



INSTITUT SUISSE DE SPÉLÉOLOGIE ET DE KARSTOLOGIE  
SCHWEIZERISCHES INSTITUT FÜR SPELÄOLOGIE UND KARSTFORSCHUNG  
INSTITUTO SVIZZERO DI SPLEOLOGIA E CARSOLOGIA  
SWISS INTITUTE FOR SPELEOLOGY AND KARST STUDIES



# Visual KARSYS

A web-platform for the documentation of karst aquifers including online geological modelling

4<sup>th</sup> meeting of the European 3D GeoModelling Community | 2018/02

Malard A.<sup>1</sup>, Randles S.<sup>2</sup>, Hausmann P.<sup>2</sup>, Bucev M.<sup>1</sup>, Jeannin PY.<sup>1</sup>, Lopez S.<sup>3</sup>, Courrioux G.<sup>3</sup>, Vogel M.<sup>2</sup>

<sup>1</sup> Swiss Institute for Speleology and Karst Studies, rue de la Serre 68 – CH2300 La Chaux-de-Fonds

<sup>2</sup> i4ds | Institut für 4D Technologien, Fachhochschule Nordwestschweiz, Bahnhofstrasse 6, CH5210 Windisch

<sup>3</sup> BRGM, 3 avenue Claude-Guillemin, 45000 Orléans



swisstopo

nagra



Kanton Graubünden  
Chantun Grischun  
Cantone dei Grigioni



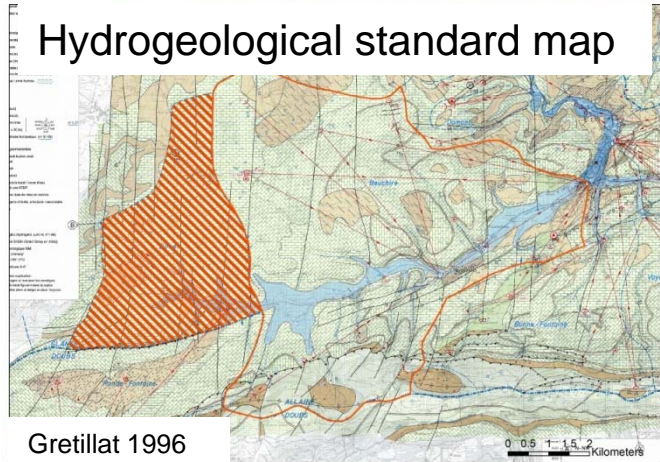
# KARSYS – a new approach in understanding karst aquifers !

Karst issues

KARSYS

Visual KARSYS

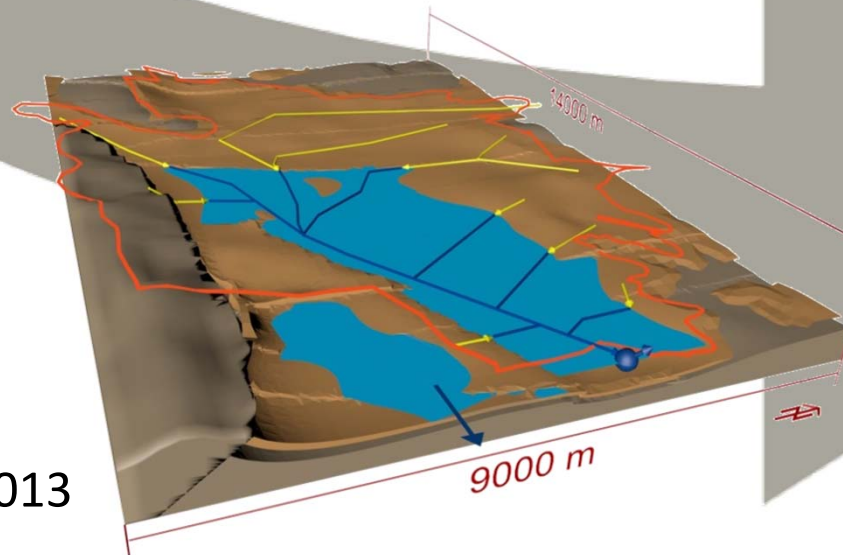
Conclusion



Explicit 3D  
conceptual model  
= KARSYS

Same data,  
new approach

Jeannin et al. 2013



Applications

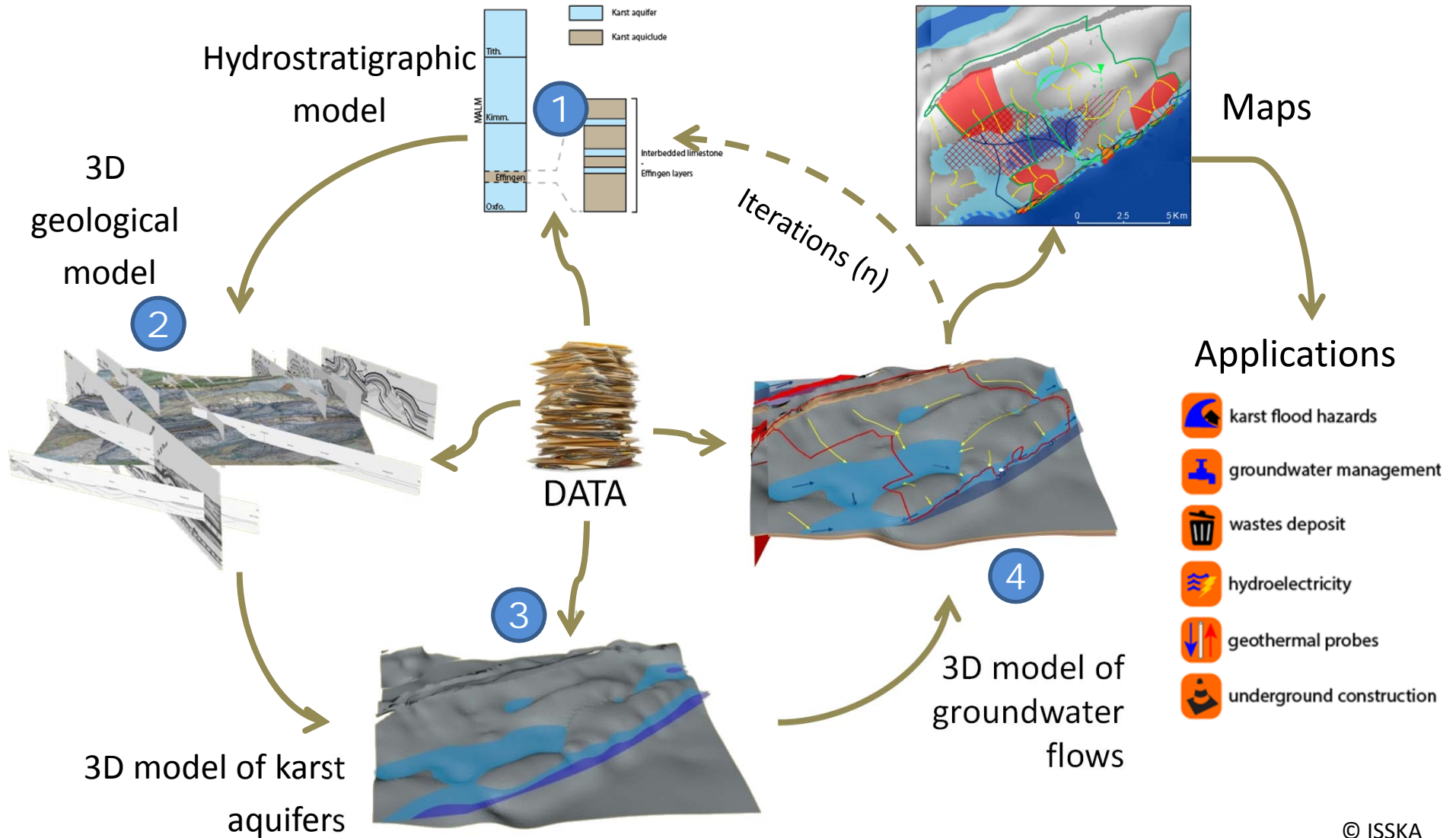
# KARSYS workflow – 4 basic models

Karst issues

KARSYS

Pilot site Burma

Conclusion



# KARSYS → base for many applications

Karst issues

KARSYS

Visual KARSYS

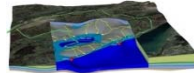
Conclusion

KARSYS  
Express



→ Karst maps

KARSYS  
Original 3D



→ 3D models (see example: [map.geo.admin.ch](http://map.geo.admin.ch))

KARSYS  
Hydrodynamic



→ Hydrological recharge models, hydraulic simulations

KARSYS  
KarstALEA



→ Voids prediction

KARSYS  
Geothermics



→ Prescription for geothermal probes

KARSYS  
Flood hazards



→ Flood risks assessment in karst areas

KARSYS  
Hydropower



→ Assessment of Hydropower potential in karst aquifers

KARSYS  
Sinkholes hazards



→ Prescription for land planning

# KARSYS – increase the dissemination

Karst issues

KARSYS

Visual KARSYS

Conclusion

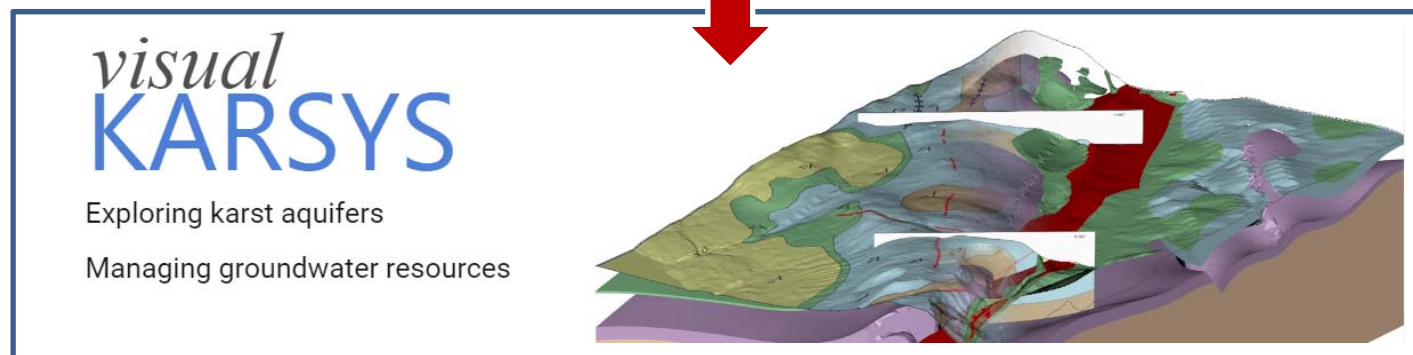
## A powerful approach!

- Various possible extensions
- Increasing demands in CH (KARSYS = awarded as national approach)
- Increasing demands from abroad (Spain, Ireland, France, China, etc.) for applying & training

## But limitations...

- Results transmission and models update = difficult
- Know-how only at SISKKA (a few persons)
- Training takes a long time
- CH costs to apply KARSYS abroad are dissuasive

Solution!



# Coming developments: hydrogeological 3D model

Karst issues

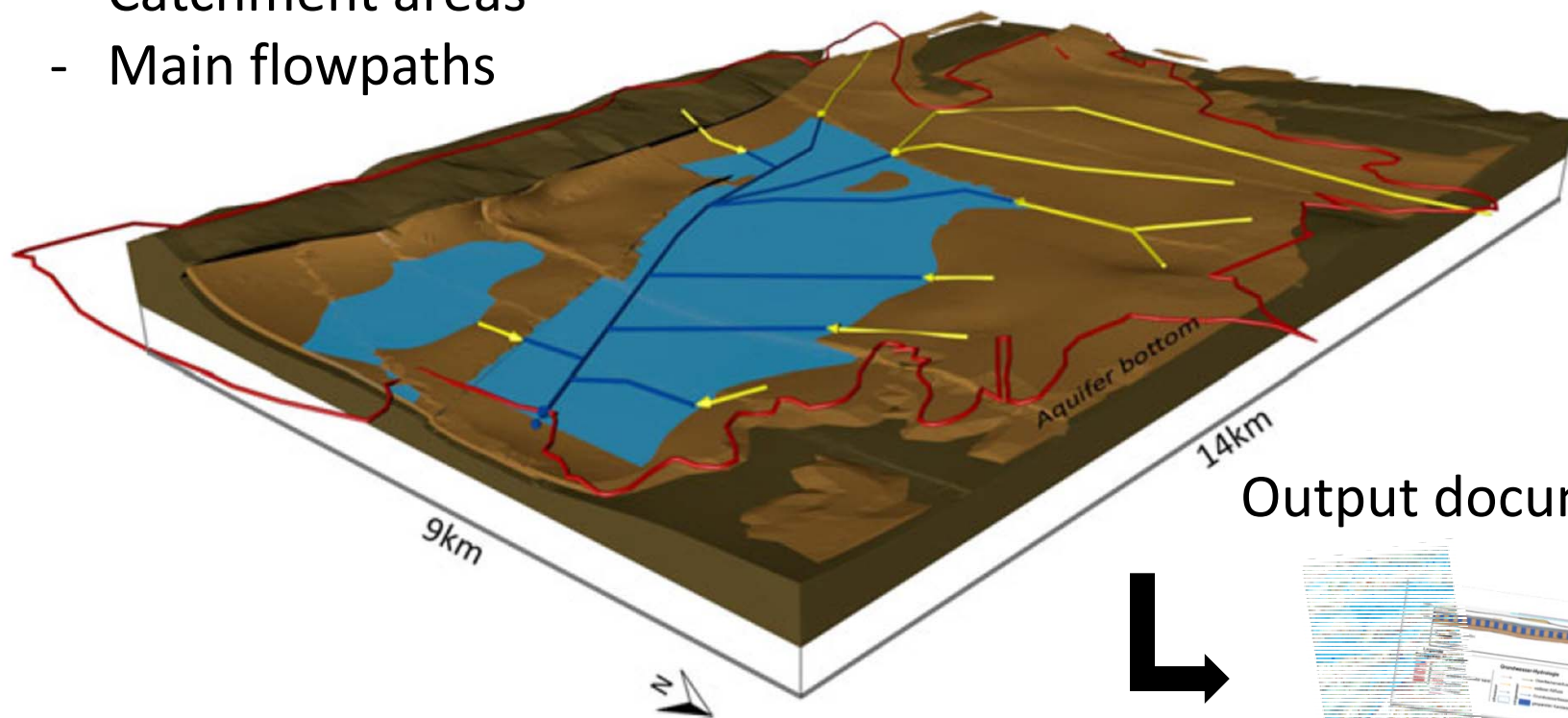
KARSYS

Visual KARSYS

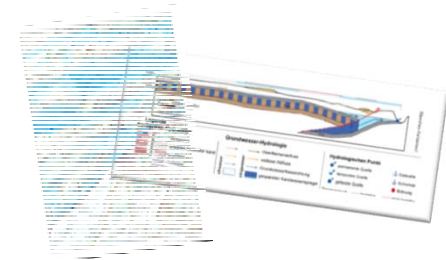
Conclusion

Delineation of:

- Phreatic zones
- Catchment areas
- Main flowpaths



Output documents



# Visual KARSYS → 2019 – What's next?

Karst issues

KARSYS

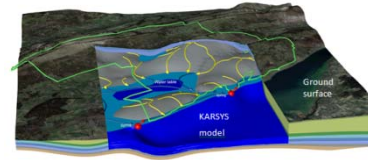
Visual KARSYS

Conclusion

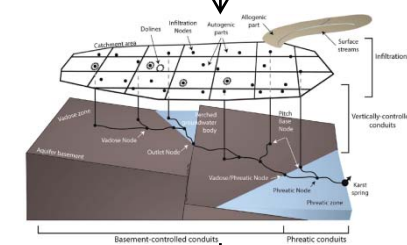
## Additional extensions (post 2019)

- Conduits generating
- Simulation tools
  - Hydrological recharge
  - Hydraulic flows
- decision-support tools
  - KarstALEA (construction)
  - Hazards assessment & other land planning tools
  - Vulnerability, S zones, etc.

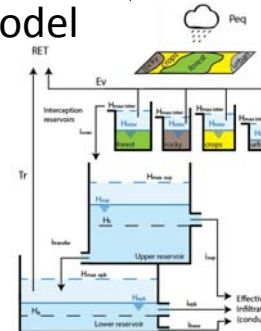
KARSYS model



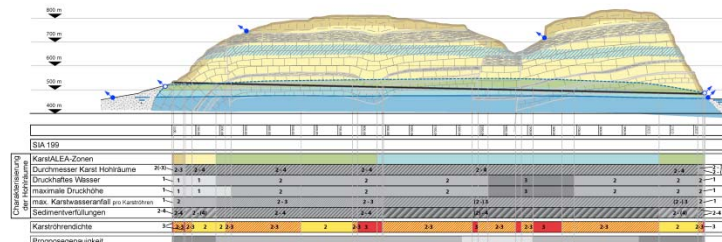
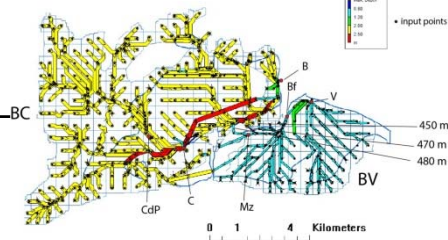
Conduits generating



Recharge simulation model



Hydraulic flows model



Decision-support tools

*Visual*  
**KARSYS**



@Visual\_KARSYS

*Thank you for your attention*

[visualkarsys.isska.ch](http://visualkarsys.isska.ch)



*Sign in!*

*→ Short course Eurokarst Conference, Besançon (FR), July 2018*

**n|w** Fachhochschule  
Nordwestschweiz



INSTITUT SUISSE DE SPÉLÉOLOGIE ET DE KARSTOLOGIE  
SCHWEIZERISCHES INSTITUT FÜR SPELÄOLOGIE UND KARSTFORSCHUNG  
INSTITUTO SVIZZERO DI SPLEOLOGIA E CARSOLOGIA  
SWISS INSTITUTE FOR SPELEOLOGY AND KARST STUDIES