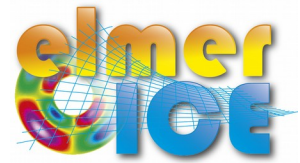




# Elmer/Ice Users splinter meeting

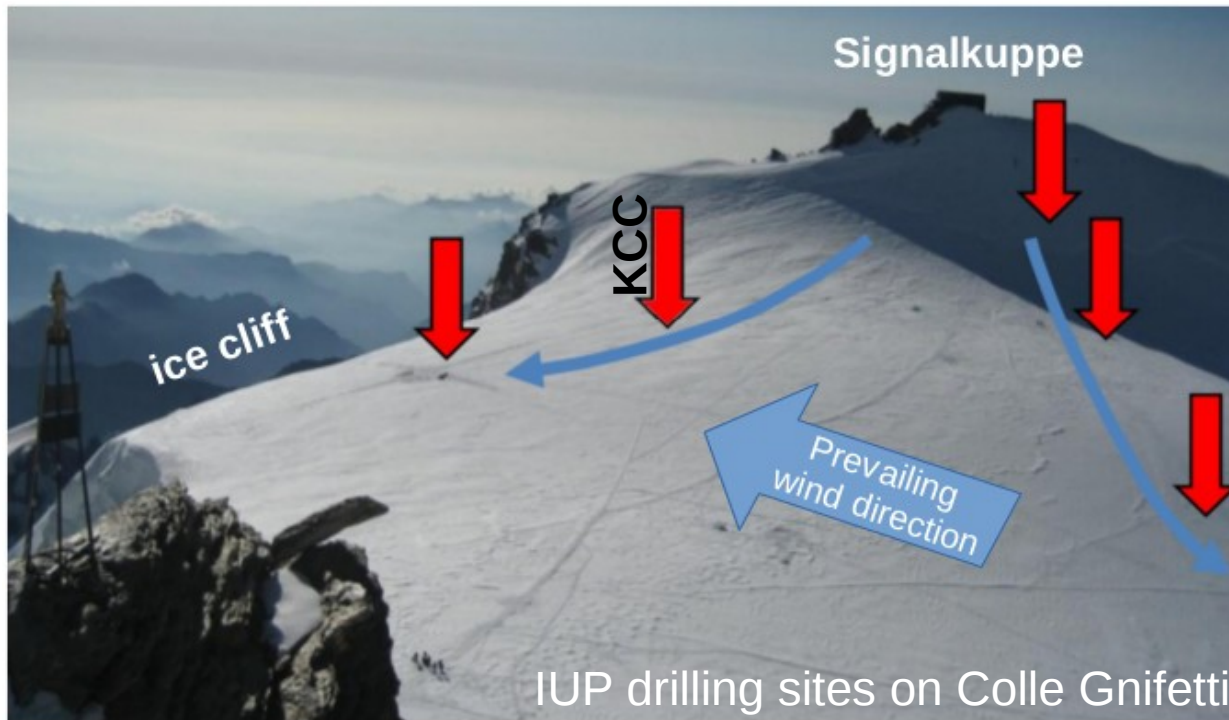
14 April 2015, EGU General Assembly, Vienna

Carlo Licciulli, Pascal Bohleber, Dietmar Wagenbach\*,  
Olaf Eisen, Olivier Gagliardini and Martin Hoelzle



**Supplementing ice core time series at a small scale  
Alpine glacier with a 3D full Stokes ice flow model  
using Elmer/Ice**

# The Colle Gnifetti Glacier, Monte Rosa, 4450 m



- Small scale cold firn saddle
- Low net accumulation, rapid layer thinning  
→ **long term ice core records possible!**
- Unique potential of this site hampered by depositional noise and upstream effects

## Main goals of the modeling tool:

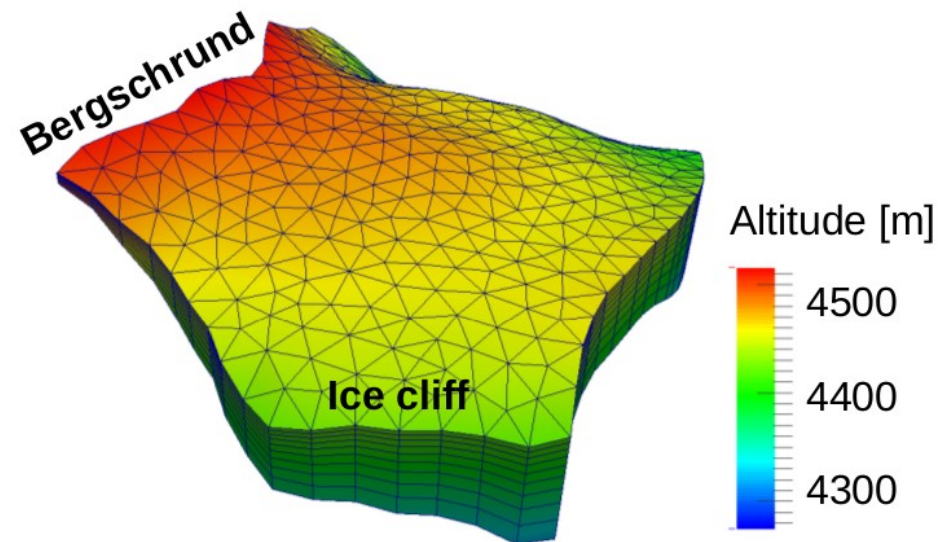
- Evaluate potential upstream effects by calculating source trajectories of existing ice core sites
- Assist in dating the ice cores
- Calculate isochronous surfaces under the firn/ice transition line

# The Colle Gnifetti Ice Flow Model



Aerial imagery from Swisstopo (<http://map.geo.admin.ch>)

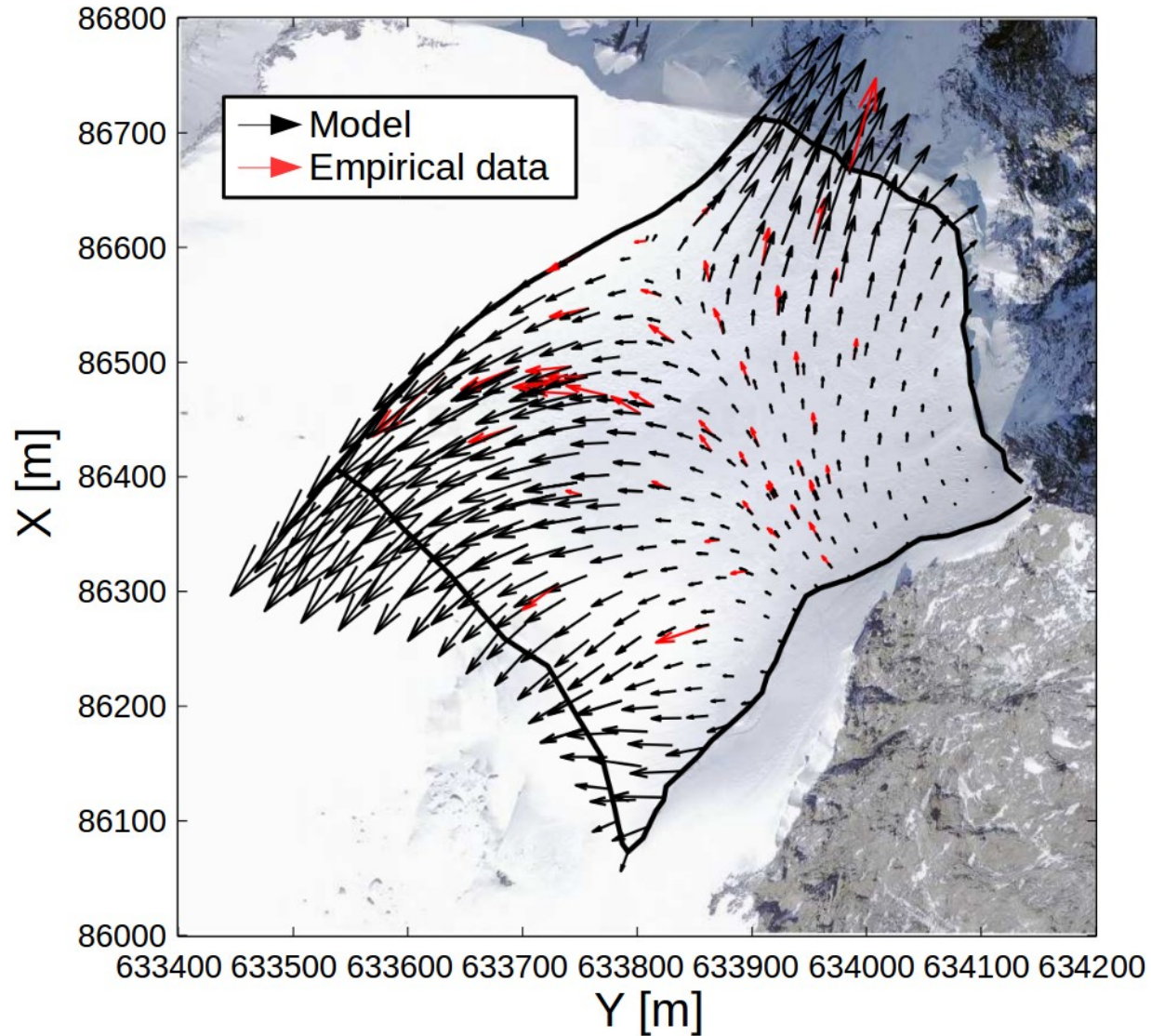
- **Main input quantities:** measured density and temperature field; boundary conditions like e.g. bedrock and surface topography
- Consideration of **firn rheology** using the Porous Solver
- **Parameter tuning** to provide the best fit between model derived and directly measured quantities





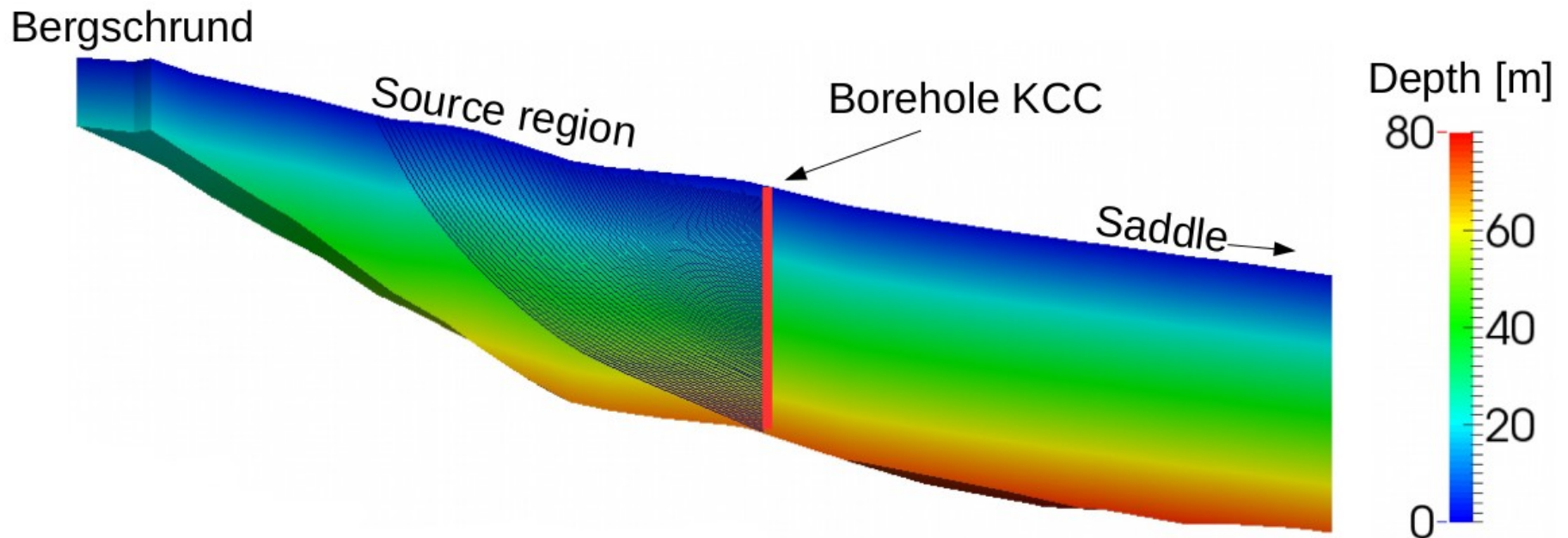
# Preliminary Model Results

## Horizontal surface velocities



# Preliminary Model Results

## Ice particles trajectories



- The accuracy of the trajectory calculation will be improved after adjusting the model parameters using ice core derived depth-dependent quantities

## **Outlook**

- Couple the mechanical model to a thermodynamical one
- Take into account ice anisotropy
- Further parameter tuning based on ice cores derived depth-dependent informations

**Have a look on my poster presentation!**

**Wed 17:30-19:00, Y167**