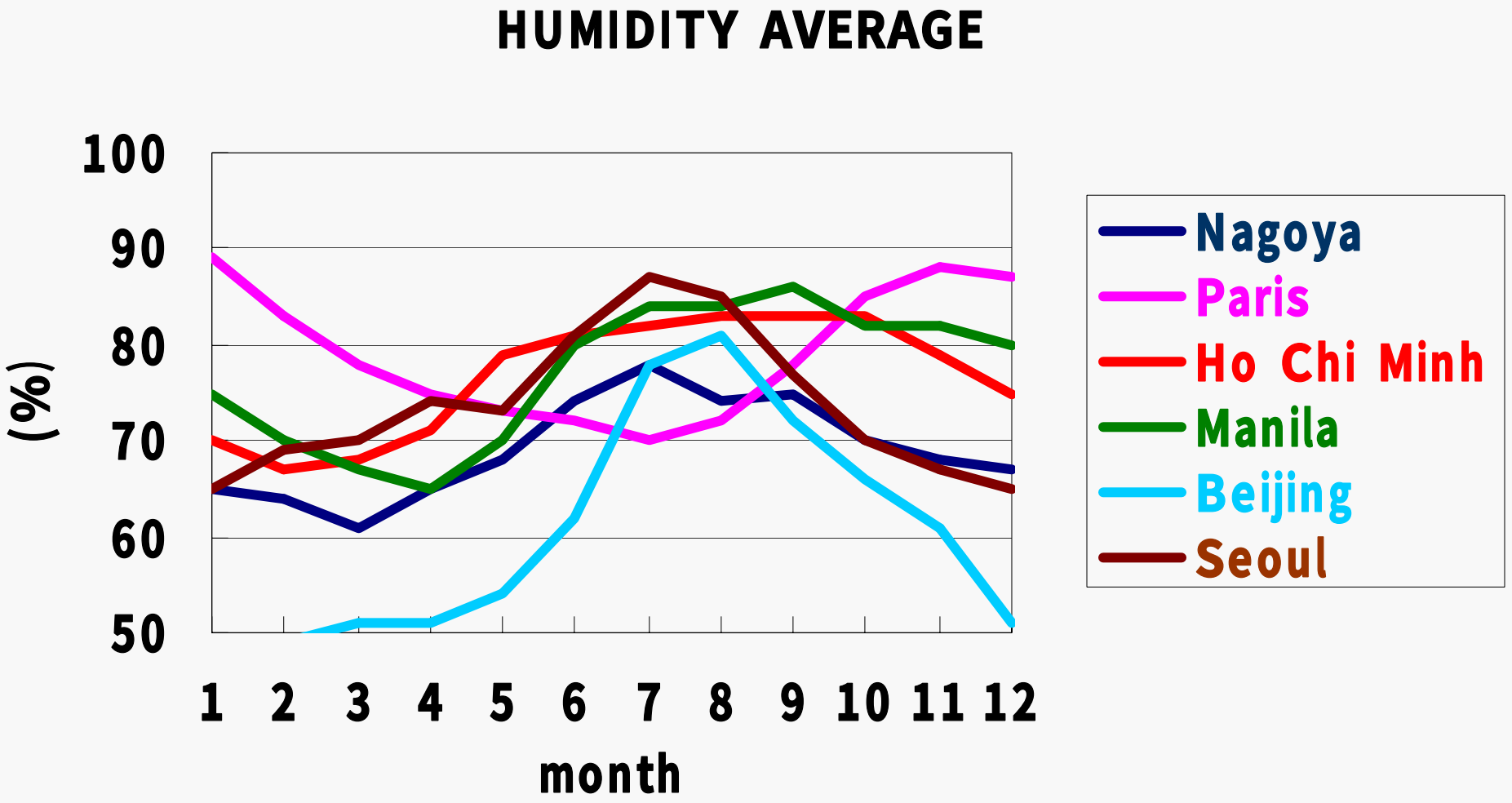


Comparison of Annual Temperature

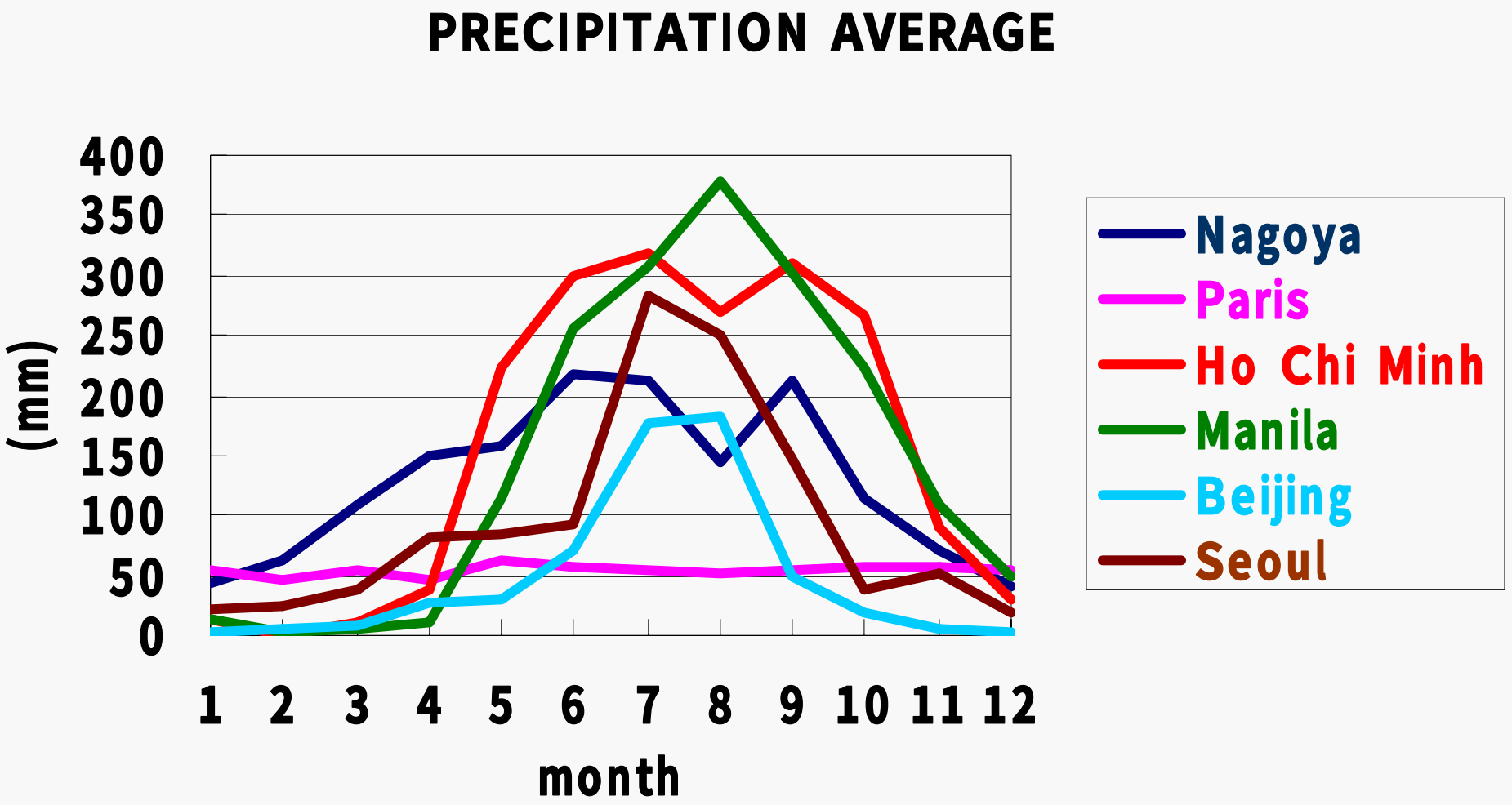


Environmental Effect

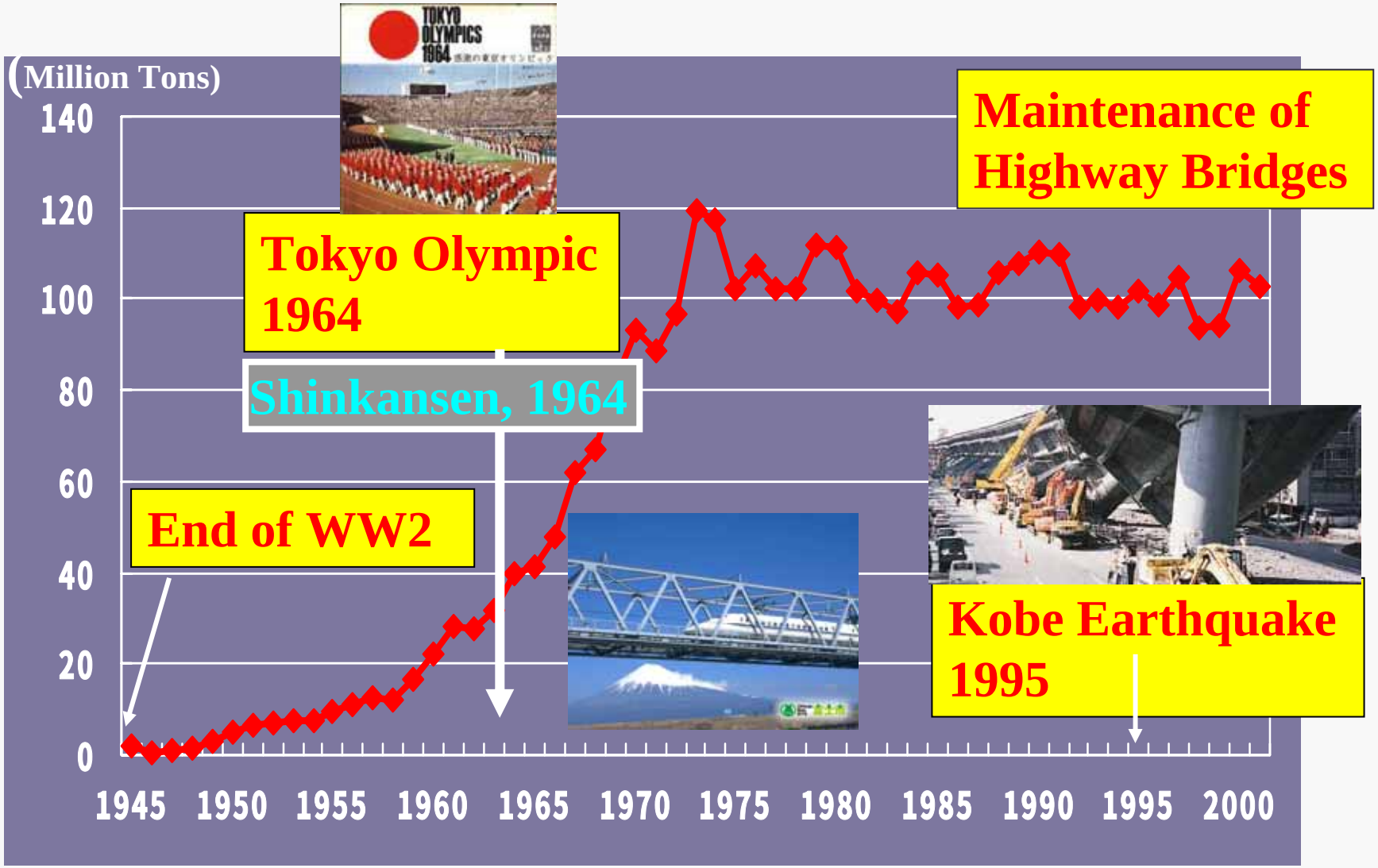
Monthly average humidity



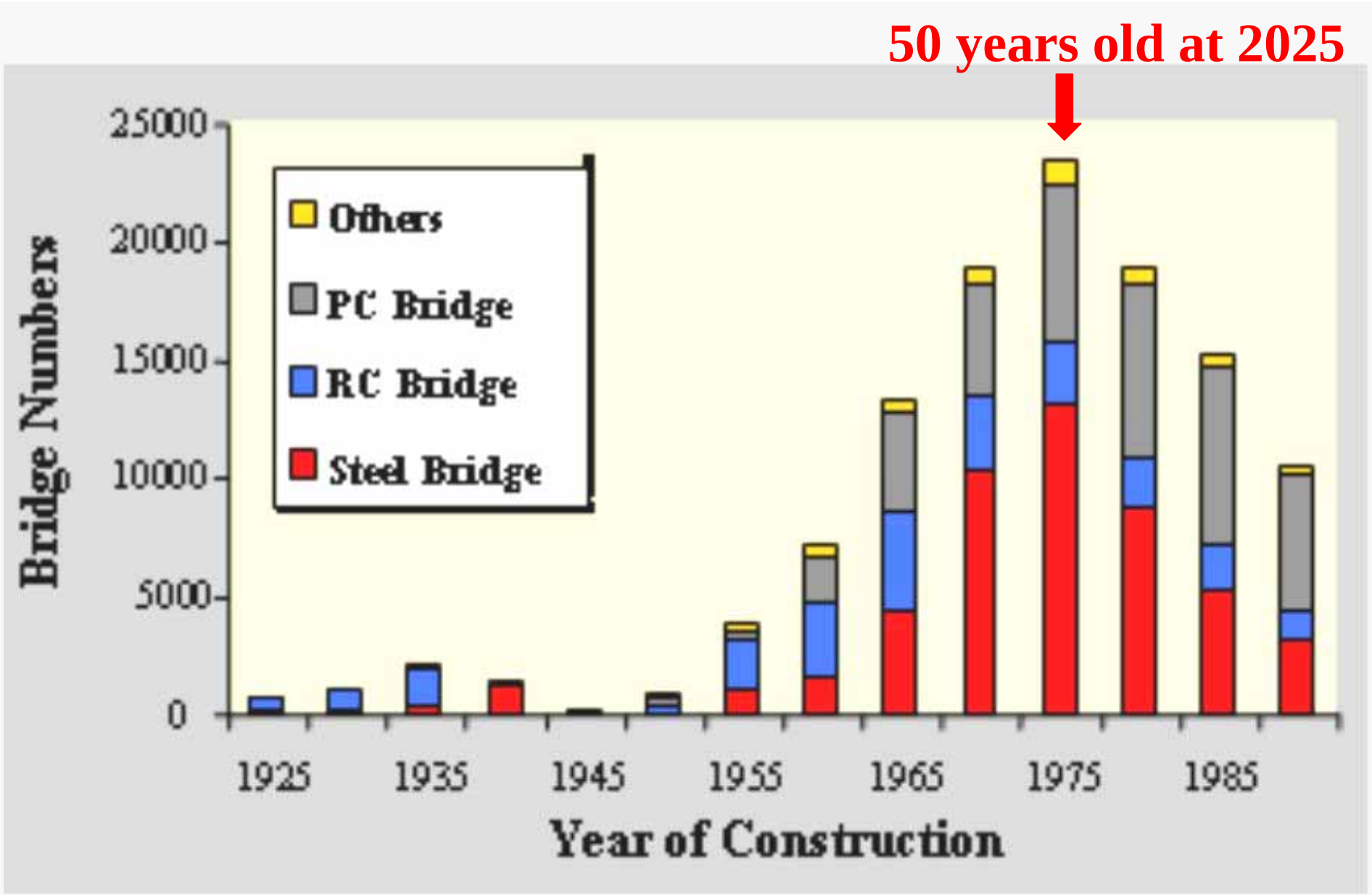
Monthly precipitation



Crude Steel Production in Japan after WW2



History of industry after the WW2



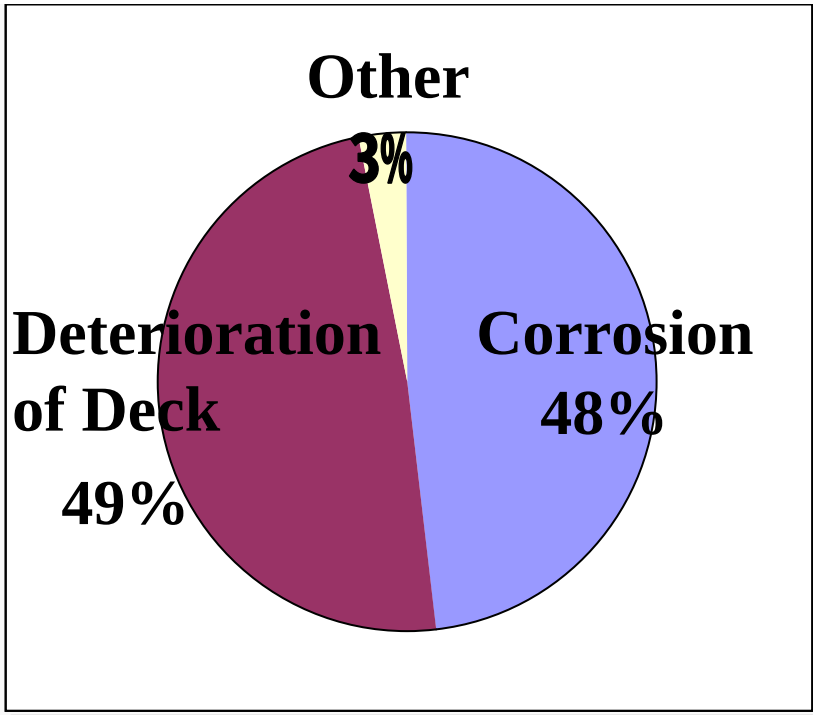
140,000 highway bridges (span > 15 m)

Minimum Maintenance Bridge, PWRI ’90

To maintain highway bridges with minimum cost.

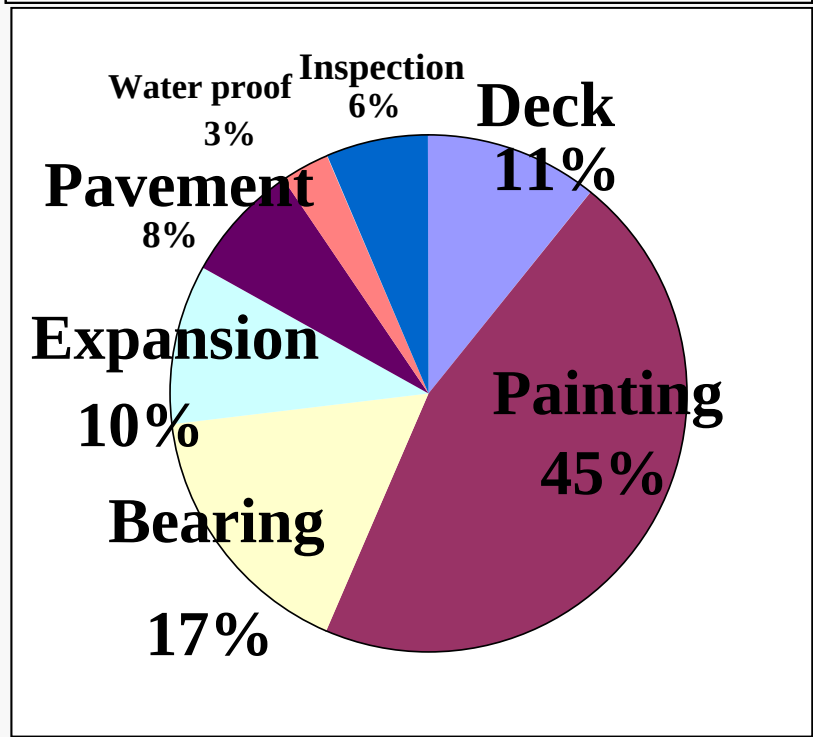
Bridge Replacement

- Corrosion
- Deterioration of Deck

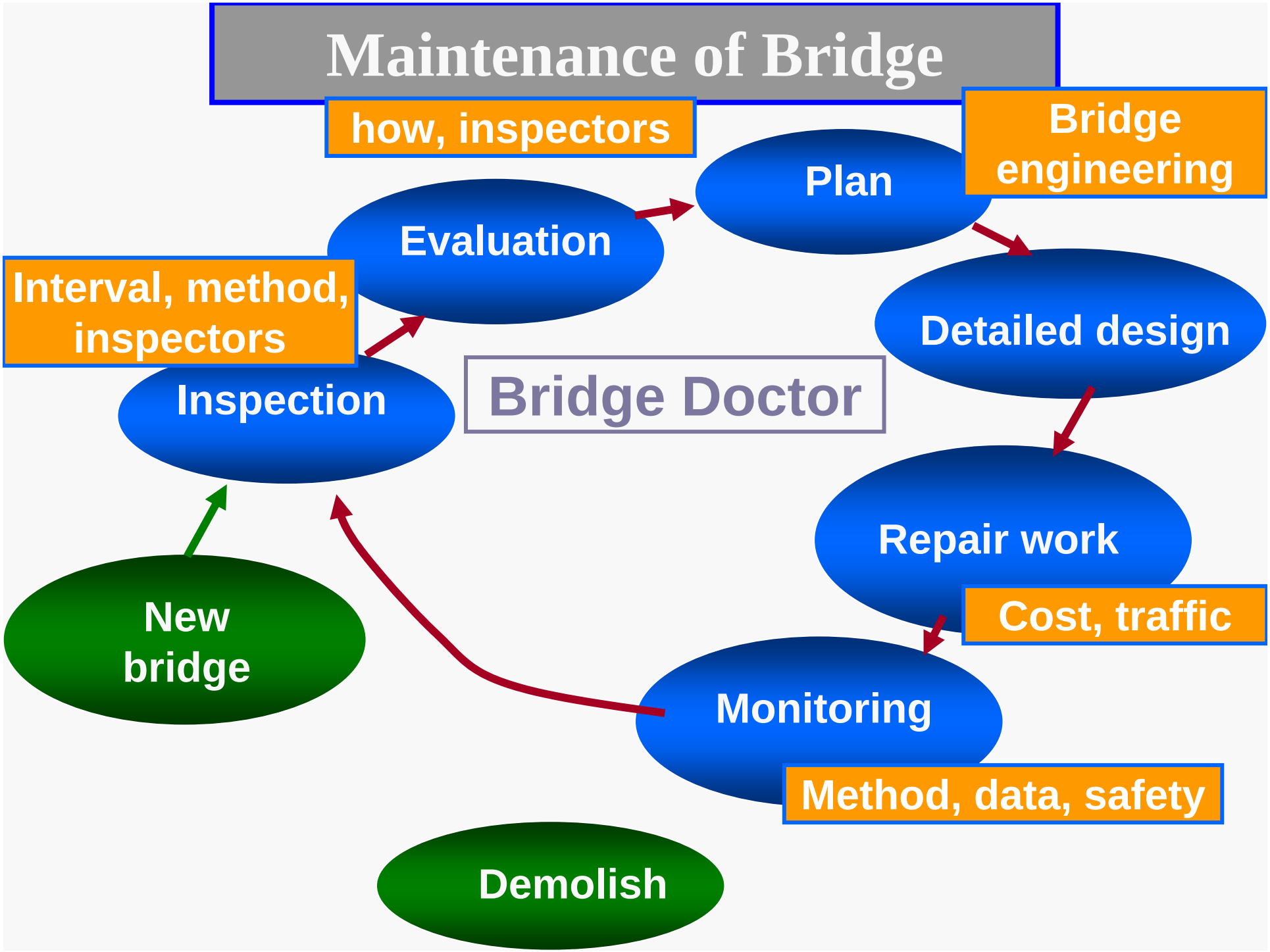


Maintenance Cost

- Corrosion Protection (Painting, re-painting)
- Bearing, expansion and deck



Data before Kobe Earthquake 1995


Maintenance of Bridge
how, inspectors
Bridge engineering
Plan
Evaluation
Interval, method, inspectors
Detailed design
Inspection
Bridge Doctor
Repair work
Cost, traffic
New bridge
Monitoring
Method, data, safety
Demolish

Bridge management system, BMS

Bridge database in 1980s to BMS in 2000s

Simple database :Bridge data

Advanced database :with BMS

Inspection and rehabilitation data

Carte of bridge

Maintenance records

Periodic inspection record

Asset Management

Planning systematic inspection and maintenance to use limited budget and human resources

Bridge database and BMS

USA

NBI (Federal) :National Bridge Inventory

Pontis (States) :With NBIS. Used over 45 states.

U.K.

SMIS (HA) :Struct. Management Information Sys.

France

LAGORA (SETRA) :

Japan

MICHI (MLIT) :Date base, inspection data, photos

Australia ?

道 michi

Bridge database and BMS

USA

NBI (Federal)

Pontis (States)

U.K.

SMIS (HA)

France

LAGORA (SETI

Japan

MICHI (MLIT)

Australia ?

L>6 m,

=> Rate of deterioration, LCC, etc.

L>3 m

LCC (30 years)

L>2 m

Inspection data

L>2 m Information of bridges (NR)

inspection results, etc.