SNOW: Can we build on it?

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Overview of presentation

Part 1: Can we build on Snow? (= Natural Snow)

Part 2: Can we build on Snow? (= Planning Adaptation)

Part 3: What is built on Snow? (= Design)

Part 1: Natural Snow

- Natural Snow is a key asset in tourism
- Snow based kinds of tourism:
  - Winter tourism in countries with temporal snow
    - Skiing
    - Cross country
    - Skating
  - Polar (Arctic and Antarctic) Tourism
    - Cruises
    - Expeditions

Development Phases in Tourism: cold temperature – snow based tourism

- Phase 1: Pioneer, Researcher & Adventurer
- Phase 2: Transition to Economic Viable Tourism
- Phase 3: Saturation and Basic Infrastructure
- Phase 4: Maintainence of Tourism, technical adaptations by innovations
- Phase 5: Decline - changed physical and socio-economic environment

Carpatian Mountains, RO

Foto: Predeal, 1. 2. 2016

Borovec, BG

Source: www.bulgariaski.com

Strbske Pleso, SK,

Foto: 5.11.2006

Shiga-ken, JP, plenty of snow……

Foto: 6.2.1999

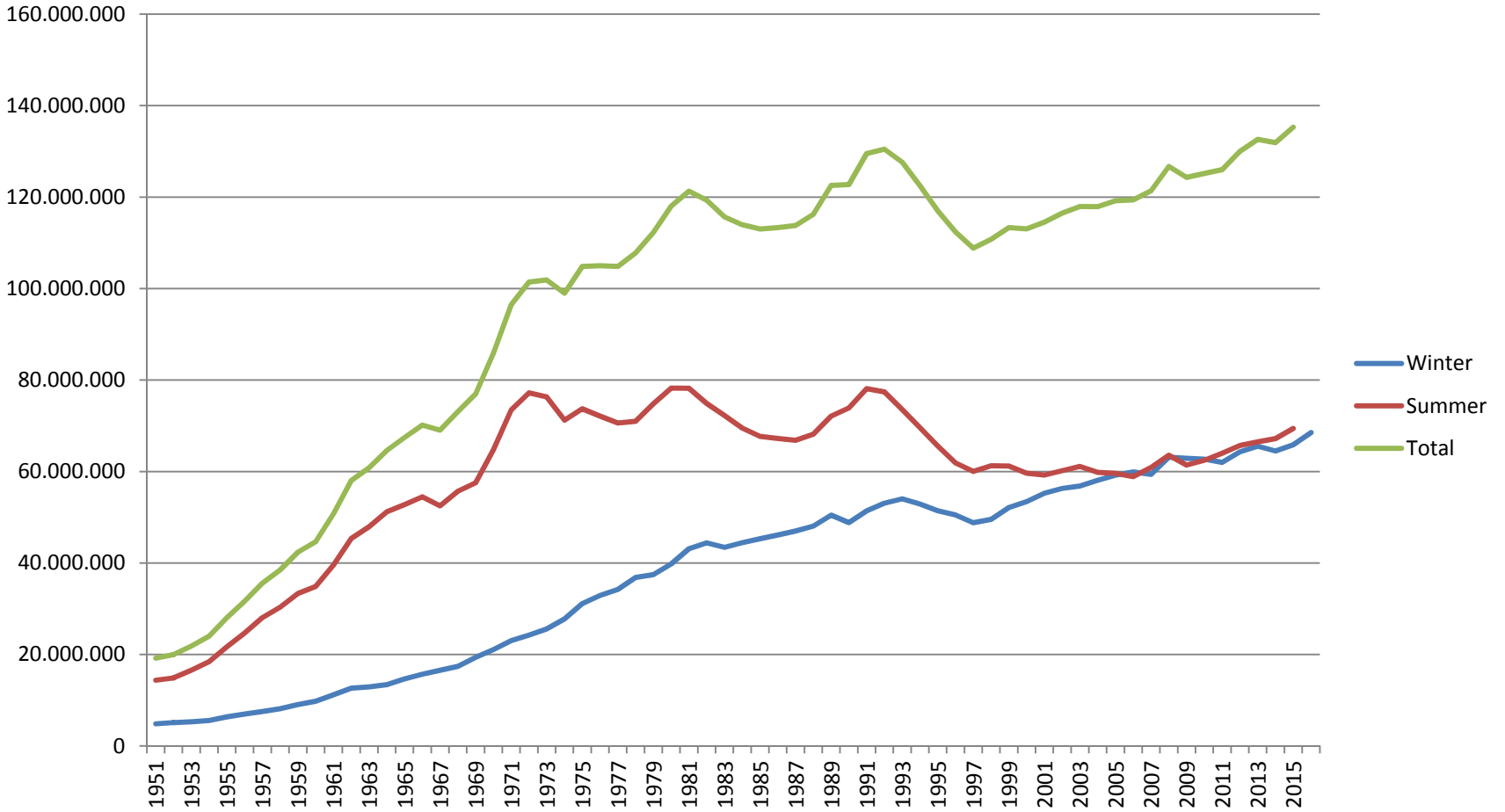
……. But not economically viable

Foto: 14.10.1998

Changing Socio-economic context in Chimgan, Usbekistan

Foto: 21.9.2006

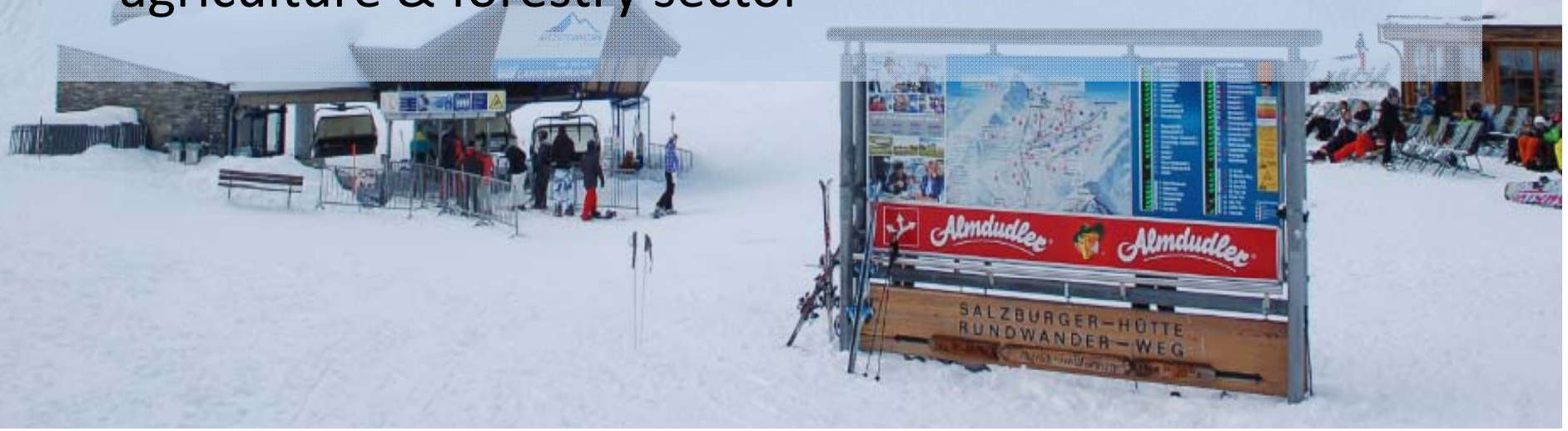
Development of Austrian Tourism 1950 to 2016 (overnight tourists)



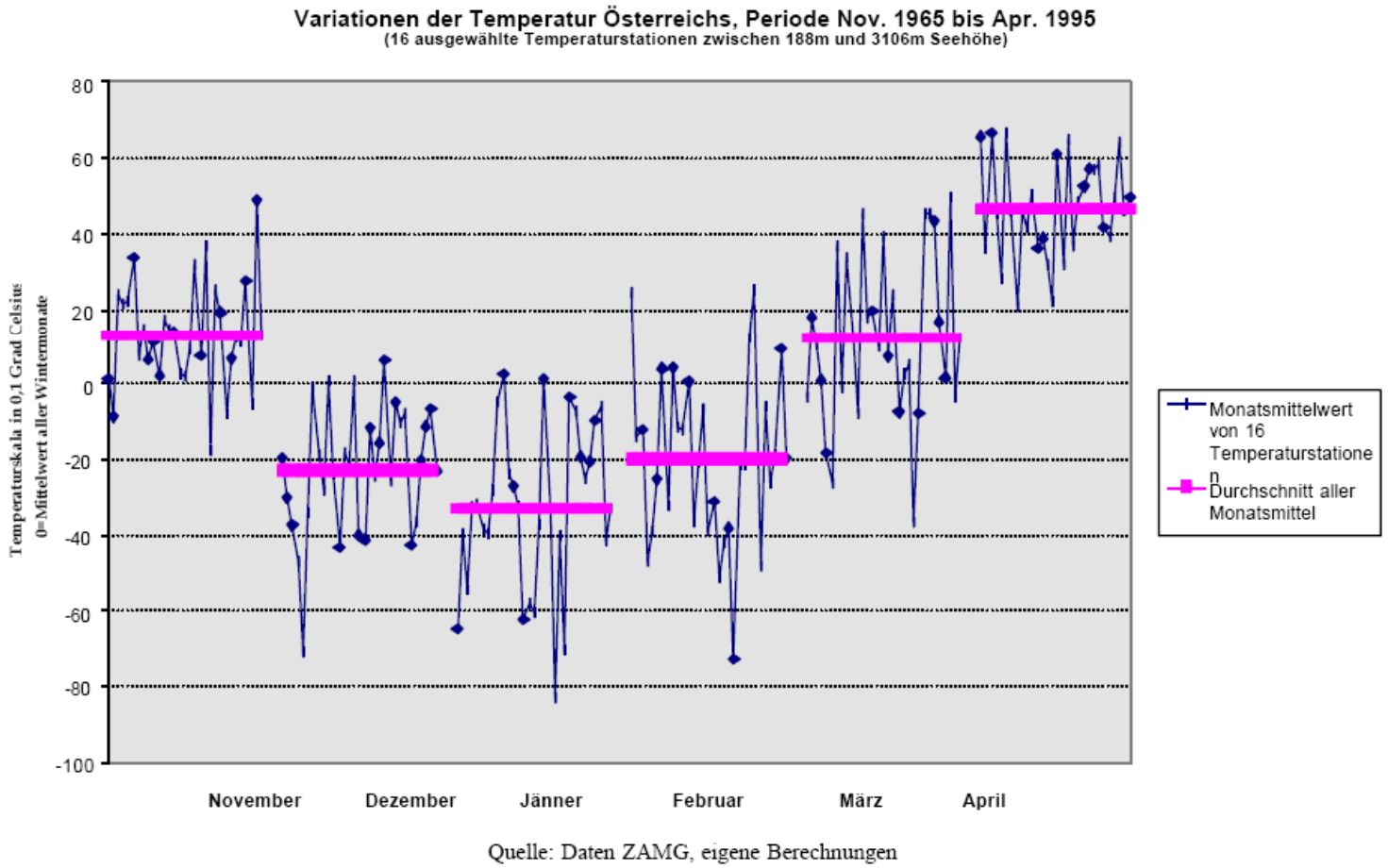
Source: own presentation based on data from Statistik Austria, 2016,

Winter tourism developed after summer tourism

- With increasing income more money is available for tourism
- Winter tourism and skiing became Austria wide more productive than summer tourism
- 50% of tourism and 60% of Austrian tourism income is earned in winter (Nov. to April)
- Each kind of tourism brings more income than agriculture & forestry sector

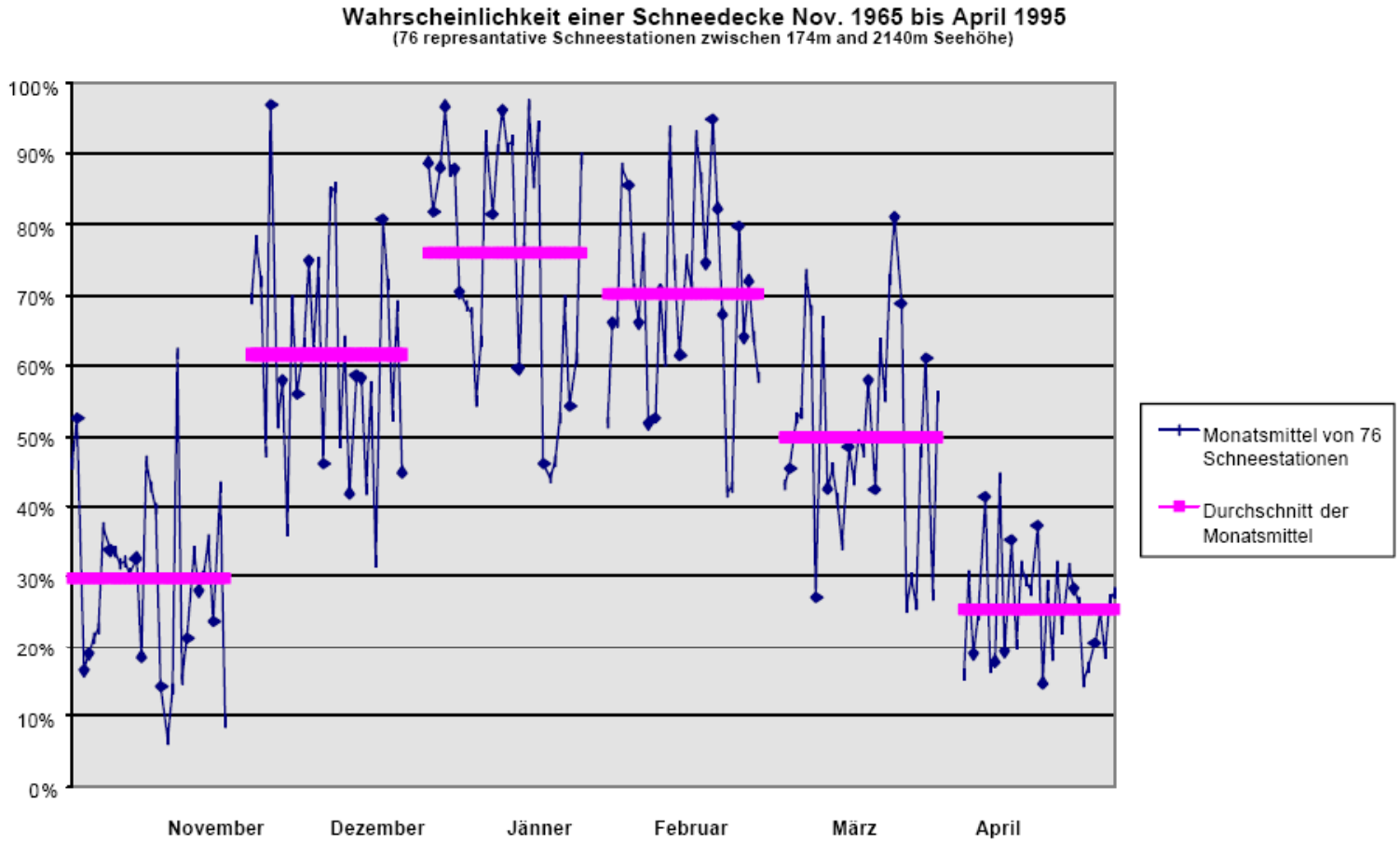


Temperature Variation in Austria

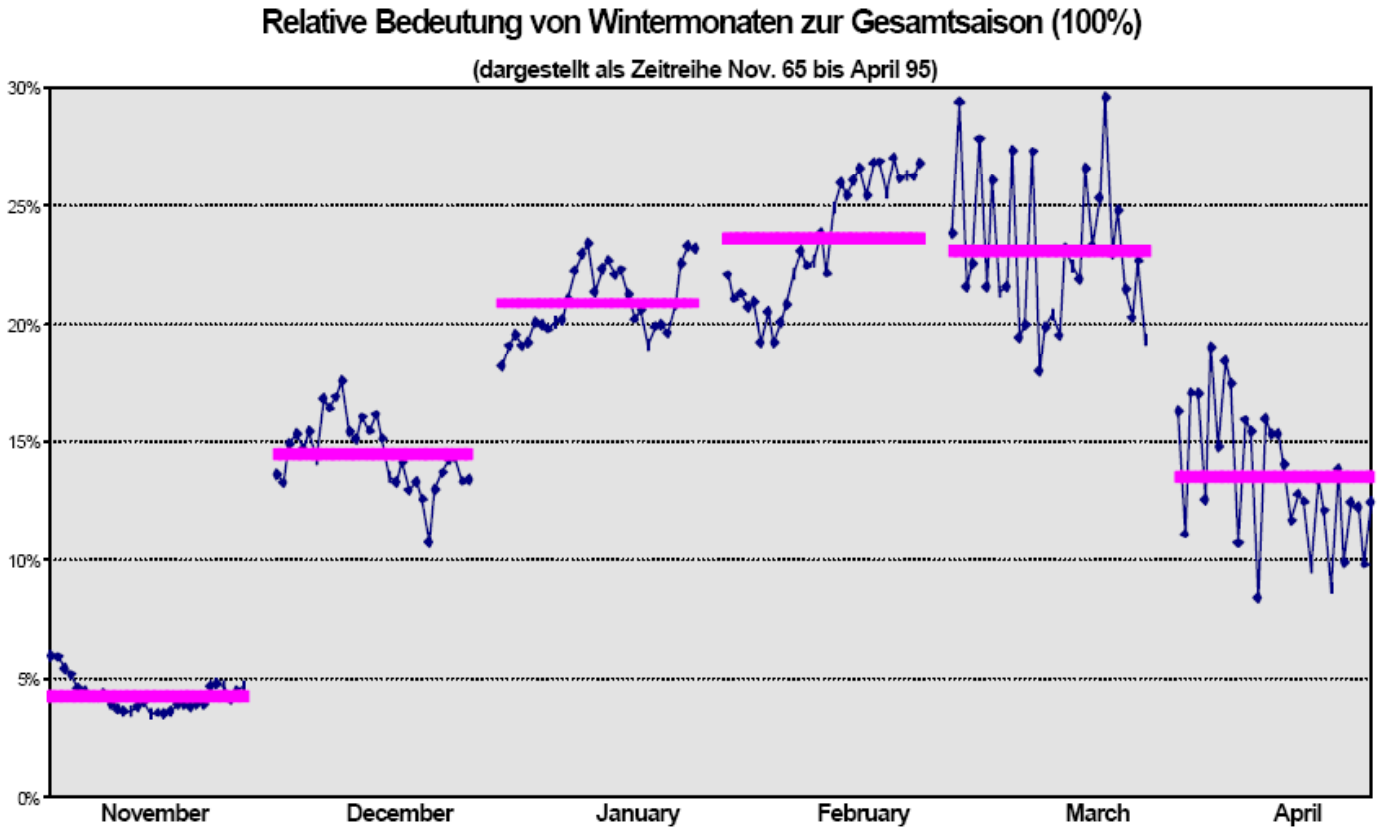


Quelle: Daten ZAMG, eigene Berechnungen

Snow Depth Variation in Austria

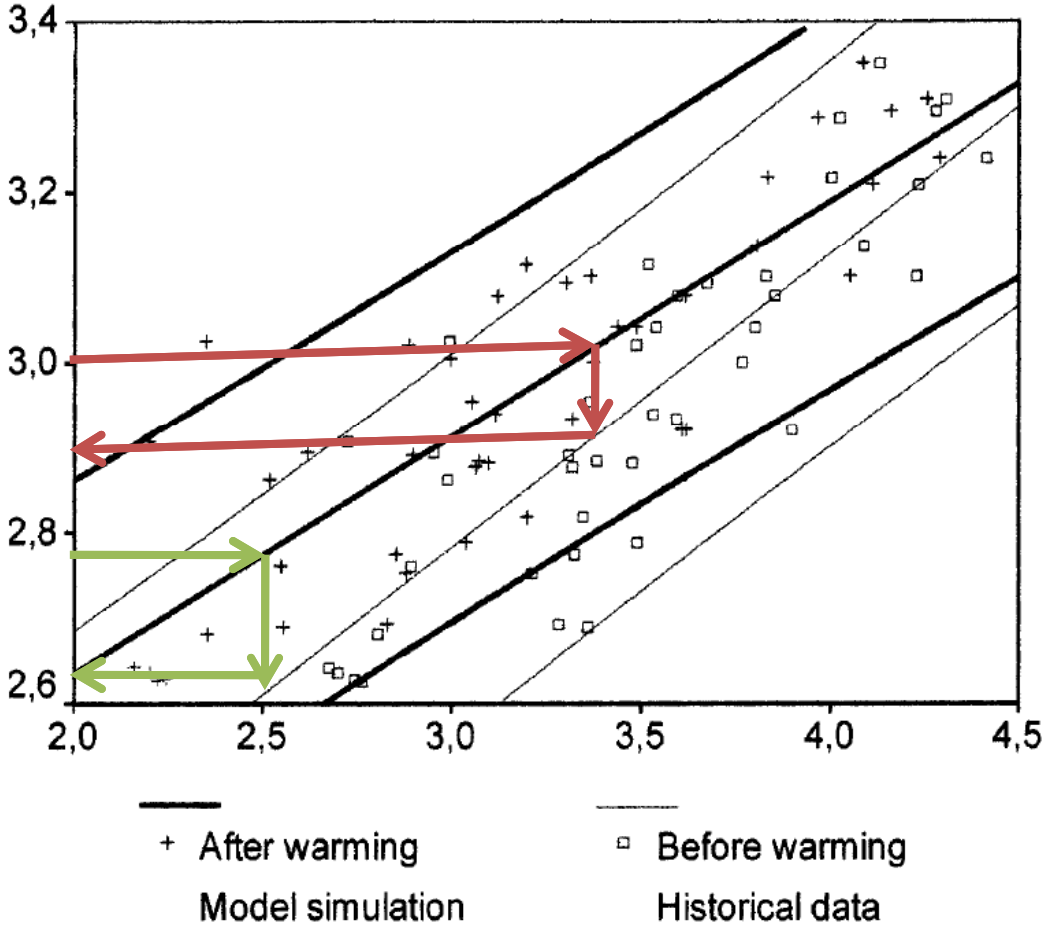


Tourist Variation in Austria



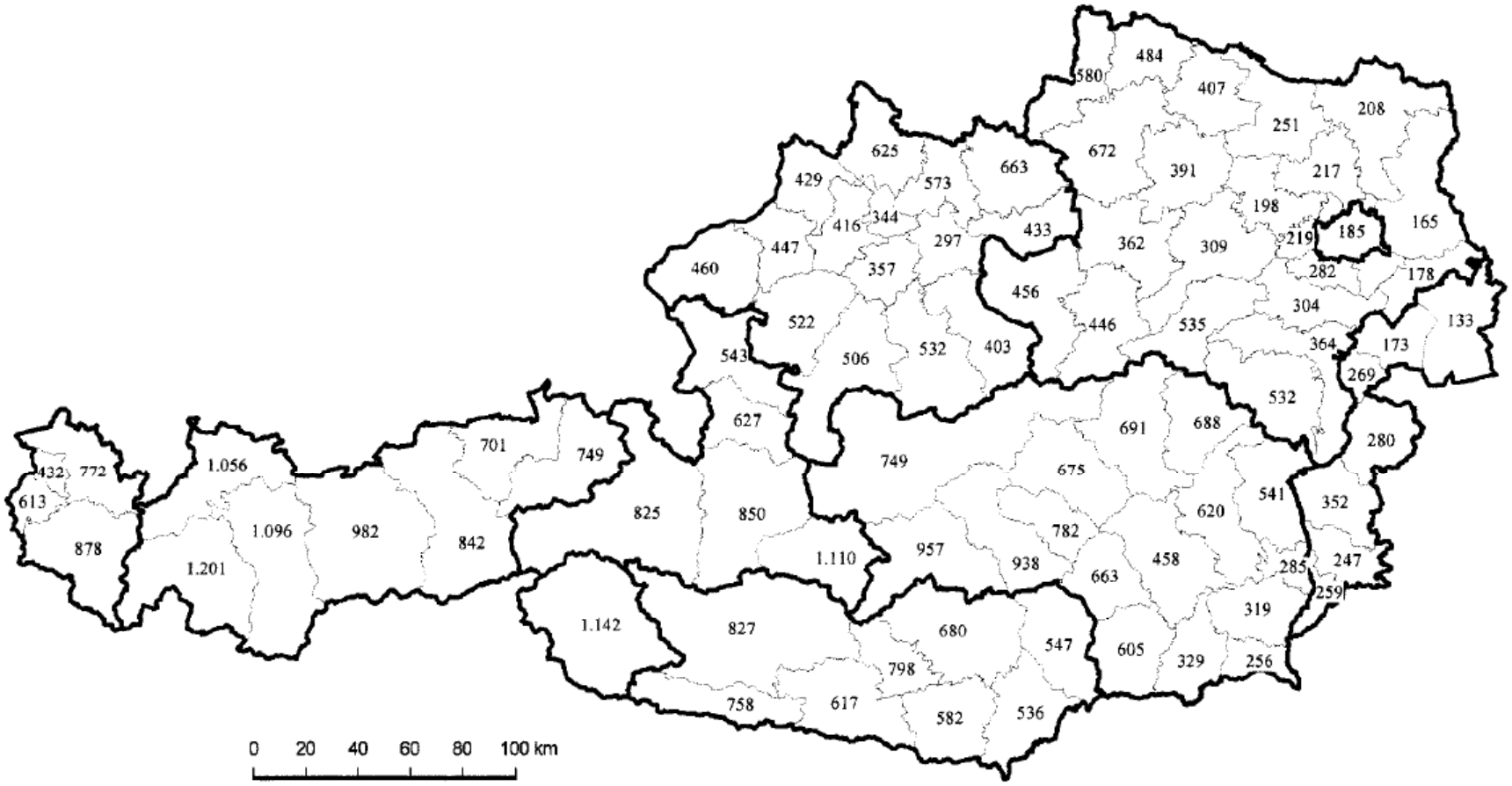
Quelle: Daten ÖSTAT, FV Statistik; eigene Bearbeitung und Darstellung

Part 2: Can „We Build on Snow?“

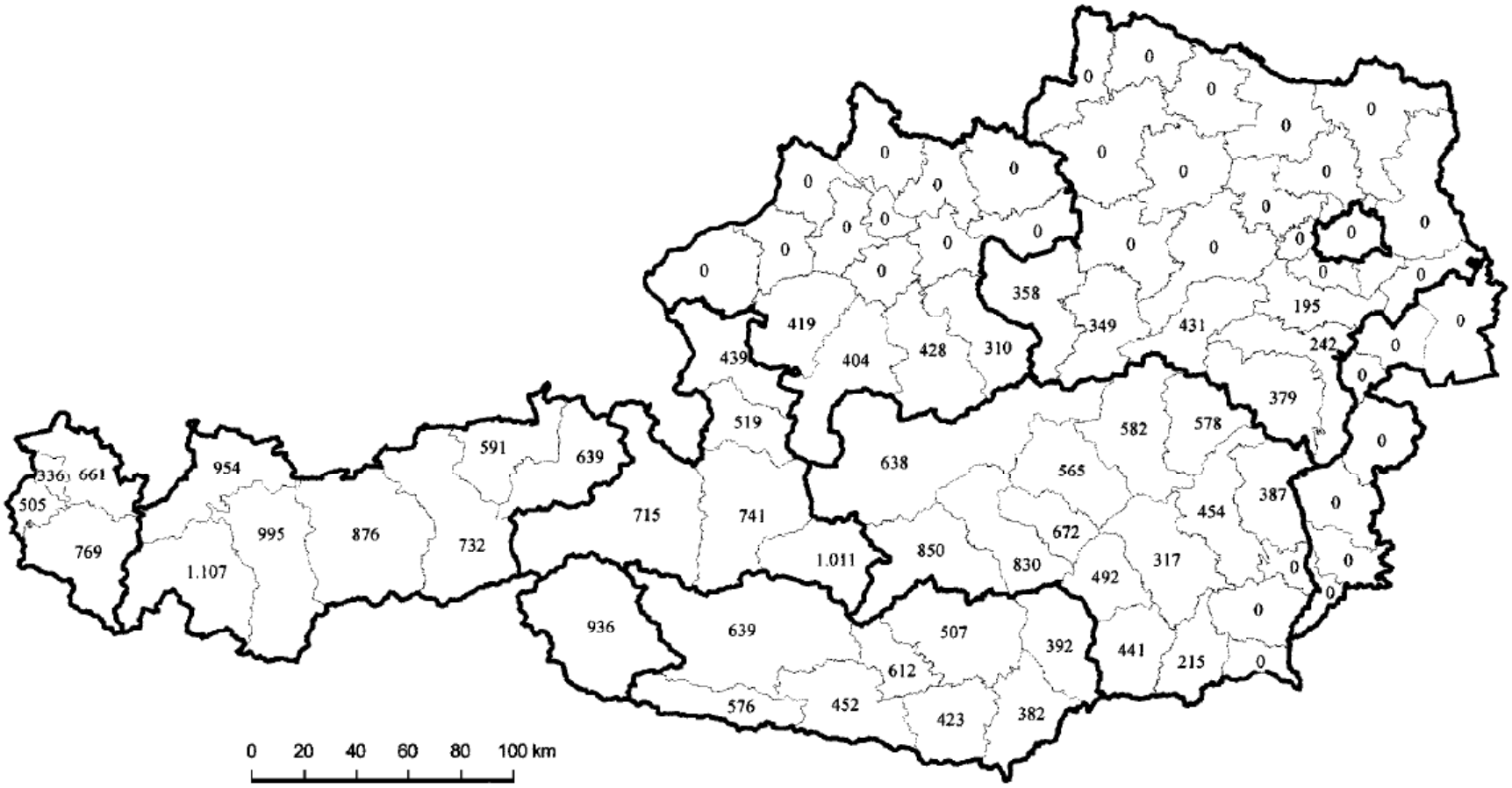


- The higher the altitude the lower the effect of warming
- Even more snow if we reach 3000m altitude
- Touristic settlements are generally lower situated
- Usually under 1000m altitude

Mean Altitude of Austrian Population



Mean Altitude of Population under Warming



Change of ratio between cold and warm winter month

Monat	1965 to 1995		2° C wärmer		3° C wärmer	
	kälter	*wärmer*	*kälter*	*wärmer*	*kälter*	*wärmer*
November	15	15	3	27	1	29
Dezember	15	15	4	26	0	30
Jänner	17	13	7	23	2	28
Februar	14	16	7	23	3	27
März	14	16	8	22	5	25
April	15	15	1	29	0	30

Quelle: Temperaturdaten ZAMG, eigene Berechnungen

- Skiing is even possible in warmer environment
- Degree of warming is decisive for economic impact
- Warming increased economic value chain
- Since 1980 artificial snow is produced

35 years of Adaptation of Winter Tourism

- Winter tourism is challenged by climate change
- Tourism was established at the seasonal Alpine snow line
  - For long time snow was a free resource
    - Reliable expectations of a snow cover
  - Today snow has to be produced
    - To provide safety of tourism performance

Snow guns for artificial snow production

Winter tourism is challenged by climate change

- Skiing became the most water demanding irrigation land use in Austria
- 25,000 ha ski tracks
- 17,000 ha equipped for artificial snow making
- Conflicts with agricultural and other industrial uses
- Conflicts with environmental protection

Winter Tourism is Technology Based Tourism

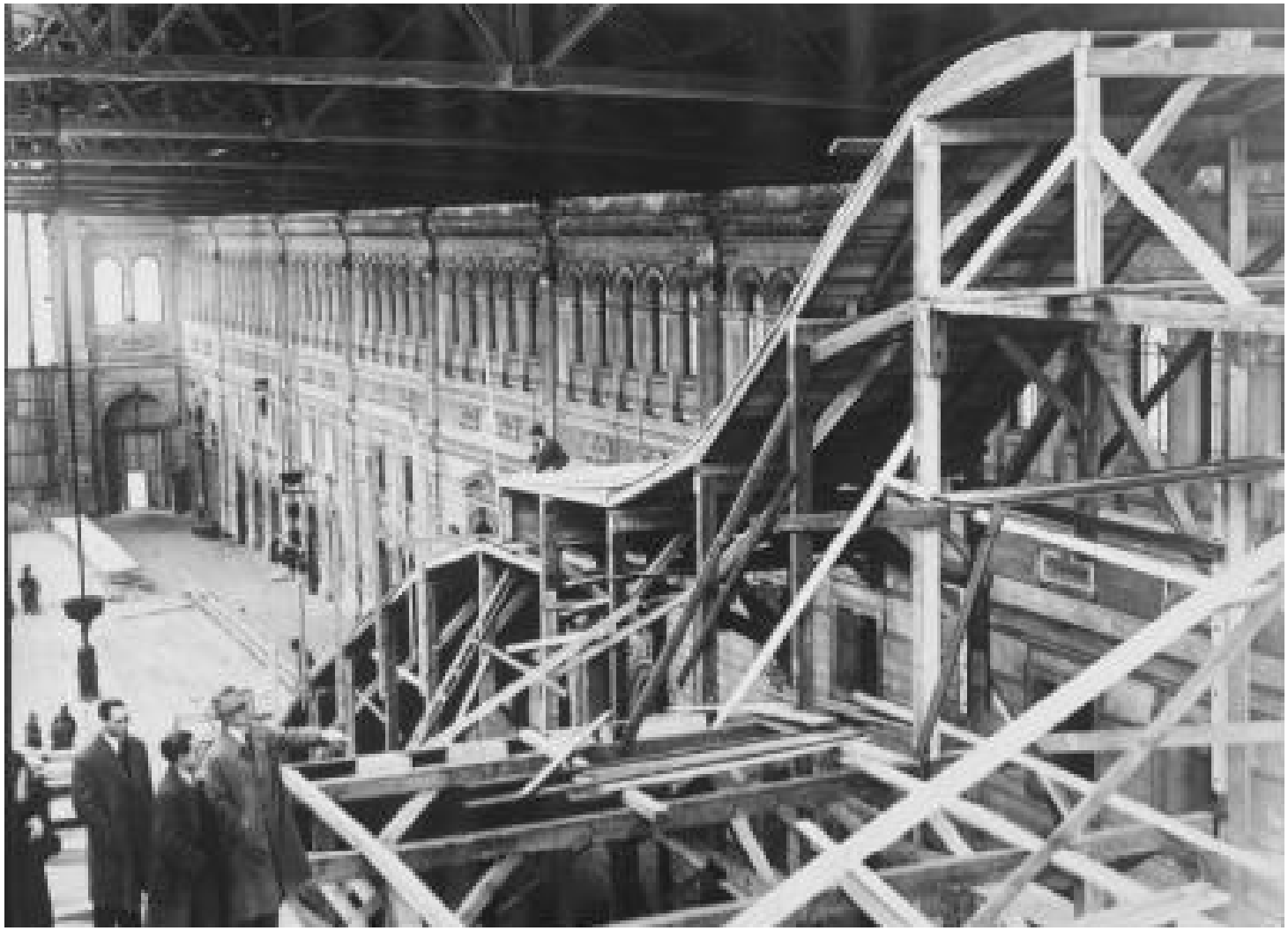
- During this century each year some 500 million € have been invested into the infrastructure of some 300 major Austrian winter tourism resorts

- High Capacity Skilifts
- Artificial Snow Making
- Water Reservoirs
- Tubes to transport water

Part 3: „What we Built on Snow“

Quelle: Österreichische Nationalbibliothek, Inventarnummer 113.397 a – D, Bildnachweis, ÖNB / Willinger, W

Snow Palace Vienna, anno 1927, Nordbahnhof



http://www.bildarchivaustria.at/Pages/ImageDetail.aspx?p_iBildID=2935895

First ski dome world wide in Vienna, anno 1927

- Snow was made from soda

Quelle: Österreichische Nationalbibliothek, Inventarnummer 113.397 b – D, Bildnachweis, ÖNB / Willinger, W

Economic fallurure of SSAWS Ski Dome in Japan

http://tokyo5.files.wordpress.com/2009/04/ssaws-inside.jpg

Landscaping in Progress

Tubing

Watching

Snow Amusement

Downhill course

New Markets for Skidomes: China and India

ALPS Center in Shenzhen

- Only place for skiing in southern China
- + 5°C temperature
- Poor snow conditions and high price

Each year a coming and going of a 6000m² Hotel

Source: M. Breiling, 6.12.2007

Patented Technology to Built Iglos

Source: Hansi Gelter, LTU Piteä

Design Studio for Items in Ice Hotel

Source: M. Breiling, 6.12.2007

Jukkasjärvi in Lapland

Source: https://lapland.nordicvisitor.com/travel-deals/partially-guided-tours/icehotel-winter-adventure/100/#&gid=1&pid=1

Last Year Icehotel

Source: https://lapland.nordicvisitor.com/travel-deals/partially-guided-tours/icehotel-winter-adventure/100/#&gid=1&pid=2

Individual design rooms made by artists

Source: M. Breiling, 6.12.2007

Answer Part 1:

- If you are tolerant and can wait: Yes, from time to time there will come natural snow and winter sports will be practiced according climate conditions
- If you are rich: Even better, at any time you may find a location in the world to experience natural snow but your choice will become more limited.
- If you are a tourist manager: You cannot expect on regular returning snow and you will suffer more in future.

Answer Part 2:

- In Austrian Case: Yes, we can „build on snow“ as we have a rich country to finance adaptations and innovations
- In a few decades the ratio of needed resources to the wanted snow output will get worse
- Each country [like Croatia] and each tourist destination has a different equilibrium.

Answer Part 3:

- Snow environments are in particular attractive in wealthy desert, subtropical and tropical urban destinations. These are particular isolated environments where climate conditions are entirely controlled.
- Snow is a unique building material and hotels, churches, concert halls were built with snow in several countries. Decisive is the length of use or season of the object which should be over 120 days.
- Snow design objects will become ever more important in particular due to more limited conditions in tourist resorts.