



Workshop IGEM

# Impact of Groundwater in Earth system Models

**With many thanks!**

# The IGEM research project

- **Co-funded by the French and Taiwanese research agencies**
- **Three main objectives:**
  - Explore the impacts of GW on regional and global climate, and its links to water resources availability, through model analyses
  - Compare the sensitivity of simulated climate to different GW parametrizations within 3 different climate models
  - Consolidate the potential of France and Taiwan in the interdisciplinary research field of the global water cycle

↳ **2 workshops : France 2016 and Taiwan 2018**

# Workshop's overview

- **Goals:**

- Discuss the state of the art and perspectives on the relationships between groundwater and the global water cycle variability,
- By bringing together experts in groundwater modeling, LSM development, interactions between groundwater and climate, and remote sensing

- **28 talks**

- **2 social events**

- Today on the campus
- Tomorrow in the Parc des Buttes Chaumont

# Workshop's overview

- **We also propose 3 round tables**

1. What kind of groundwater model do we need for current climate models?  
What are the pros and cons?

Moderator: Ruby Leung (PNNL)

2. How can we use land surface models to address the issues of groundwater resource? Can we bridge the gap between hydrological and land surface models?

Moderator: Petra Döll (U. Frankfurt)

3. What are the available datasets to support groundwater modeling at the large scales? What is particularly missing?

Moderator: Ying Fan (Rutgers)

- **To be organized at the end of today's morning and afternoon sessions**
- **Group work Tuesday and Wednesday pm**
- **May be the basis of a collective opinion paper (HESS)**

# Practical information

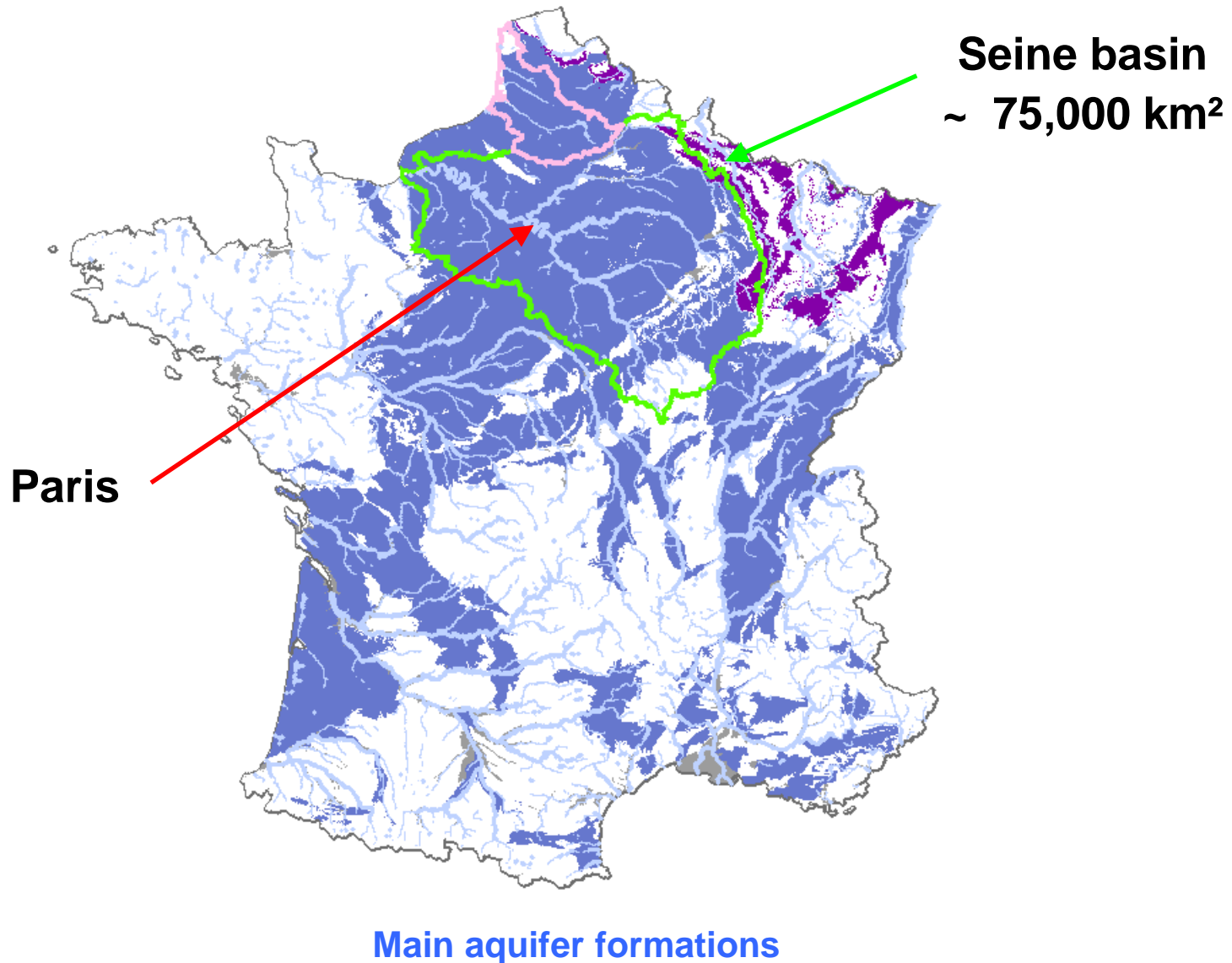
- **Folders and badges**
- **Wifi**
- **If you need help:**
  - Agnès, Ana & Ardalan at workshop
  - Isabelle BAUWE across the hall
  - Valérie GIRARD at 3<sup>rd</sup> floor
- **The UPMC campus**

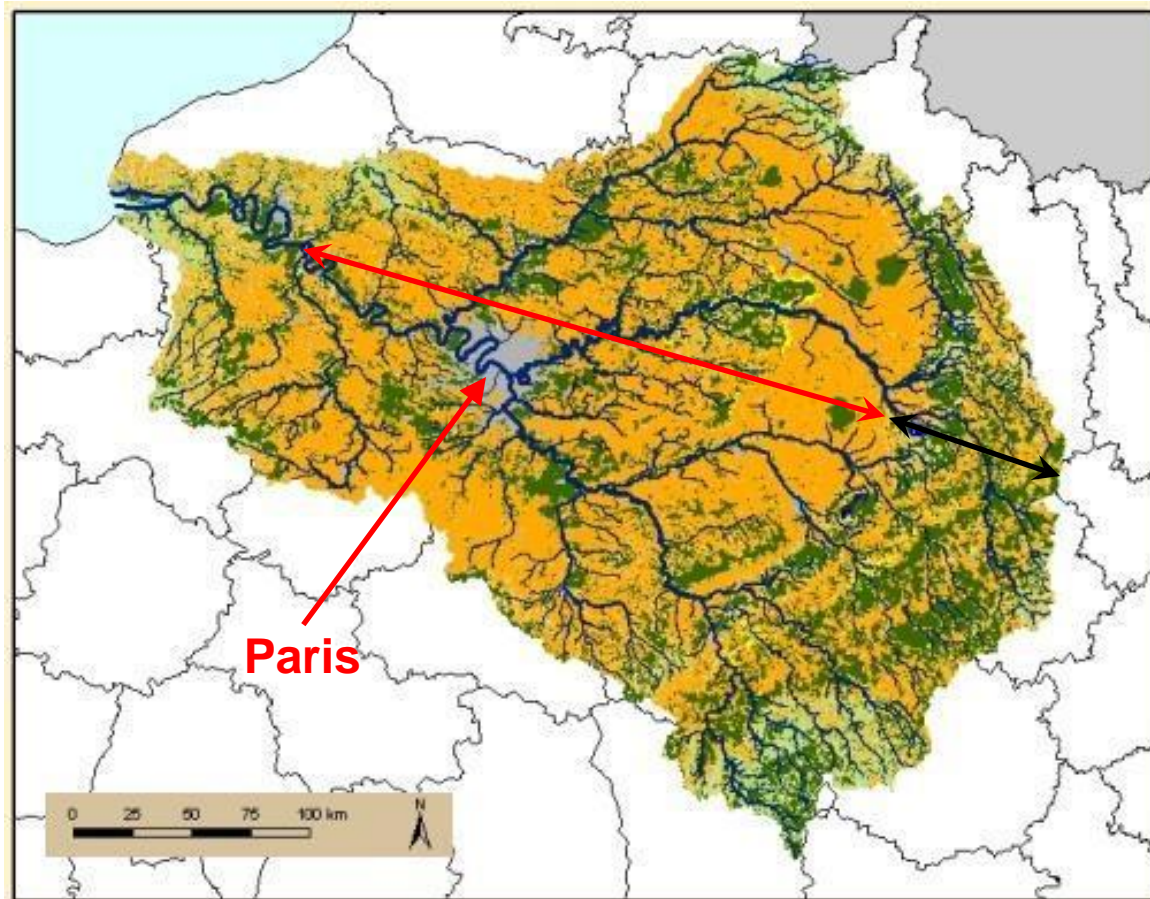
*Just inaugurated  
after 20 years of renovation work!*





# We rest on a complex GW system

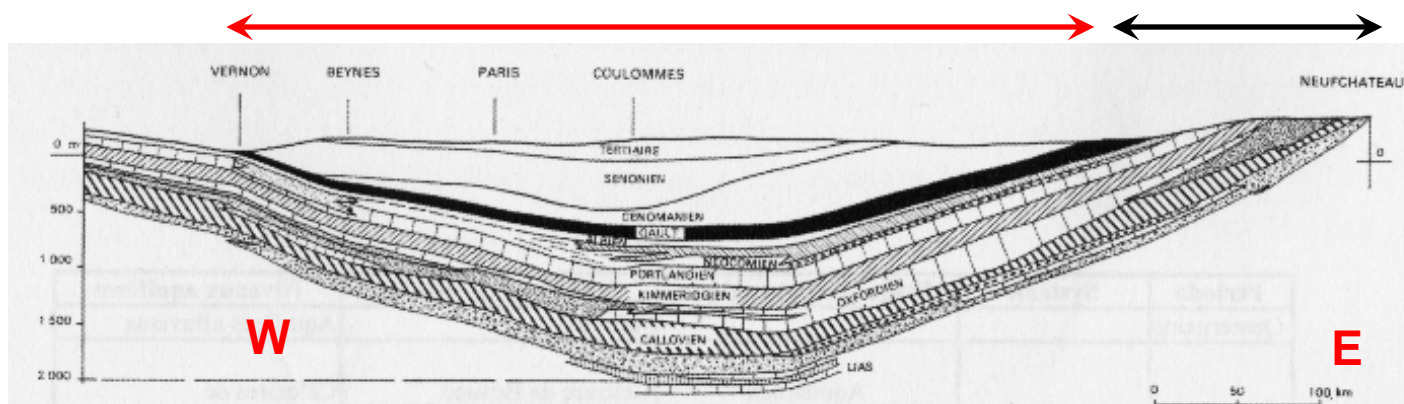




## Land Cover (Corine 2000)



## Geological section





## Monday, Oct 3rd: GW use and properties

11 talks

9h	Welcome+coffee	
9h30	<i>Introduction/Organisation/Round-Tables (RT)</i>	
10h	<b>Aureli</b>	<b>UNESCO: Addressing the Challenge of “Groundwater in a Changing Environment”</b>
10h30	<b>Doell</b>	<b>Impact of human water use on groundwater, and information content of GRACE for understanding groundwater dynamics</b>
11h	<b>Villholth</b>	<b>Large Scale Groundwater Assessments in Context of the Global Water-Food-Climate-Environment Nexus</b>
11h30	<b>Wada</b>	<b>Fate of water pumped from underground and contributions to sea level rise</b>
12h	<i>Discussion around the RT questions</i>	
12h30	Lunch	
14h	<b>Longuevergne</b>	<b>A few notes on GRACE information content for ESM improvement</b>
14h30	<b>Krakauer</b>	<b>Remote sensing for groundwater in the Earth system</b>
15h	<b>Yeh</b>	<b>Dynamics of Daily and Monthly Groundwater Recharge and Baseflow Based on 30-year Observations in Illinois</b>
15h30	Coffee break	
16h	<b>Schneider</b>	<b>Estimation of the base flow characteristic time scale for global applications</b>
16h20	<b>Tootchi</b>	<b>Delineation of groundwater-fed riparian wetlands: challenges and advances for the global scale</b>
16h40	<b>Rashid</b>	<b>Evaluating groundwater balance components as an indicator of over exploited groundwater resource in a semi-arid crystalline aquifer</b>
17h	<b>Habets</b>	<b>AquiFR : a national multimodel hydrogeologic system</b>
17h30	<i>Discussion</i>	
18h	<i>Constitution of RT groups</i>	
18h30	Welcome cocktail: cheese & wine	

## Tuesday, Oct 4th: GW modelling

10 talks

9h	<b>Xie</b>	<b>Effects of anthropogenic water regulation and groundwater lateral flow on land processes</b>
9h30	<b>Maxwell</b>	<b>Connections between groundwater flow and transpiration partitioning</b>
10h	<b>Condon</b>	<b>Evaluating groundwater surface water interactions across the continental US using an integrated hydrologic model</b>
10h30	Coffee break	
11h	<b>Leung</b>	<b>Modeling surface water - groundwater interactions in the ACME Earth System Model</b>
11h30	<b>Yang</b>	<b>Understanding groundwater hydrological coupling in a land surface model based on multi-sensor satellite data assimilation</b>
12h	<i>Discussion</i>	
12h30	Lunch	
14h	<b>Sulis</b>	<b>Groundwater-landsurface-atmosphere simulations: An overview of experiences and results using TerrSysMP</b>
14h30	<b>Hazenberg</b>	<b>Development of a hybrid 3-D hydrological model to simulate hillslopes and the regional unconfined aquifer system in Earth system models</b>
15h	<b>Maquin</b>	<b>An hydrological column model for predicting interactions between water table and evapotranspiration</b>
15h30	Coffee break	
16h	<b>Reinecke</b>	<b>Global-scale gradient-based groundwater modeling within the global hydrological model</b>
16h30	<b>Sutanudjaja</b>	<b>A century-long simulation of terrestrial water storage change and its contribution to global sea-level</b>
17h	<i>Discussion and RT work</i>	
18h30	Departure for the Buttes Chaumont	
19h30	Social dinner at "Le Pavillon du Lac"	

Wednesday, Oct 5th: GW-climate interactions			7 talks
9h	Colin	Modelling of floodplains and aquifers in global climate simulations : evaluation and impact	
9h30	Lo	The contrasting impacts of climate change on groundwater hydrology in the world's major aquifers	
10h	Fan	Groundwater and plant root interactions: Impact on global water and carbon cycle	
10h30	Coffee break		
11h	Ducharne	Groundwater-soil moisture-climate interactions: lessons from idealized model experiments with forced water table depth	
11h30	Lan	Responses of Atmospheric General Circulation to Groundwater	
11h50	Chien	Impacts of groundwater on the atmospheric convection in Amazon using multi-GCM simulations from I-GEM project	
12h10	Wang	Impact of a prescribed groundwater table on the near surface climate in the IPSL land atmosphere coupled model	
12h30	Lunch		
14h	<i>Work in RT groups</i>		
15h30	<i>RT restitutions</i>		
16h30	Closure		