

Transport Geography

Manoj Kumer Ghosh
Associate Professor
Department of Geography and Environmental Studies
University of Rajshahi

What is Transport Geography?

- **Transport geography** is a sub-discipline of **geography** concerned about movements of freight (goods), people and information. It seeks to link spatial constraints and attributes with the origin, the destination, the extent, the nature and the purpose of movements.

What is Transport Geography?

- 1 – The Purpose of Transportation
- 2 – The Importance of Transportation

1 – The Purpose of Transportation

■ Overcome space

- Variety of human and physical constraints.
- Distance, time, administrative divisions and topography.

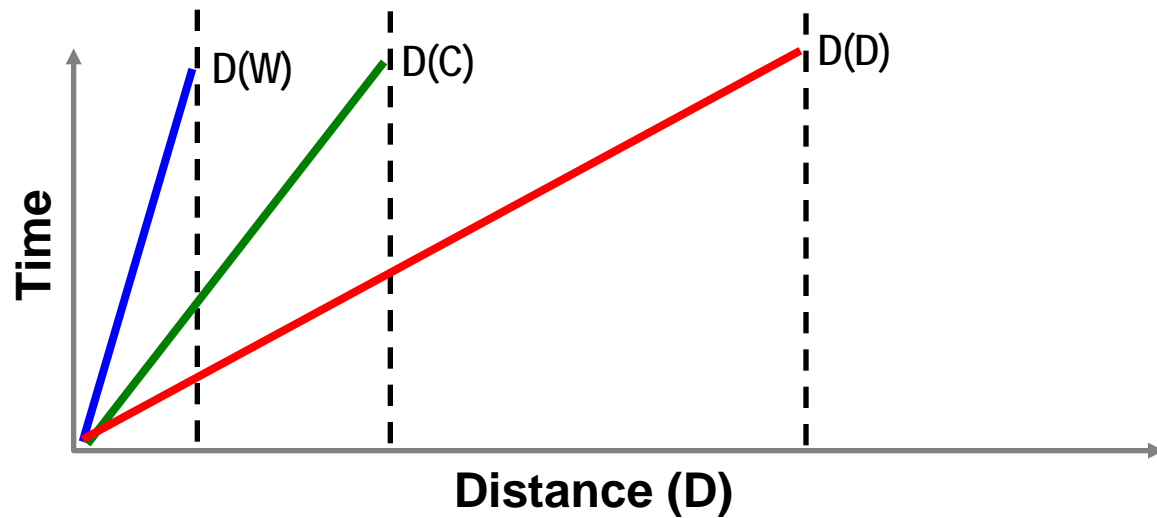
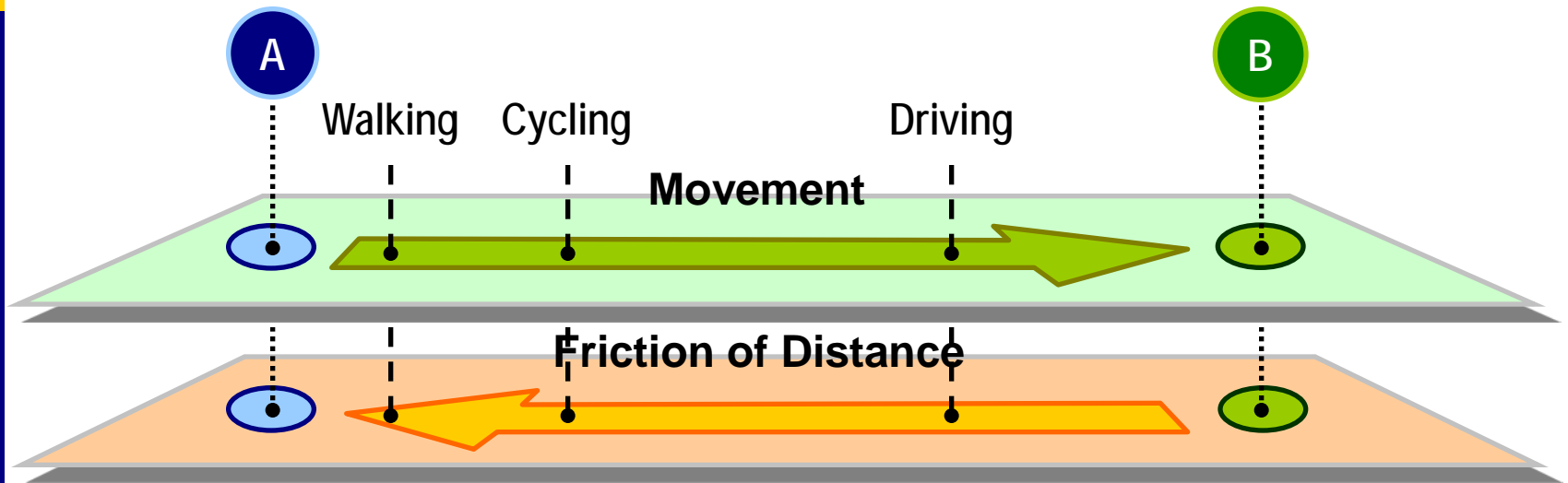
■ Friction of distance

- Costs.
- Distance involved.
- Nature of what is being transported.

■ Goal of transportation

- Transform the geographical attributes of freight, people or information.
- Give an added value in the process.
- Fulfillment of a demand for mobility.

The Spatial Consideration of a Movement



1 – The Purpose of Transportation

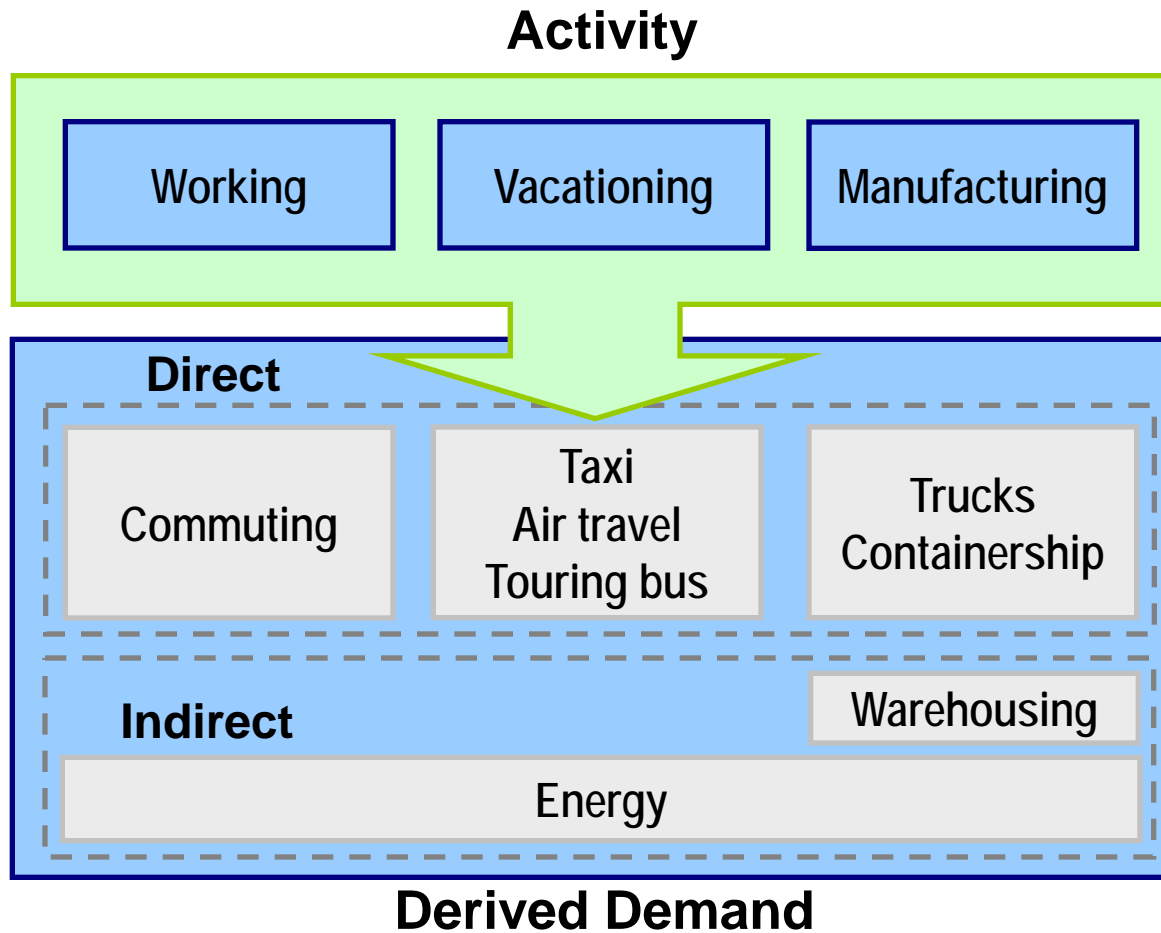
■ Transportability

- Transport costs.
- Attributes of the transported goods (fragility, perishable, price).
- Some institutional factors such as laws, borders and tariffs.

■ Derived demand

- Transportation cannot exist on its own and cannot be stored.
- Direct derived demand:
 - Movements directly the consequence of an economic activity.
- Indirect derived demand:
 - Movements created by the requirements of other movements.
 - Energy consumption from transportation.
 - Warehousing can be labeled as an indirect derived demand since it is a "non movement" of a freight element.

Transportation as a Derived Demand



2 – The Importance Transportation

■ Dimensions

- Historical:
 - Played several different historical roles.
 - Rise of civilizations (Egypt, Rome and China).
 - Development of political and cultural societies.
 - National defense (Roman empire, American road network).
- Social:
 - Access to healthcare, welfare, and cultural or artistic events.
 - Shape social interactions.
- Political:
 - Rules and regulations.
 - Mobility often subsidized.
 - Nation building and national unity.

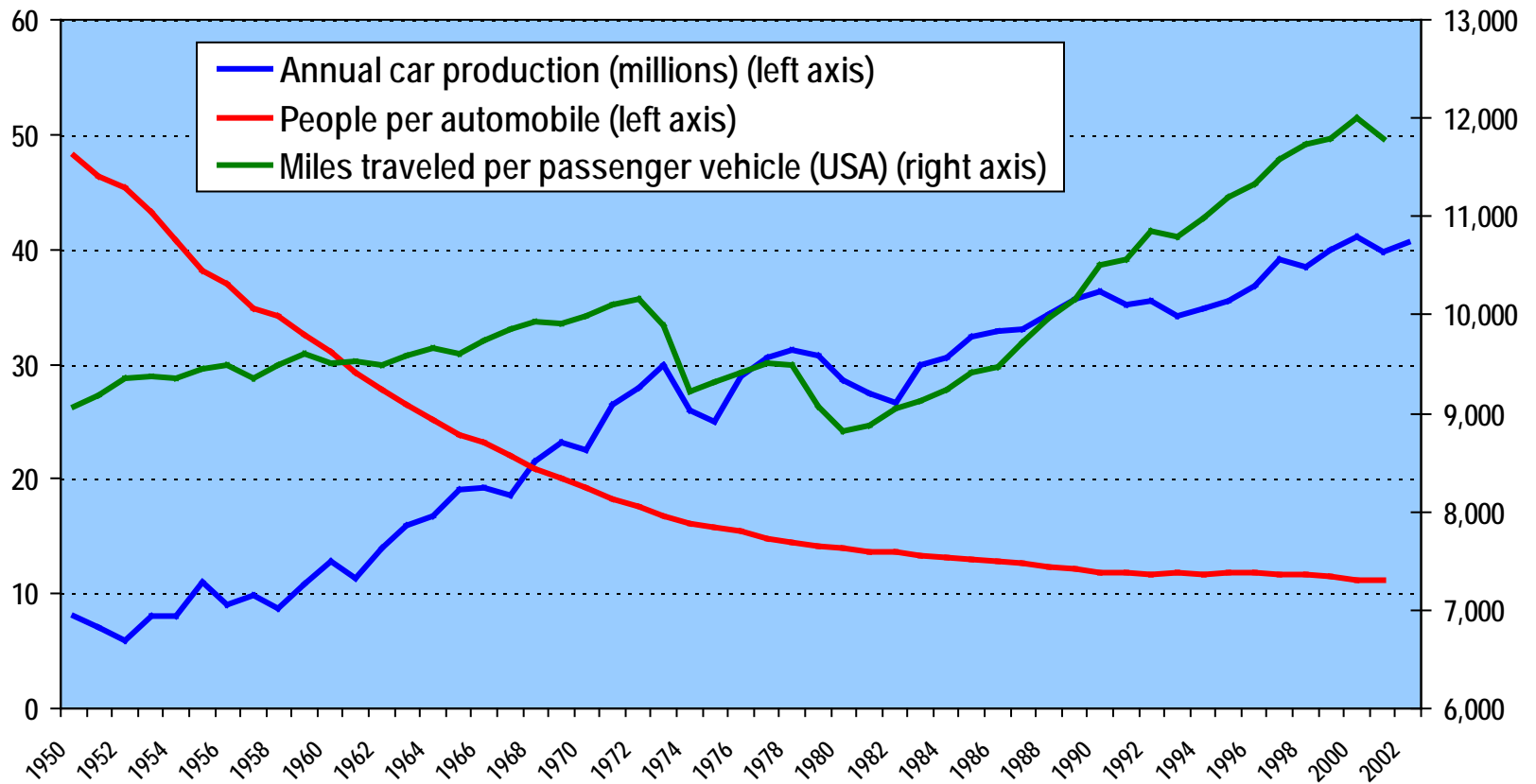
2 – The Importance Transportation

- Environmental:
 - Important environmental impacts.
 - Pollution, exploitation of natural resources.
- Economic:
 - Linked to economic development and job creation both indirectly and directly.
 - According to modal developments; maritime, rail, automobile, and aerospace construction.
 - Factor in the production of goods and services.
 - Contributes to the value-added of goods and services.
 - Facilitates economies of scale.
 - Influences land (real estate) value.
 - Contributes to the specialization of regions.

2 – The Importance Transportation

- The importance of transportation is growing
- Growth in the demand for mobility
 - Considerable growth of the transport demand:
 - Individual (passengers) and freight mobility.
 - Larger quantities of passengers and freight being moved.
 - Longer distances over which they are carried.
 - Multiplication of the number of journeys.
 - Wide variety of modes servicing transport demands.

Vehicle Use Indicators, World, 1950-2002

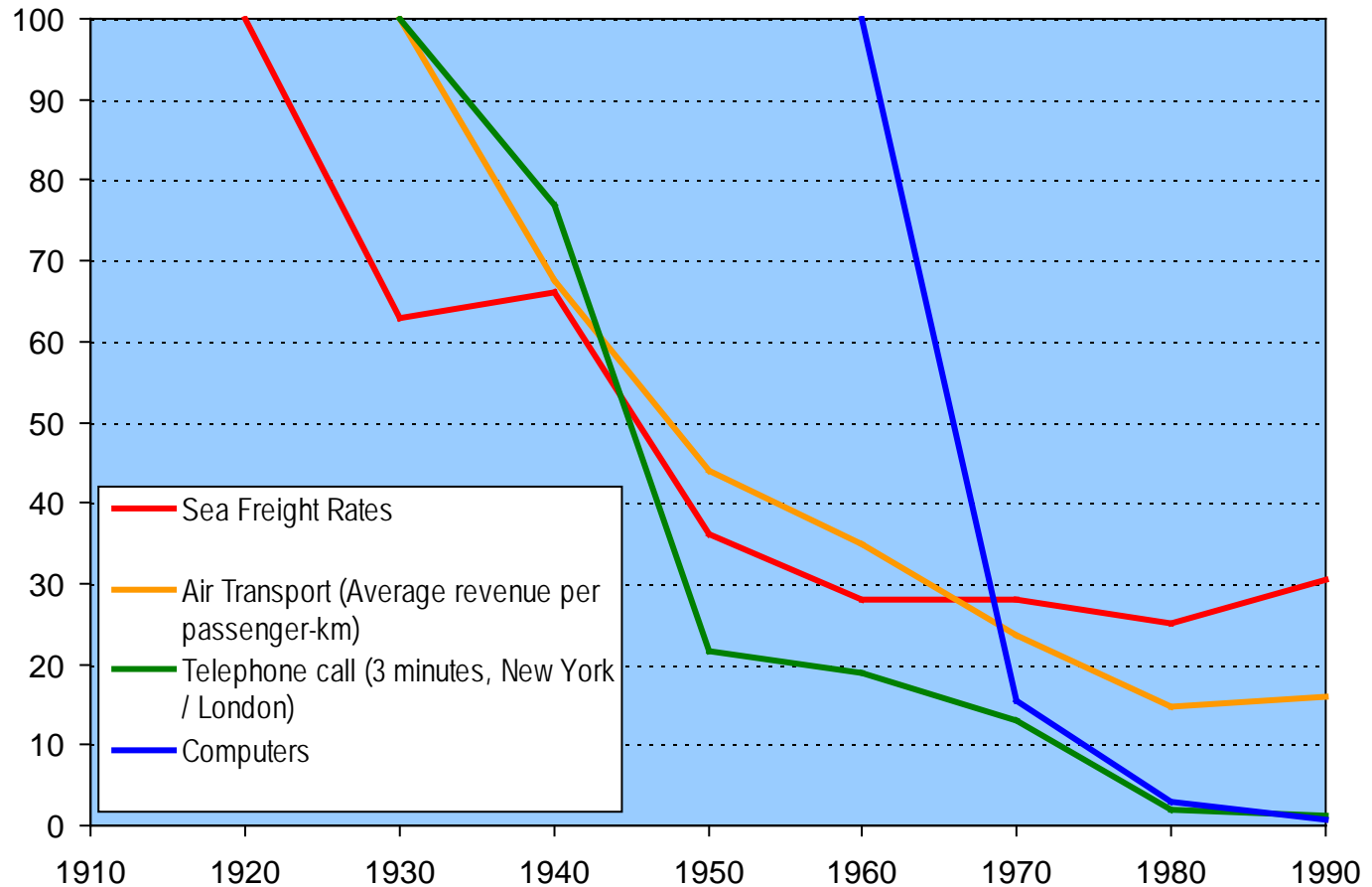


2 – The Importance Transportation

■ Reduction of costs

- Several transportation modes are very expensive to own and operate (ships and planes).
- Costs per unit transported have significantly dropped.
- Overcome larger distances and further exploit the comparative advantages of space.
- Lower costs linked with longer distances.

Transport and Communication Costs Indexes, 1920-1990

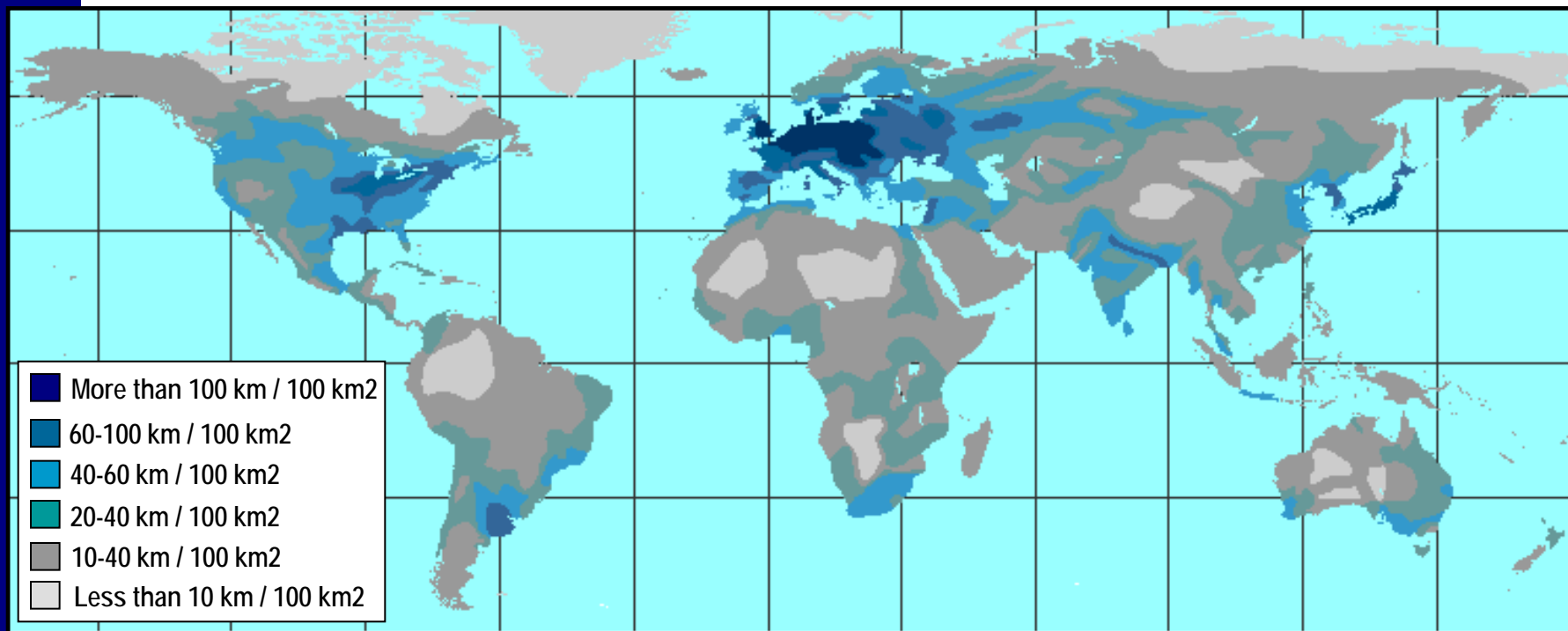


2 – The Importance Transportation

■ Expansion of infrastructures

- Extended the requirements for transport infrastructures both quantitatively and qualitatively.
- Roads, harbors, airports, telecommunication facilities and pipelines have expanded considerably.
- Service new areas and adding capacity to existing networks.
- Transportation infrastructures are a major component of the land use.

Transportation Network Density (in km per 100 sqr km), 2000



2 – The Importance Transportation

■ Spatial differentiation of the economy

- Different locations
- Location of resources (raw materials, labor, manufacturing).
- Spatial division of production and consumption.
- Service embedded in the socio-economic life of individuals, institutions and corporations.
- Often invisible for to consumer, but always part of all economic functions.

2 – The Importance Transportation

■ Strategic infrastructure

- Embedded in the socio-economic life of individuals, institutions and corporations.
- If disrupted or cease to operate, the consequences can be dramatic.
- No specific user can have a competitive advantage over others.
- Often invisible to the consumer.
- The perceived invisibility of transportation is derived from its efficiency.

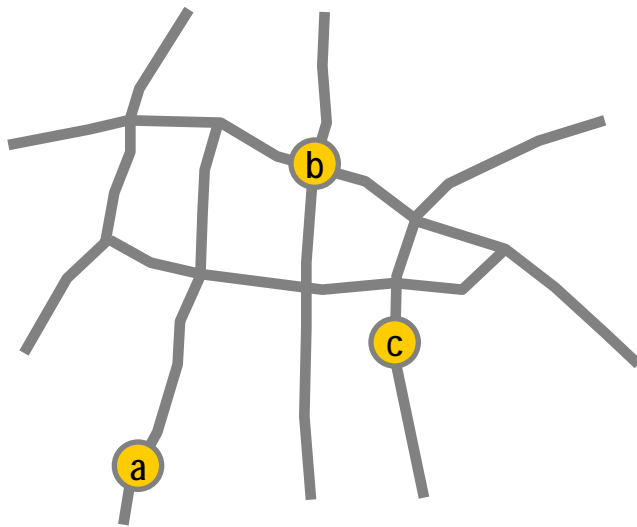
2 – The Importance Transportation

■ Common fallacies

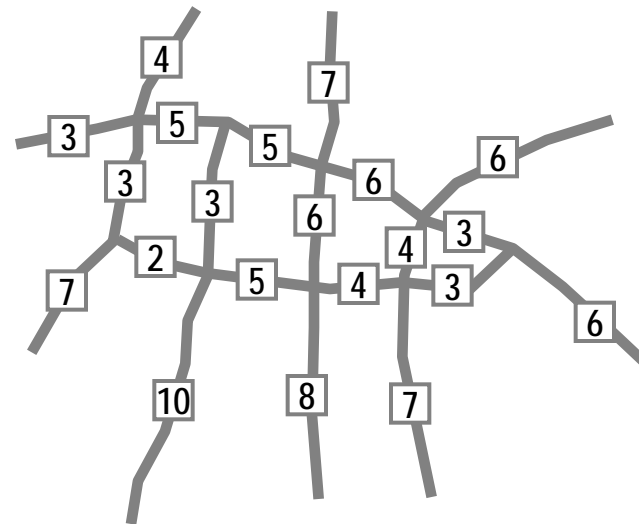
- Access is not accessibility:
 - Access is uniform wherever one is located in regard to the transport system as long as there is a possibility to enter or to exit ; public highway.
 - Often no specific user can have a competitive advantage over others.
 - Accessibility varies according to one's location within the transport system.
- Distance is not time:
 - Distance remains constant.
 - Time can vary due to improvements in transport technology or because of congestion.

Two Common Fallacies in Transport Geography

Access vs. Accessibility



Distance vs. Time



B – Transportation and Space

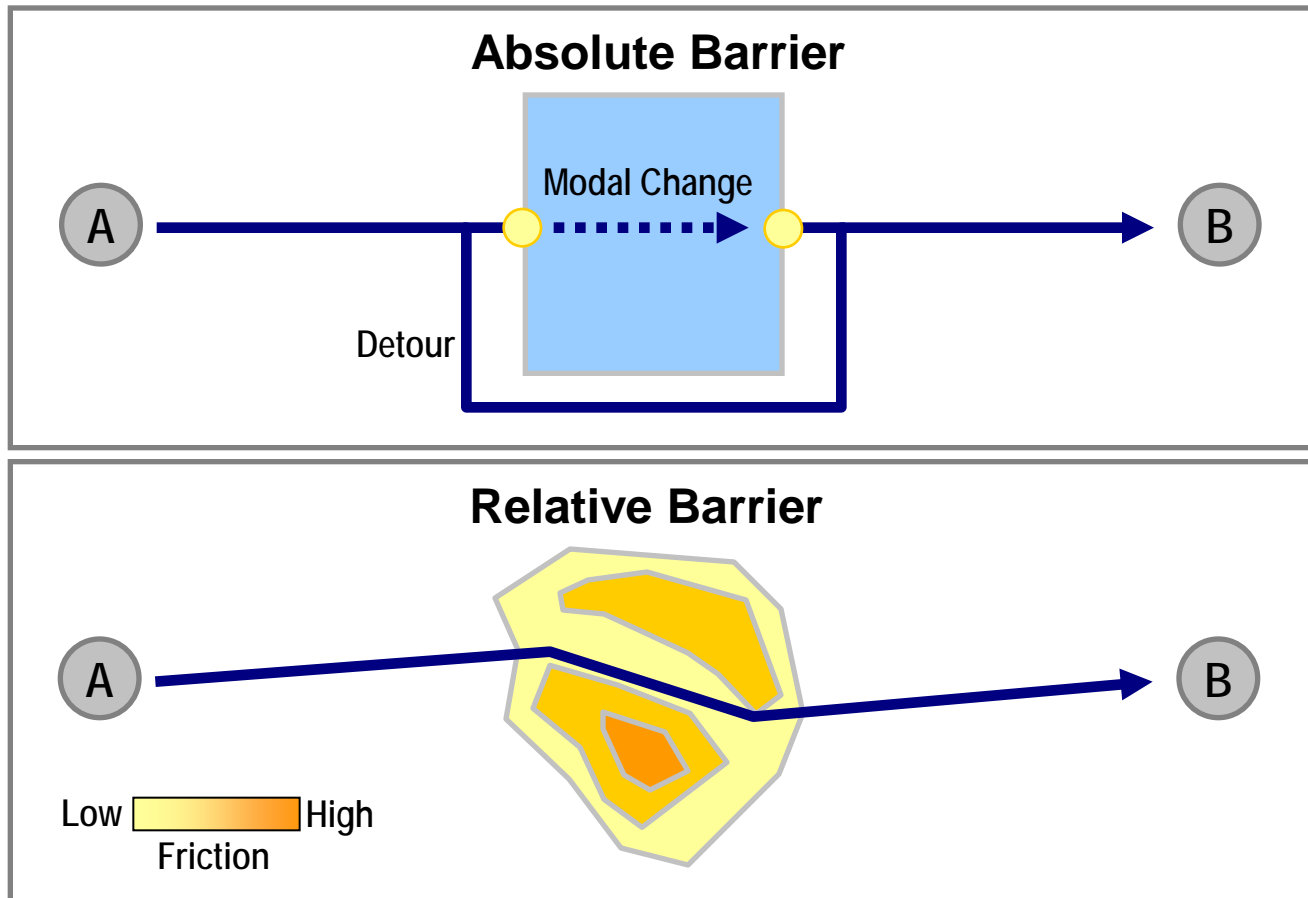
- 1 – Physical Constraints
- 2 – Transportation and the Spatial Structure
- 3 – Space / Time Relationships

1 – Physical Constraints

■ Topography:

- Strongly influence the structure of networks, the cost and feasibility of transportation projects.
- Transport infrastructures are built usually where there are the least physical impediments.
- Physical constraints fundamentally act as absolute and relative barriers to movements.

Absolute and Relative Barriers

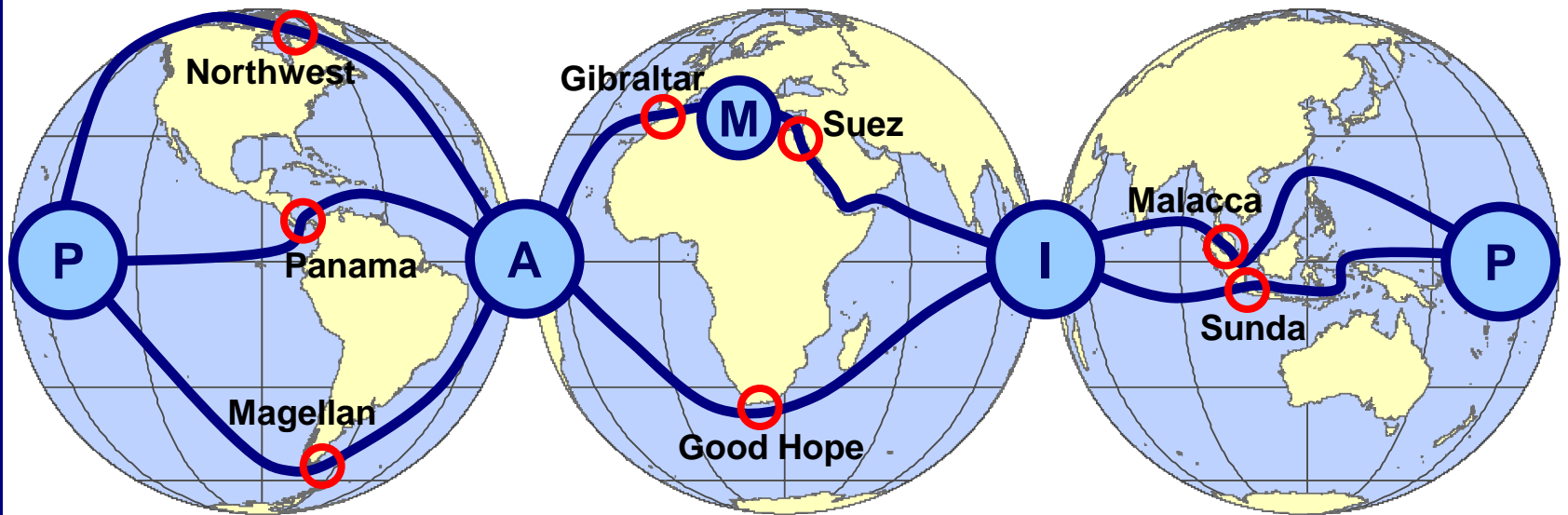


1 – Physical Constraints

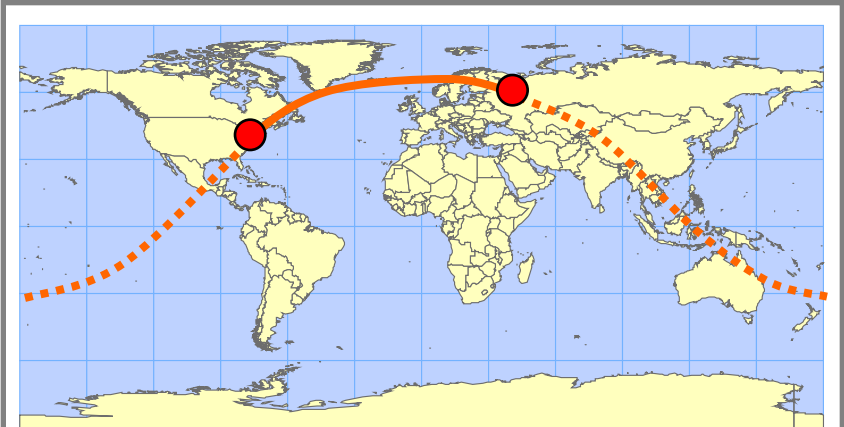
■ Hydrography:

- Determines the extent of navigation.
- Constraints on land transportation:
 - Bridges, tunnels and detours.
- Can also be a transport infrastructure on its own.
- Several rivers are important navigable routeways and been the focus of human activities
- Ports:
 - Strongly conditioned by the hydrography.
 - Quality of the site and its depth.

The Geographical Space of Maritime Transportation



The Great Circle Distance between New York and Moscow



$$\cos(D) = (\sin a \sin b) + (\cos a \cos b \cos |c|)$$

$$\sin a = \sin(40.5) = 0.649$$

$$\sin b = \sin(55.5) = 0.824$$

$$\cos a = \cos(40.5) = 0.760$$

$$\cos b = \cos(55.5) = 0.566$$

$$\cos c = \cos(73.66 + 37.4) = -0.359$$

$$\cos(D) = 0.535 - 0.154 = 0.381$$

$$D = 67.631 \text{ degrees}$$

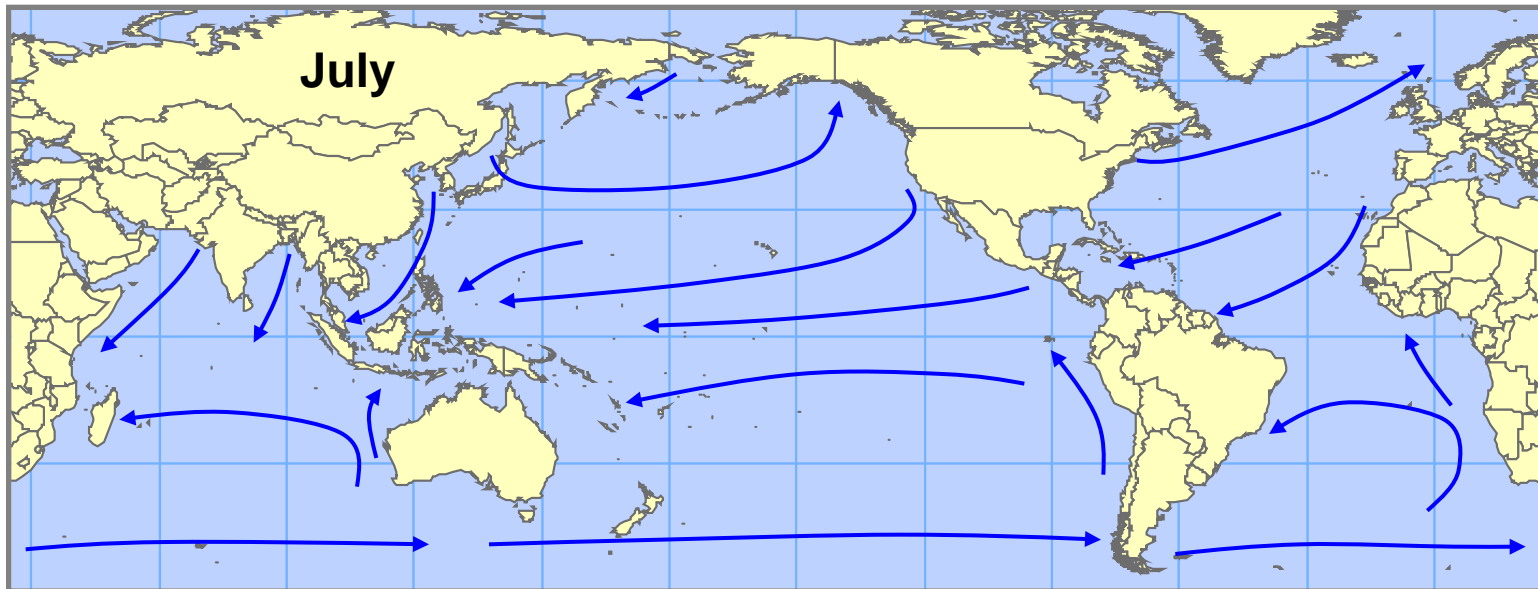
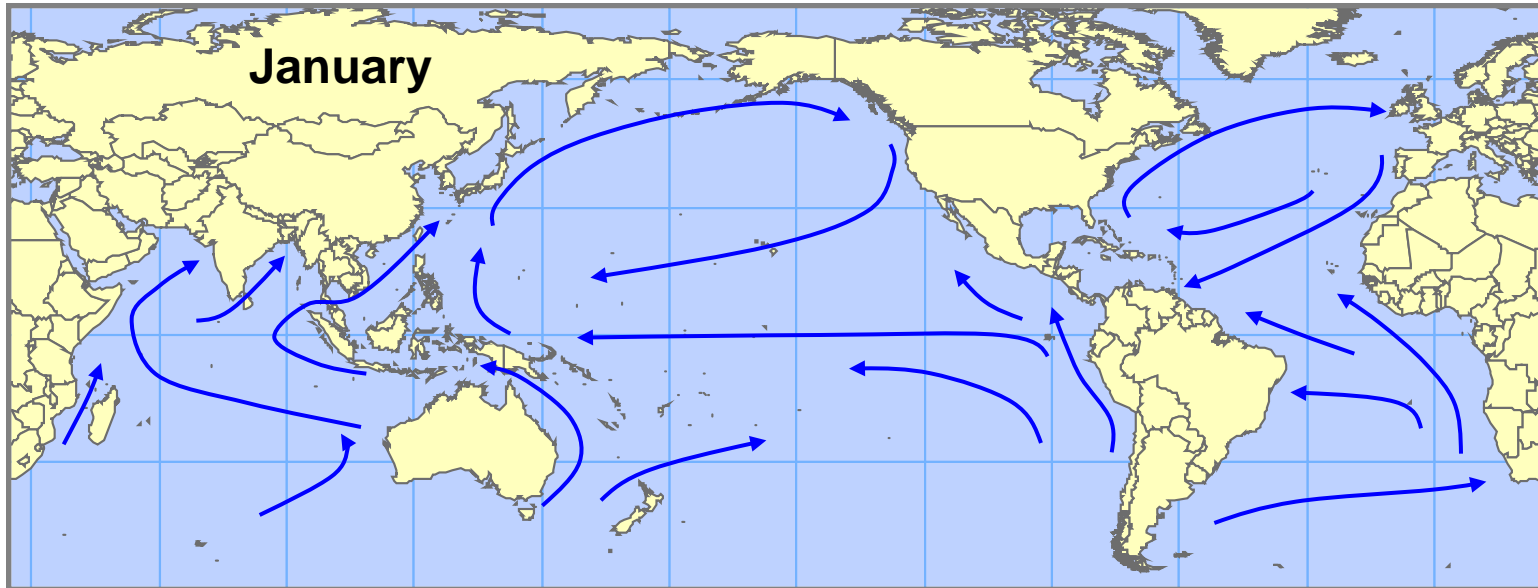
$$1 \text{ degree} = 111.32 \text{ km, so } D = 7528.66 \text{ km}$$

1 – Physical Constraints

■ Climate

- General weather pattern affecting a region:
 - Temperature, wind and precipitation.
- Varied impacts on transportation:
 - From negligible to hazardous or impossible operating conditions.
- Jet streams:
 - Major physical component that international air carriers must take into consideration.
 - Speed of wind can affect costs of air travel.
 - Can add or reduce flight time, especially at intercontinental distances.
 - Flight between New York and London:
 - About 7 hours (from gate to gate) eastbound
 - About 7 hours 45 minutes westbound.

Major Global Wind Patterns



2 – Transportation and the Spatial Structure

■ Inertia of transport infrastructures

- Physical attributes:
 - Natural conditions can be modified and adapted to suit human uses.
 - Most networks follow the easiest (least cost) and most direct path, which generally follows valleys and plains.
- Historical considerations:
 - New infrastructures generally reinforce historical patterns of exchange.
 - Highway network of France.
 - Urban streets pattern.

3 – Space / Time Relationships

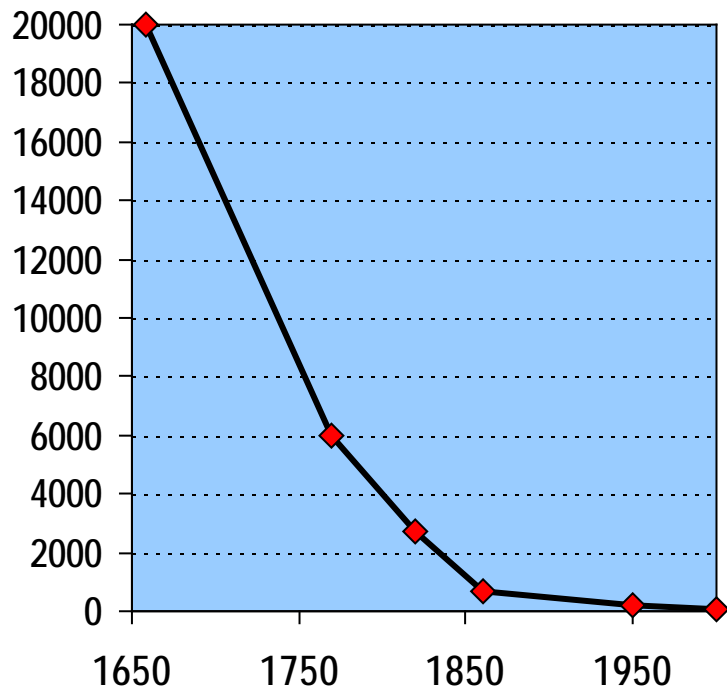
■ Space / Time Convergence

- Amount of space that can be “purchased” with a specific amount of time.
- Related to the efficiency of the transport system.
- Significant convergence in the 19th and 20th centuries.
- Space / time convergence has reached to global level.

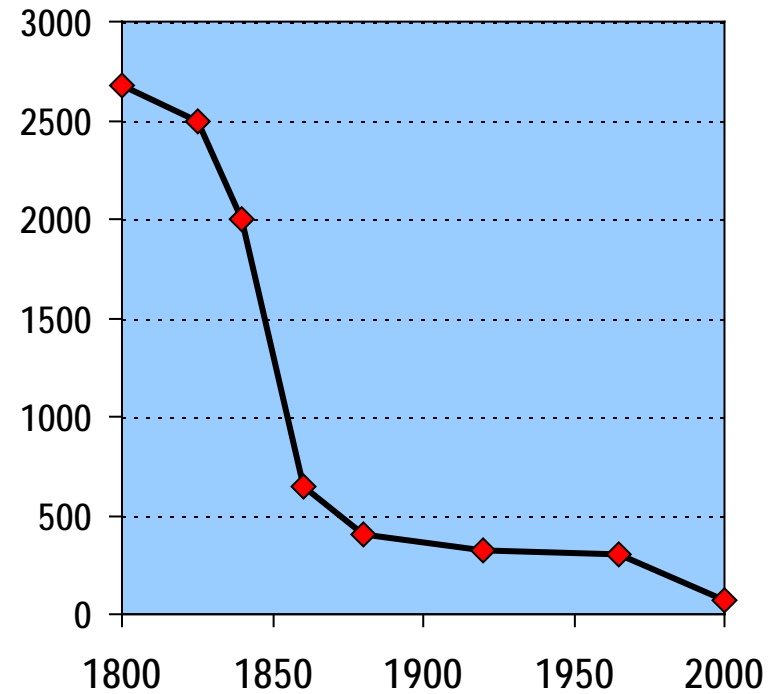


Regional Space / Time Convergence (in minutes)

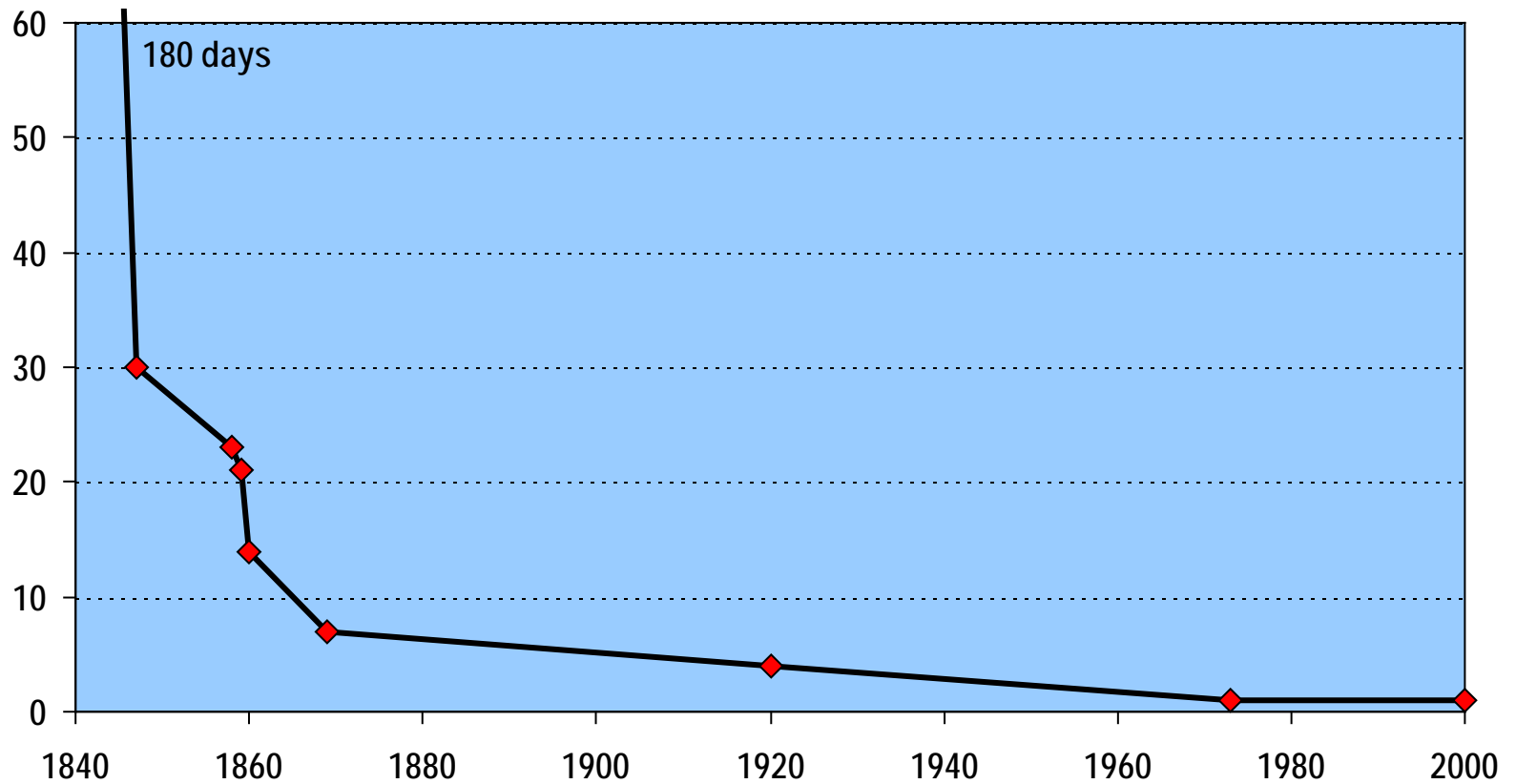
Between London and Edinburgh
(1658-2000)



Between New York and Boston
(1800-2000)



Mail Delivery Times between New York and San Francisco, 1840-2000 (in days)



Space / Time Convergence of the World Transport System



1500-1840 Average speed of wagon and sail ships: 16 km/hr

1850-1930 Average speed of trains: 100 km/hr.
Average speed of steamships: 25 km/hr

1950 Average speed of airplanes: 480-640 km/hr

1970 Average speed of jet planes: 800-1120 km/hr

1990 Numeric transmission: instantaneous

3 – Space / Time Relationships

■ Factors of space / time convergence

- Speed.
- Economies of scale:
 - Transport larger amounts of freight and passengers at lower costs.
- Expansion of transport infrastructures:
 - Service areas that were not or insufficiently serviced.
 - Expanded the average length of traffic.
- Telecommunications:
 - Substitution to transportation (telecommuting).
 - Improvement in management.
- Transport terminals efficiency:
 - Growing capacity to handle large quantities of traffic over a short time period.



Thank you