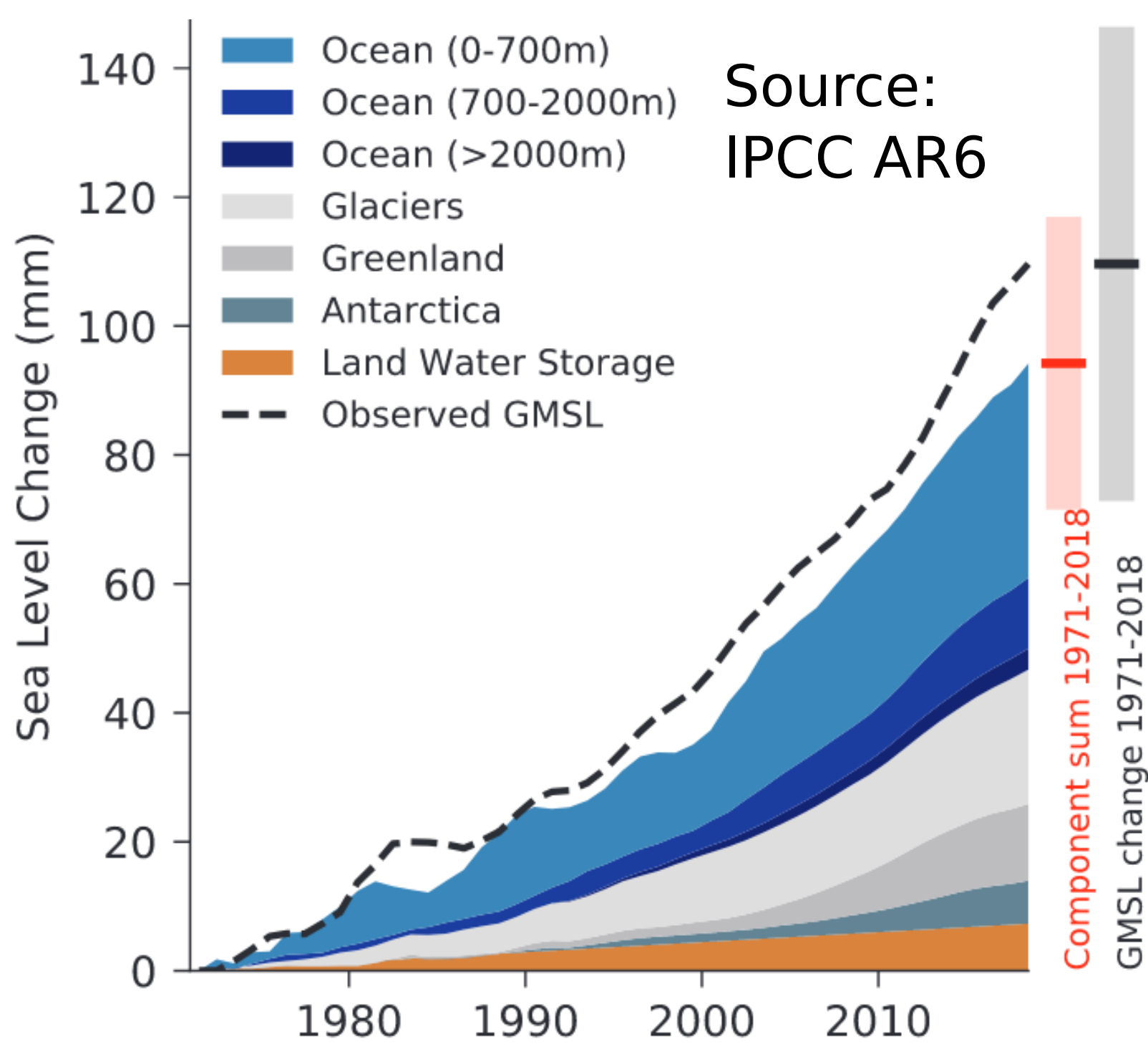


International Doctoral Program: Measuring and Modelling Mountain glaciers and ice caps in a Changing Climate (M³OCCA)

Matthias Braun, Thorsten Seehaus

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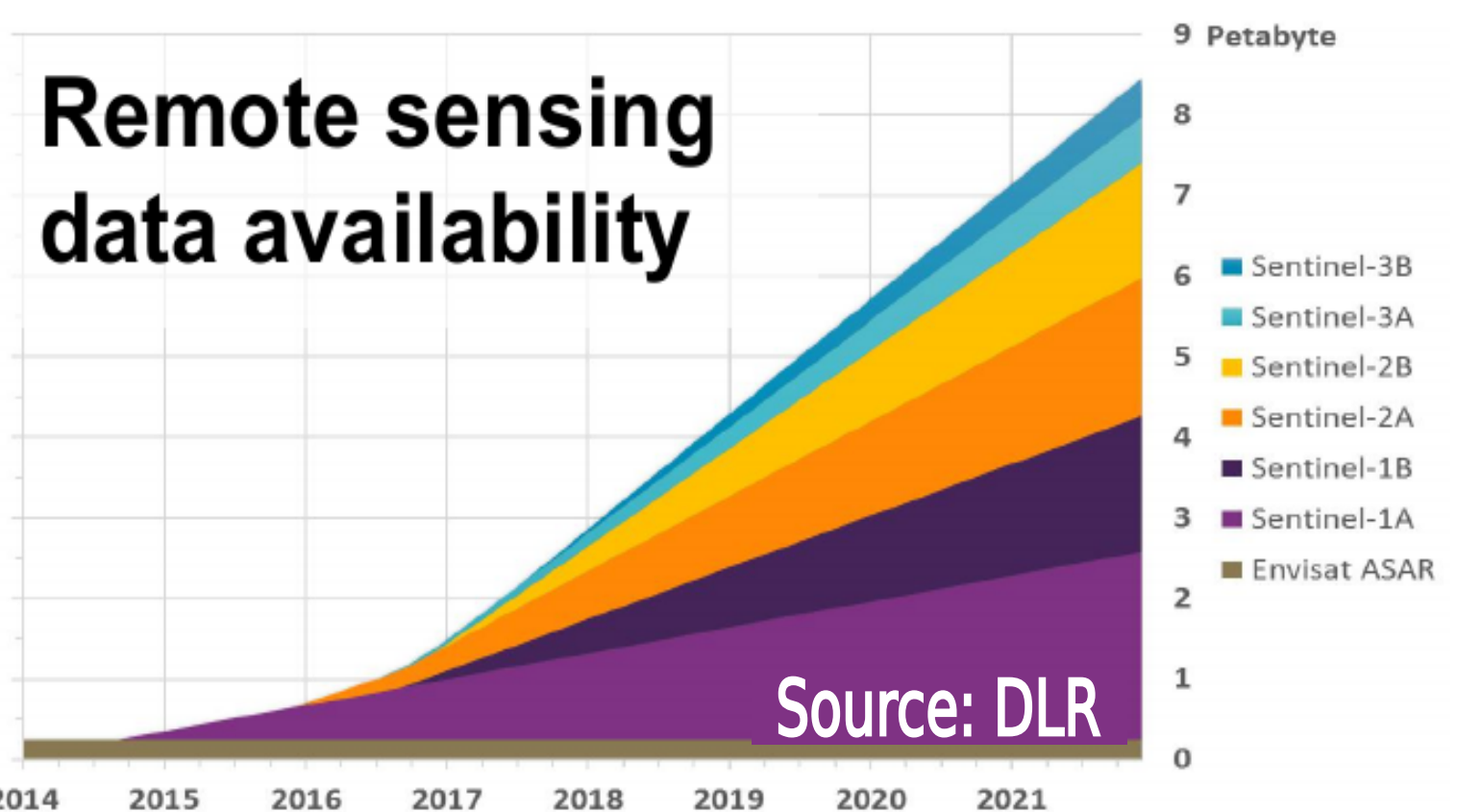
:: Motivation ::



Mountain Glaciers and Ice Caps are strongly affected by changing climate conditions leading to:

- sea level rise,
- reduced water resources,
- increased risk of natural hazards.

Strongly increasing amount of data and remote sensing products to be assimilated into geophysical models. Machine learning open new possibilities in EO data analysis but also for large-scale modelling.



:: Interdisciplinary Team ::

Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)

- Prof. Dr. Matthias Braun (Geography, Speaker)
- Dr. Ilaria Tabone (Physics/Glaciology)
- Dr. Johannes Fürst (Physics/Glaciology)
- Dr. Thorsten Seehaus (Physics/Glaciology)
- Prof. Dr. Gerhard Krieger (Electronics/Engineering)
- Prof. Dr. Harald Köstler (Computer Science)
- Prof. Dr. Thomas Mölg (Geography)
- Prof. Dr. Andreas Maier (Computer Science)
- Dr. Vincent Christlein (Computer Science)
- Prof. Dr. Martin Vossiek (Electronics/Engineering)
- Prof. Dr. Eberhard Bänsch (Mathematics)

Technische Universität München (TUM)

- Prof. Dr. Michael Krautblatter (Geography/Geology)

Deutsches Zentrum für Luft- und Raumfahrt (DLR)

- Dr. Paola Rizzoli (Electronics/Engineering)
- Prof. Dr. Irena Hajnsek (DLR/ETH Zürich, Geography)

Bavarian Academy of Sciences and Humanities (BAdW)

- Dr. Christoph Mayer (Geophysics/Glaciology)
- Dr. Martin Rückamp (Glaciology)

+ International advisory and supervisor board

:: Cross-cutting Research Topics ::

+Machine Learning

+Data Assimilation

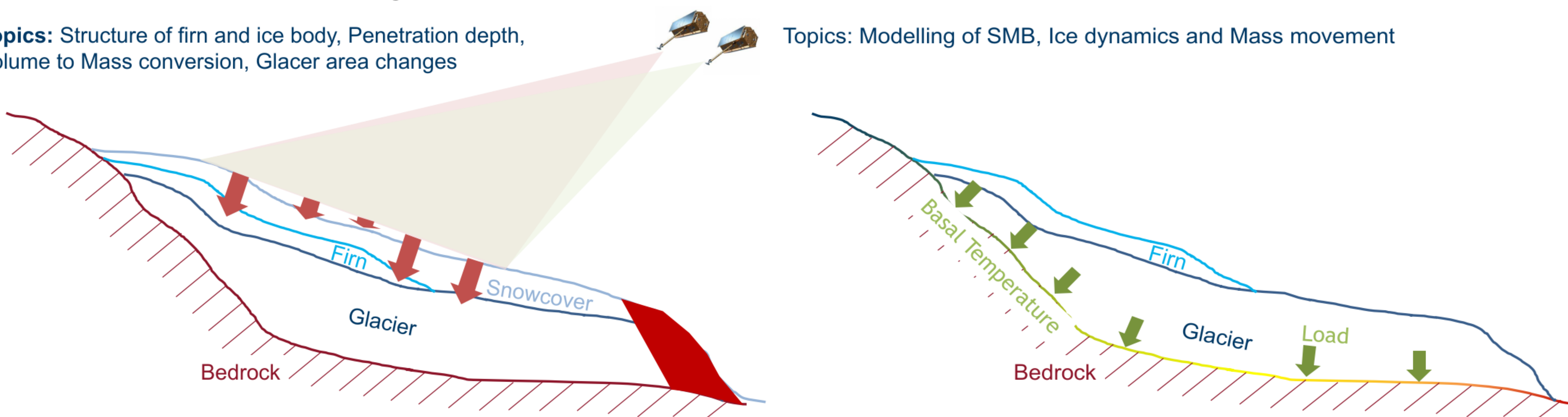
+Fieldwork

:: Remote Sensing ::

Topics: Structure of firm and ice body, Penetration depth, Volume to Mass conversion, Glacier area changes

:: Modelling ::

Topics: Modelling of SMB, Ice dynamics and Mass movement



:: Core Projects ::

Research Field 1: Future Technologies

Multi-frequency digital Radarsystem

(Vossiek, Seehaus, Krieger, Navarro)

SAR Tomography

(Krieger, Hajnsek, Mayer, Rott)

Radargramm analysis using Deep Learning

(Maier, Christlein, Seehaus, Navarro)

Research Field 2: Improved precision

Glacier outlines by means of machine learning

(Braun, Bänsch, Rizzoli, Zemp)

SAR signal penetration assessment using AI

(Rizzoli, Braun, Maier, Milillo)

Enhance Volume to Mass conversion

(Mayer, Mölg, Huss, Hock)

Research Field 3: Enhanced geophys. Modelles

Snow drift and interanl re-freezing

(Mölg, Nicholson, Prinz, Hock)

Deep learning in ice dynamical modelling

(Fürst, Köstler, Tabone, Galiardini, Maussion)

Mass movement in ice free areas

(Krautblatter, Fürst, Etzelmüller, Westermann)

9 core funded doct. cand.
+ **11 additional affiliated doctoral candidates**
projects at FAU, DLR and BAdW

:: Training elements ::

- research seminar
- topic workshops
- self-organized workhops (by doct. cand.)
- yearly retreat