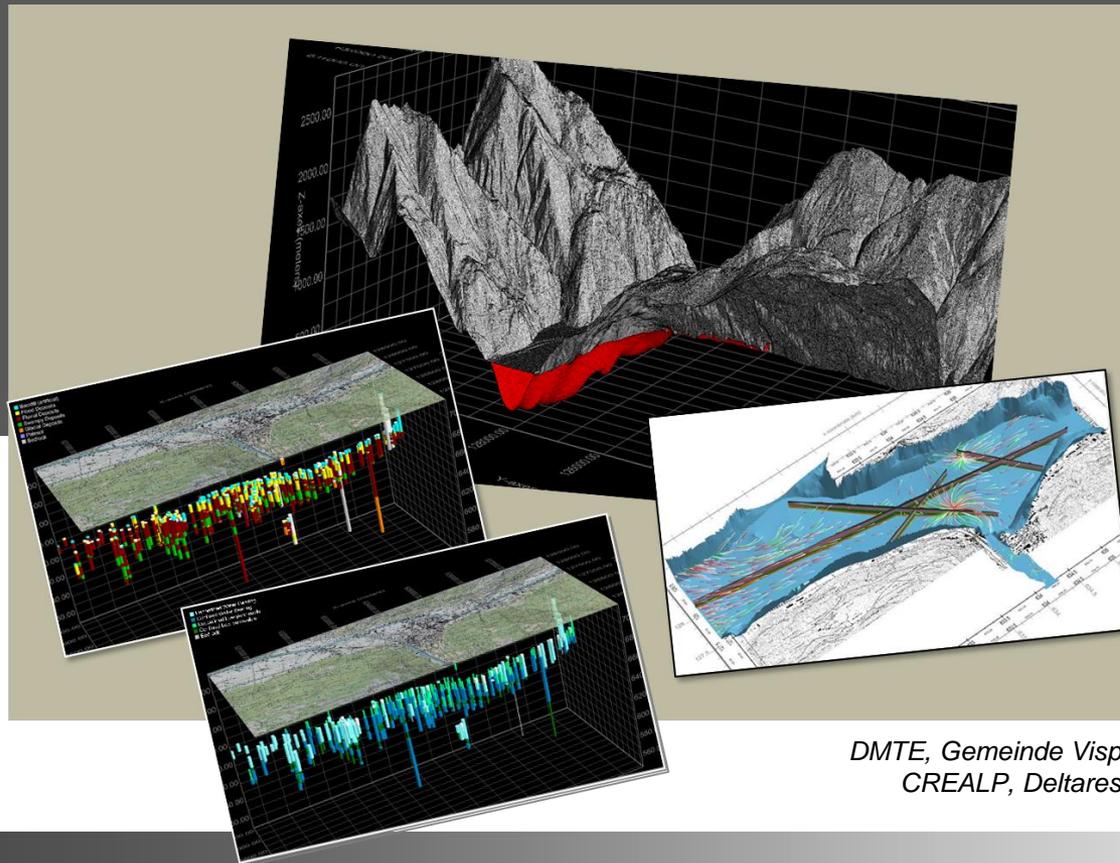




Département de la mobilité, du territoire et de l'environnement
Departement für Mobilität, Raum und Umwelt

CANTON DU VALAIS
KANTON WALLIS

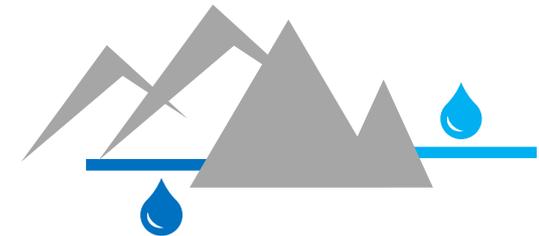
« 3D Modelling of the Rhone valley » – Why?



DMTE, Gemeinde Visp
CREALP, Deltares

Dr Pierre Christe, CHGEOL^{cert}
Service of the Environment
Head Groundwater group

Visp, 22. June 2017





The workshop intends to **exchange information** on:

1. the **different approaches** implemented in numerical modelling (*local vs. regional* models),
2. the **use of models** for different type of studies (i.e. *geological, hydrogeological, seismological, geotechnical and geothermal*),
3. the **interest of 3D models** for land planning issues in the Rhone valley,
4. the possibility to access **basic geological data**.



EarthScienceMatters

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Numerical Modelling...

...**tool** to simulate, highlight and reproduce the mechanisms of a particular system.

- Feasibility Study
- Project Design and Dimensioning
- Impact & Risk: Assessment
Prevention
Management
- Resource Protection
Exploitation
- Decision Making
- Communication



**Legal
constraints**

Coordinating activities over- & underground (LAT / RPG)

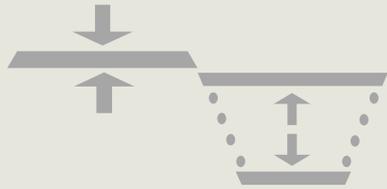
Groundwater protection (LEaux / GSchG)

Responsibility over risk and use (≠ environmental disaster) (LPE / USG)

Breakthrough 3D models...



...to improve the understanding of physical processes in 3D space.



Soil & Subsoil



Surface & Groundwater



Natural Hazards



Energy & Resources

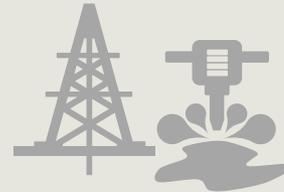
...to better take into account existing practices, uses and heritages.



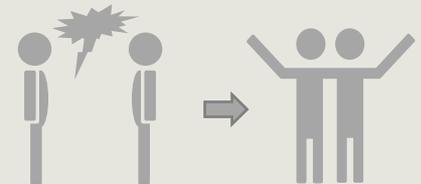
Buildings & Infrastructures



Waste & Contamination



Extraction



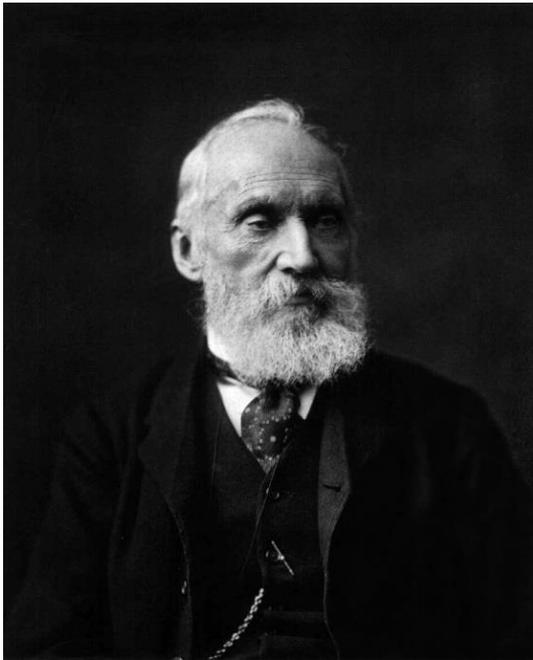
Neighbourhood

Data processing & integration

Observation at different scales (*local / regional*)

Monitoring over different times (→ 4D)

Reducing uncertainties / Preventing conflicts / Anticipating damages



reproduce

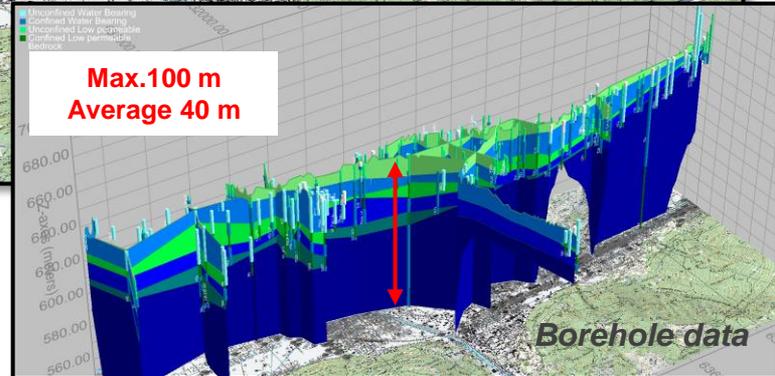
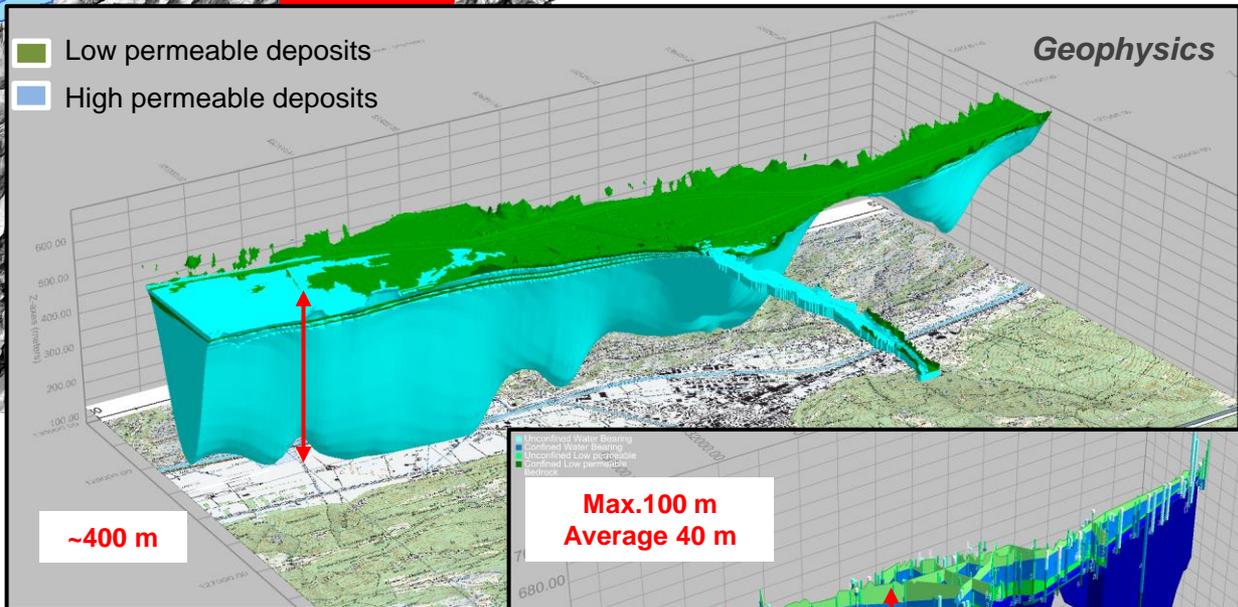
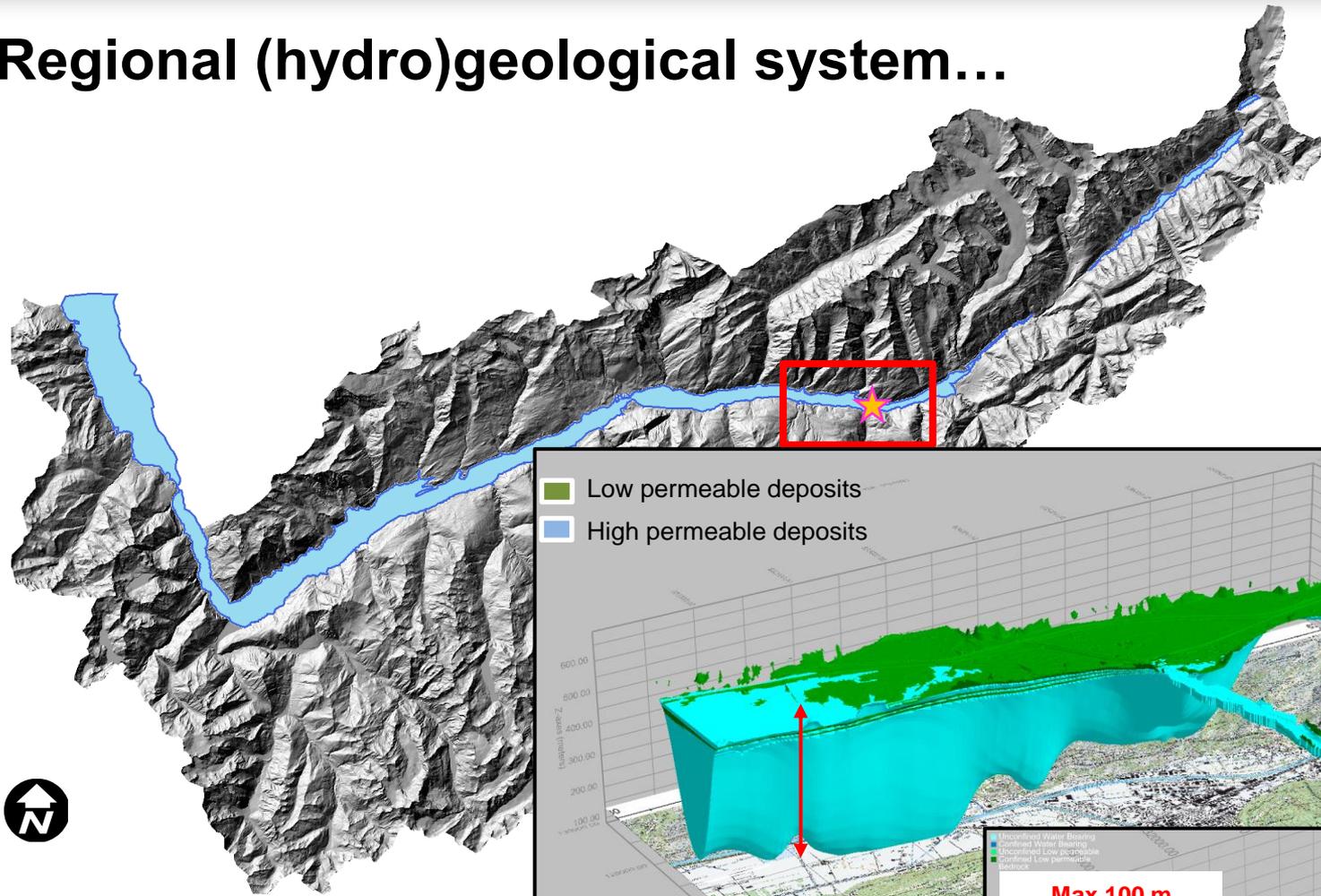
“When you can ~~measure~~ what you are speaking about, and express it in numbers, you know something about it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind.”

reproduce

“If you can not ~~measure~~ it, you can not improve it.”

William Thomson (Lord Kelvin, 1824-1907)

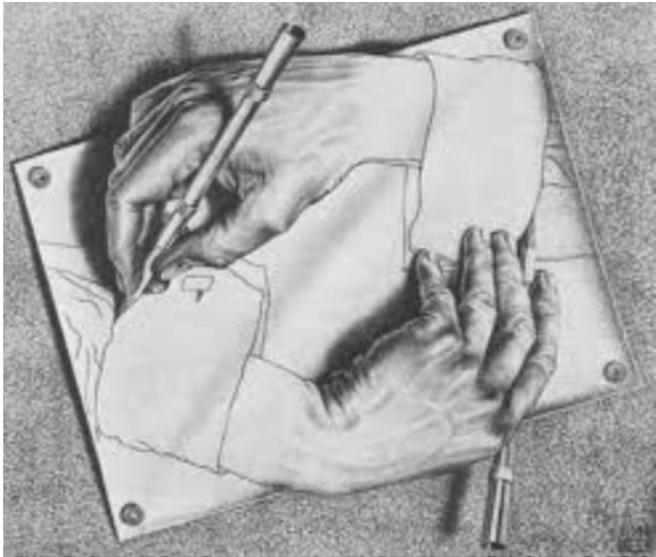
Regional (hydro)geological system...



Current situation



- In recent years, **different 3D models** of the Rhone valley were developed for **different objectives** (i.e. *geological, hydrogeological, seismological, geotechnical and geothermal studies*).
- Each model is based on specific **data sets** that might not be exhaustive. Model calibration might differ (*steady-state / transient*).
- As a result, models might be **incomplete** or even **partially contradictory!**
- **Consolidated regional data sets** were rarely implemented so far.



Drawing Hands, M.C. Escher, 1948

- ✓ **Models could benefit from each other!**
- ✓ **Centralised access to coherent data sets would assist models improvement!**

LONG-TERM VISION

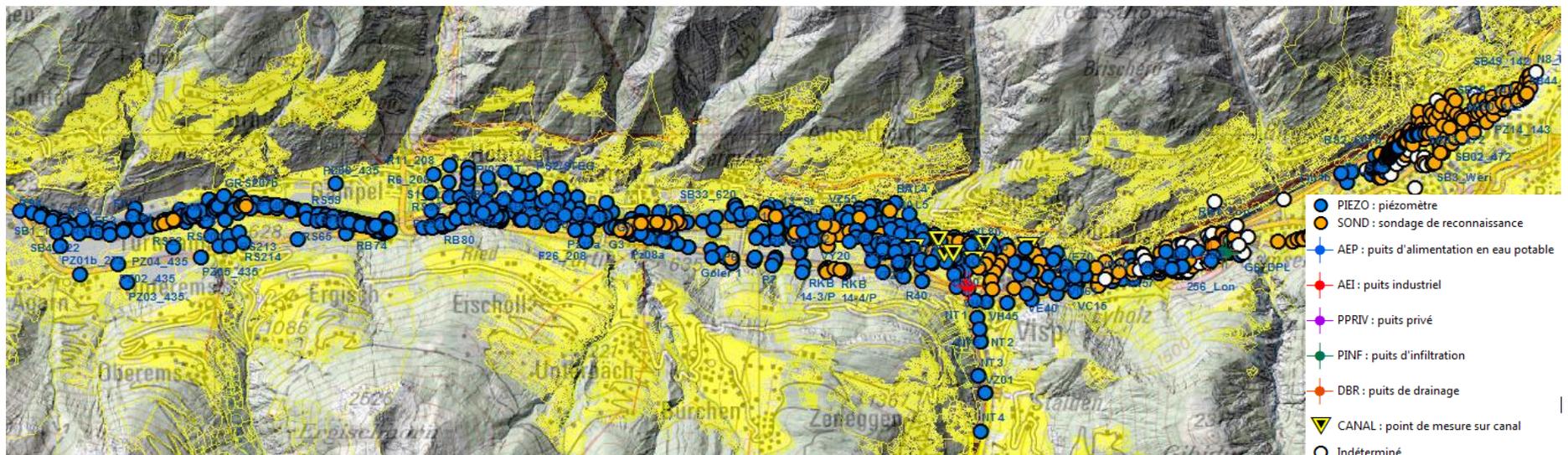
« 3D harmonised model »
for the Rhone Valley
(*interdisciplinary combined approach*)

Constant integration of new data, information and knowledge.

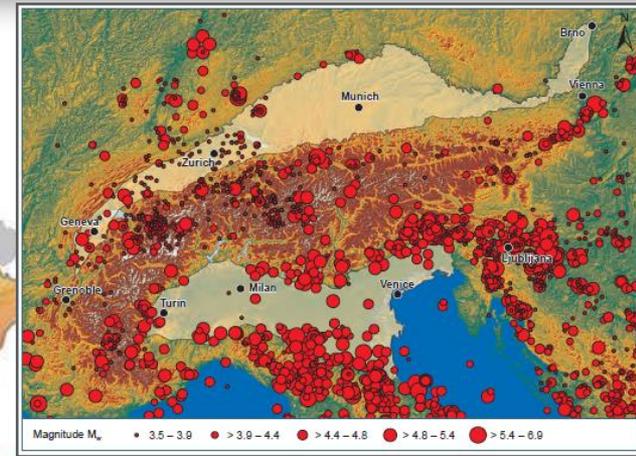
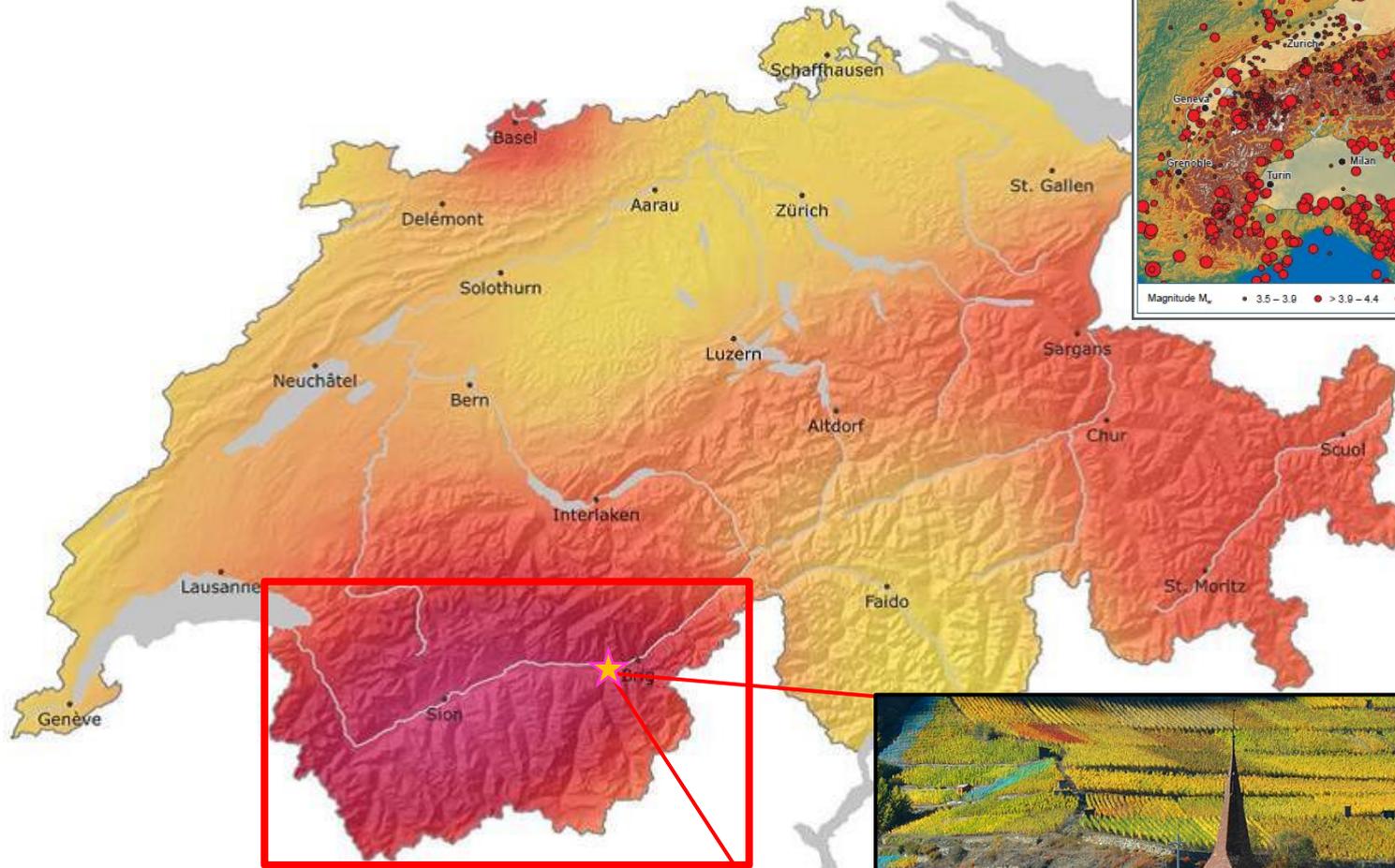
Addressing issues in the Rhone valley



- Manage **groundwater levels** with respect to **existing land use** (*buildings, agriculture / crops, infrastructures, waste disposal sites, etc.*).
- Plan **future land use** with respect to the prevalent **groundwater situation**.
- Quantify effects on the surface and subsurface of **constructions** and **extraction wells** (*drinking water, irrigation, industry, etc.*).
- Determine available **geopotentials** (*e.g. heat & energy*).
- Evaluate groundwater chemistry (*Fe/Mn, spatial heterogeneity, contaminants, etc.*).
- Prepare response to **natural disasters** (*earthquakes, flood, etc.*).



Demonstrator: "Hotspot" Visp

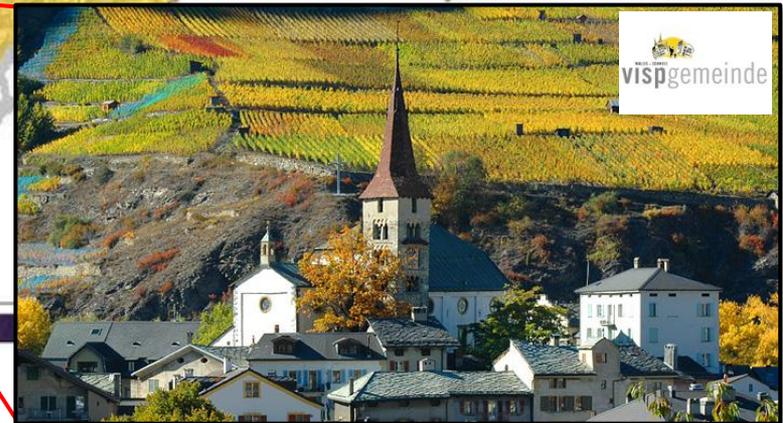


GeoMol Project Report, 2015

Earthquake model 2015



Erdbebengefährdung
 horizontale Beschleunigung bei 5 Hertz
 10 % innerhalb von fünfzig Jahren



weinwanderungen.ch