Technical snowmaking & touristic aspects

Schneezentrum Tirol

Michael Rothleitner | Schneezentrum Tirol | 2021-02-11

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The Alpine winter in economic key figures

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The economic importance of tourism in Austria

Direct value added effects € 23.6 billion = 6.4% of GDP.

The total expenditure of travellers amounts to approx. € 42.5 billion in 2018.

Sources: Statistics Austria, WIFO

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The overall economic significance of tourism in Tyrol

Direct value added effects € 4.5 billion = 17.5% of gross value added. The total expenditure of travellers amounts to approx. 8.4 billion €. Of which 42% summer and 58% winter

Sources: Tirol Tourist Board T-MONA 2017/18

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Arrivals and overnight stays Tourism in Tyrol

Arrivals:		Overnight stays:	
Winter 2018/19	6.2 m.	Winter 2018/19	27.5 m.
Summer 2019	6.2 m.	Summer 2019	22.2 m.

Source: Mafo brochure Facts and figures 2019 Tirol Werbung Gmbh

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Expenditure and turnover

Daily expenditure of guests (excluding travel) higher in winter than in summer: Winter € 185, and summer € 144,-

Of which approx. 52% for accommodation- 13% food and beverages (excluding accommodation and supermarket)- Purchases in summer and winter approx. 9%- Expenditure on cable cars and local public transport much higher in winter (19% in winter vs. 9% in summer)- Approx. 5% for leisure, culture, sports, wellness.

Source: Mafo Brochure Zahlen Daten Fakten 2019 Tirol Werbung Gmbh

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Activities of Tyrol holidaymakers

Winter:
Skiing (80%)
Winter hiking (35%)
Tobogganing (15%)
Snowboarding (14%)

Summer:
Hiking (87%)
Swimming/bathing (42%)
Biking/MTB/E-Bike (23%)
Mountaineering (17%)

Source: Mafo brochure Zahlen Daten Fakten 2019 Tirol Werbung Gmbh

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Infrastructure for Tyrolean holidaymakers

Winter Cableways:
167 Ropeways
307 Chairlifts
467 T-bar lifts

Slopes:
Kilometres 2400
Area 7300 hectares
Techn. snowed of which 5500

Source: WKO Tyrolean cable car industry in figures 2019

Problems and solutions of snow management in Alpine ski resorts

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Typical Tyrolean Winter

- Fresh Powder
- Blue Sky
- Nothing but nature

Technical snow production

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Forschung zur Effizienzsteigerung der technischen Schneeerzeugung

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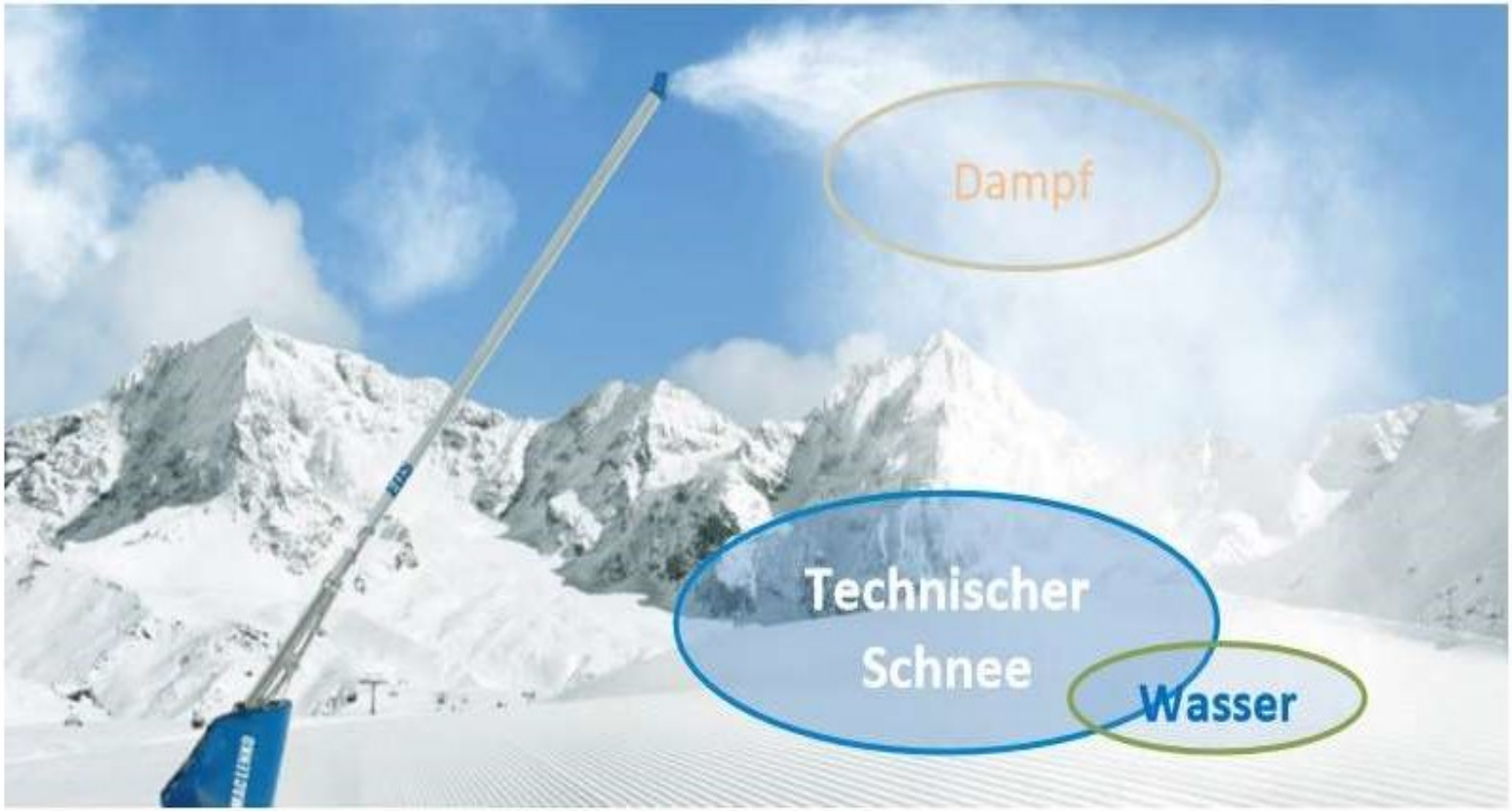
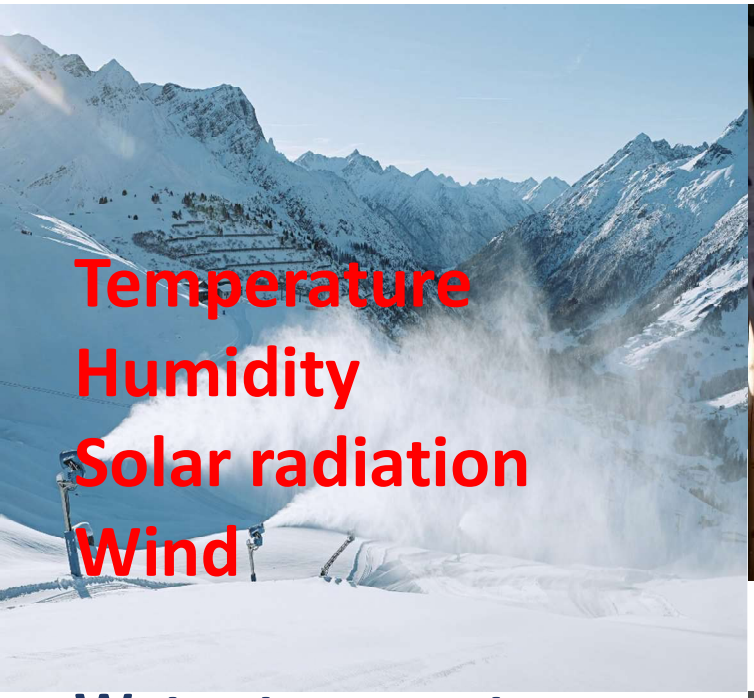


Die Tiroler Skigebiete verwenden zur Erzeugung von technischem Schnee nur reines Trinkwasser. Dieses wird mit CO_2-neutraler Energie und ohne jegliche Zusätze durch feine Düsen in die kalte Winterluft gesprüht. Ein Teil des Wassers gefriert dabei zu kleinen Eiskörnern (Technischer Schnee), ein anderer Teil verdunstet und ein dritter Teil bleibt trotz der tiefen Temperaturen flüssig. Das Verhältnis variiert in Abhängigkeit von den Wetterbedingungen und der Geometrie der Düsen. Im Winter forschen wir daher hier im Messcontainer, um die Ressourcen möglichst effizient einzusetzen.

Gefördert durch tirol Unser Land



Temperature
Humidity
Solar radiation
Wind

Conditions

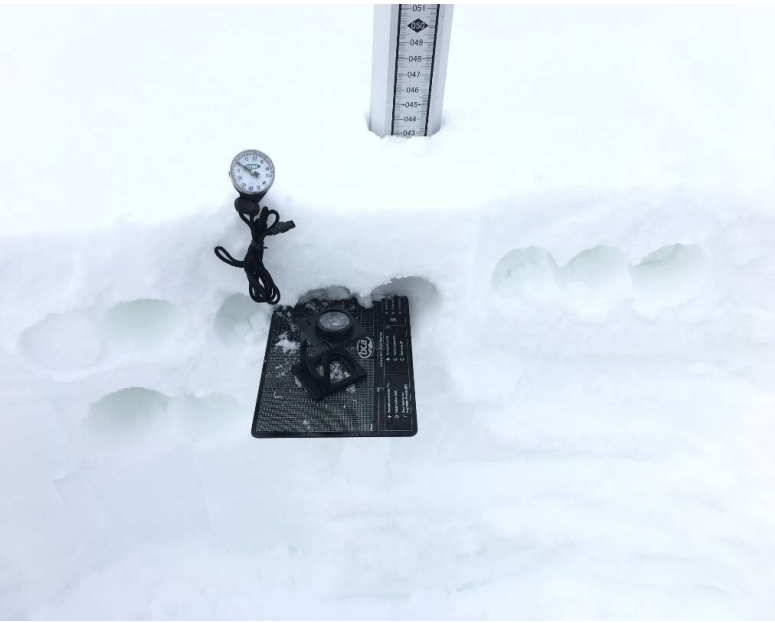
Water temperature
Water pressure
Water volume
Air temperature
Air pressure
Air volume
Energy + Nozzles

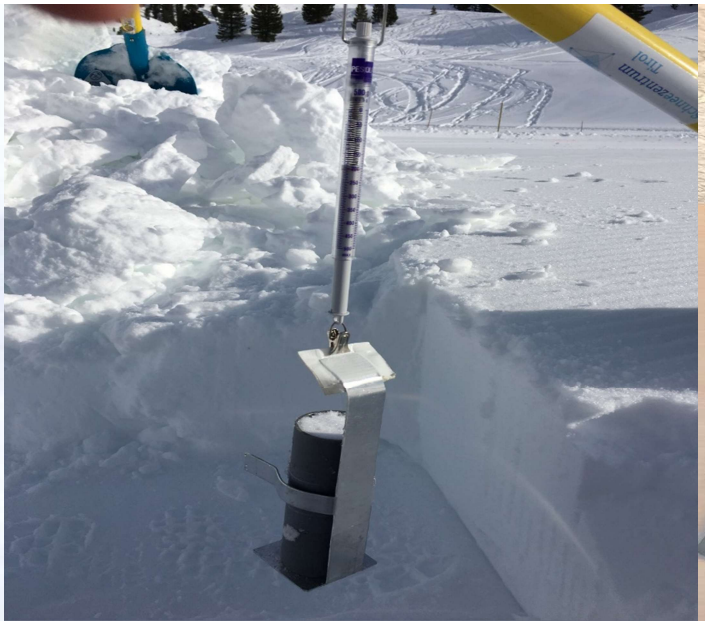
Snow quality

- Grain size
- Weight
- Density
- Wetness

Snow quantity

- Volume
- Weight
- Density

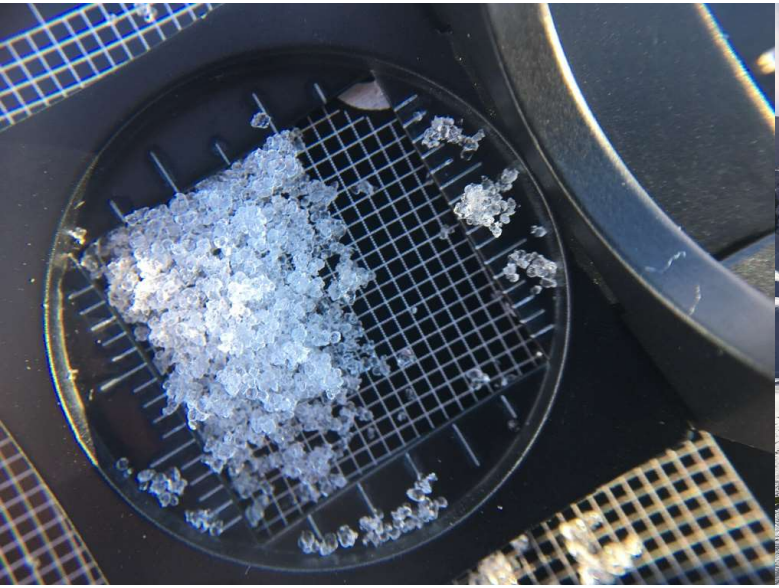


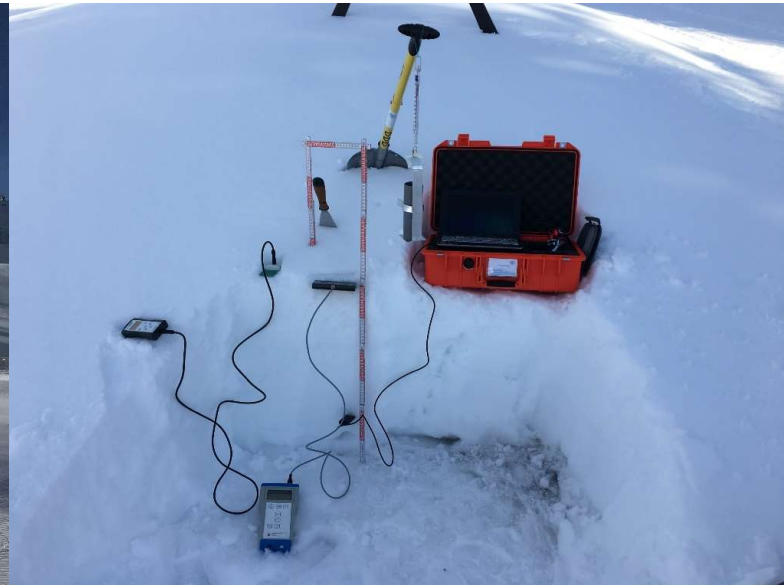


Grain size

Density/Volume

Wetness





Snow management

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Preparation Problem

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Snow Volume Problem

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Economic Problem (~60km slopes)

- Variable Costs of Snow production

  Water, Electricity, Staff

  € 800.000,-

- Variable Costs of Preparation

  Fuel, Staff

  € 700.000,-

  Total: € 1.500.000,- (per year)

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Ecological Problem?

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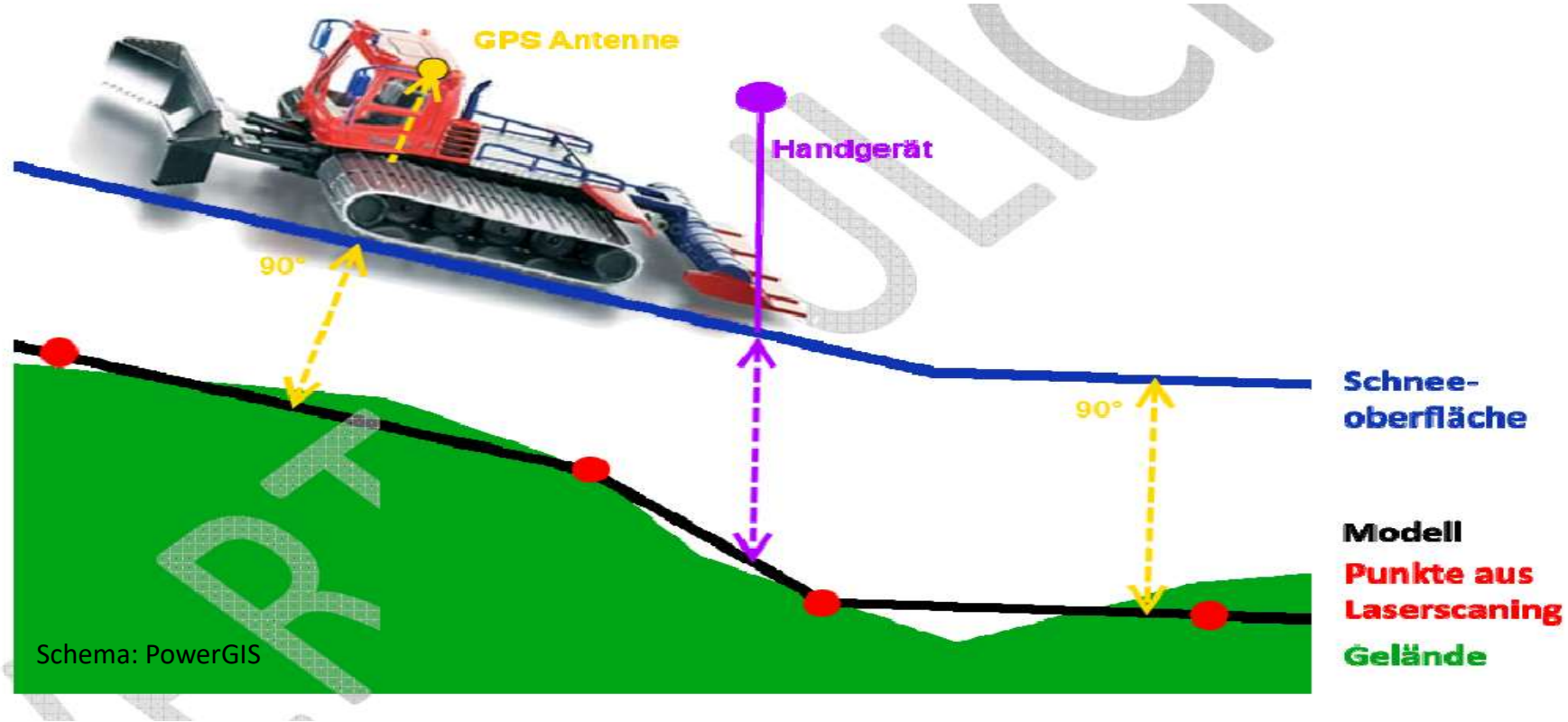
Scheme Snow Depth Measurement



Schema: PowerGIS

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Typical Snow Production Problem

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Untypical Snow Growth

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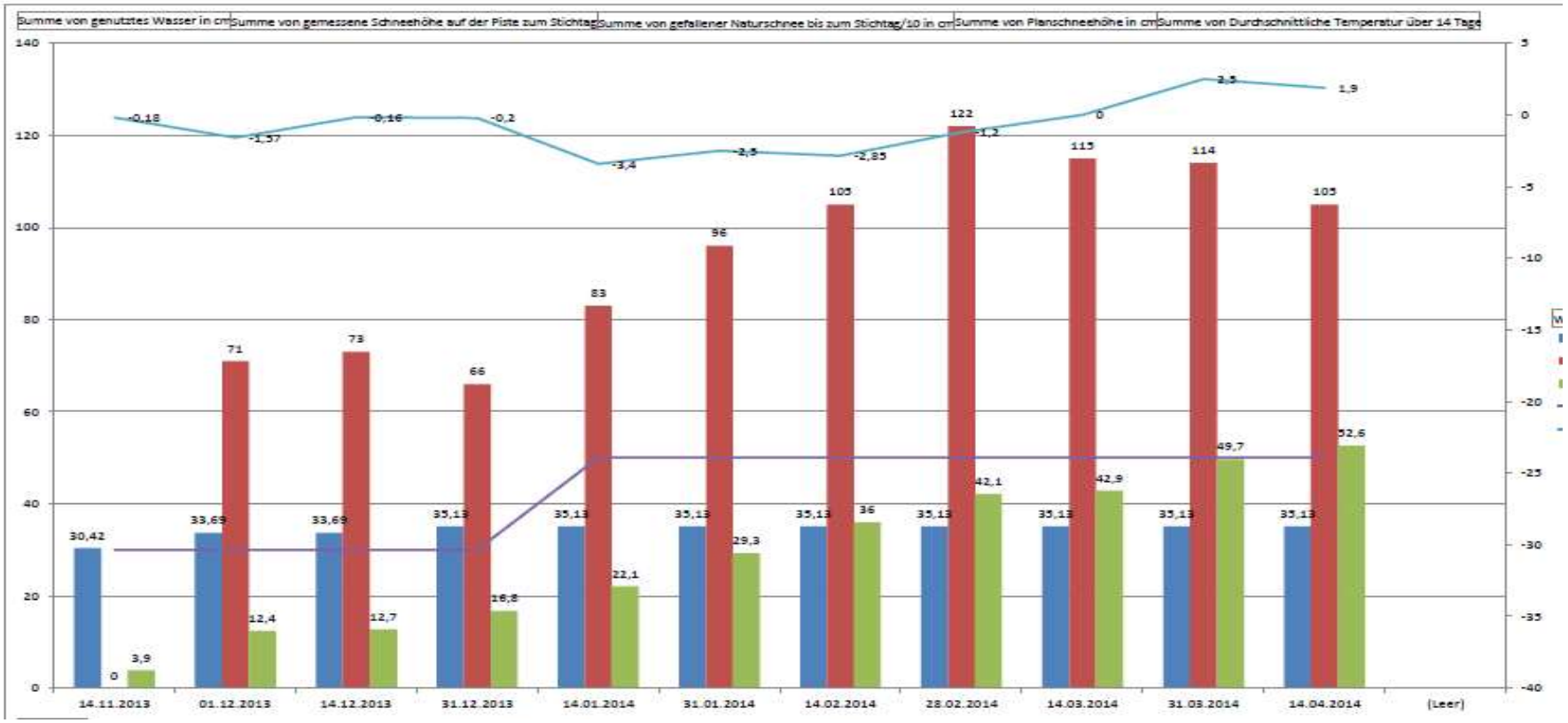
Target / Actual: Water resp. Snow amount

(Water – Natural Snow – Snow on the slope actual – Target height [line])



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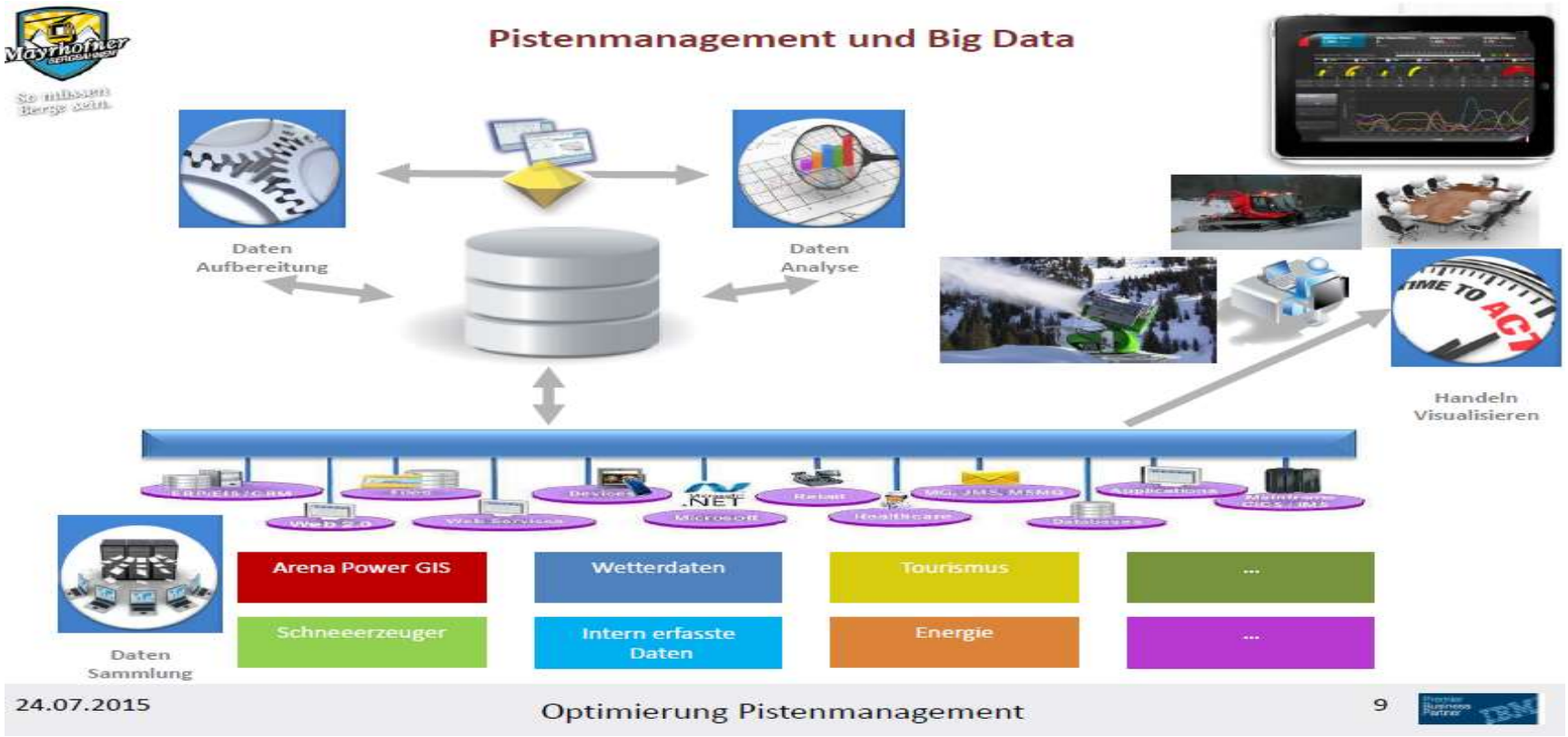
6 Bn. Data for slope management



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Systems in use

For example:

- ARENA PistenManagement
- Leica Geosystems
- SNOWsat
- Technoalpin ATASSplus

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PROSNOW

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FuSE-AT

Ergebnisse eines gemeinsamen Forschungsprojekts

Gefördert vom Austrian Climate Research Program (ACRP)

Future Snow Cover Evolution in Austria

2018 - 2021

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Foto: Tirol Werbung

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