**6th CARGESE school: FLOW and Transport In porous and fractured MEdia (FLOWTIME)**
Linking life supporting functions of the subsurface across disciplines
*10-21 Jun 2024 Cargèse (France)*

**Hand-on on Environmental sensing: from DTS to Plants**

Objectives: The main goal of this session is to learn fundamentals for in-situ environmental sensing. During the first week, you will get an overview of the Distributed Temperature Sensing (DTS) technology and its principles. Furthermore, Interdisciplinary Earth Sciences applications will be presented. (2) During the second week, you will examine wood structure and set up experiments to investigate the properties of the porous nature of wood.

Teachers: John Selker, Bernard Brixel, Maria Klepikova (week 1), Dani Or, Maciej Zwieniecki, Andrea Schnepf (week 2)

Timeframe: Week 1 (DTS):

11/06: free afternoon

12/06: 14:00-14:30 Lecture on applications in hard rocks (Bernard);

14:30-16:30 Going to the site: design a DTS experiment, cable installation (Bernard, Maria)

13/06: 14:00-14:45 Lecture on theory and fundamentals of DTS (John)

14:45-15:45 Fiber optic cable splicing (John, Maria)

15:45-16:30 Set up the instrument (John, Bernard)

14/06: 14:00-14:30 Taking first data (John, Bernard)

14:30-16:00 Data analysis, develop presentation (John, Bernard)

16:00-16:30 Lecture on other applications (John)

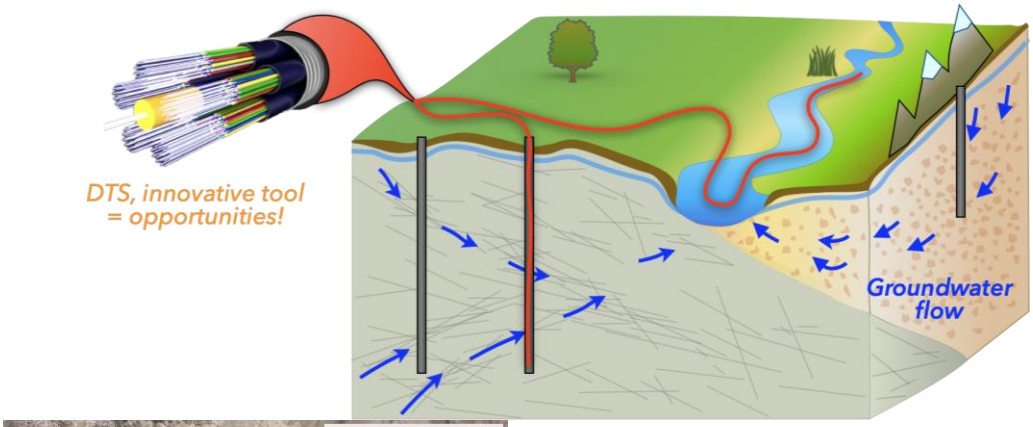



*Figure 1: Different investigation techniques based on the utilization of DTS (heat tracer tests, passive and active DTS measurements) may help to image physical and hydrogeological properties of porous media.*

Week 2 (plants):

17/06: 14:00-16:30 observations and counting of plant stomata to estimate leaf gas exchange resistance (Maciej, Dani)

18/08: 14:00-16:30 practical demonstration of vascular flow in branches (Maciej, Dani)

19/06: Interpretative walk through Mediterranean vegetation highlighting adaptation and water conservations strategies (Maciej, John)

20/06: 14:00-16:30 CPlantBox computational tool for root architecture and water uptake (Andrea)

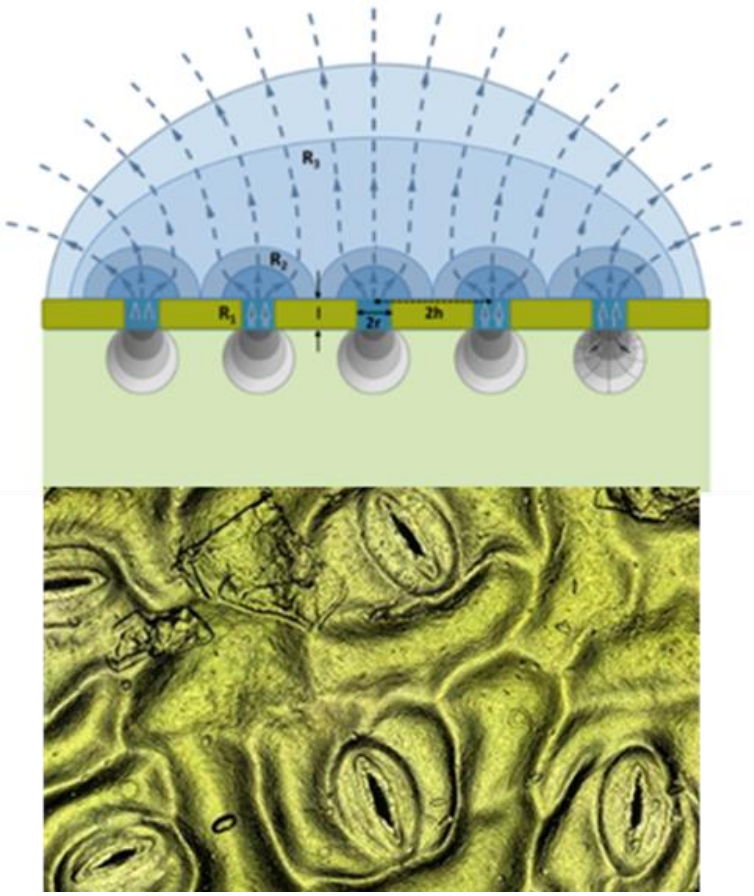


*Figure 2: (bottom) a laser scanning image of stomata on a leaf, and (top) conceptual gas diffusion pathways from the leaf to the atmosphere.*

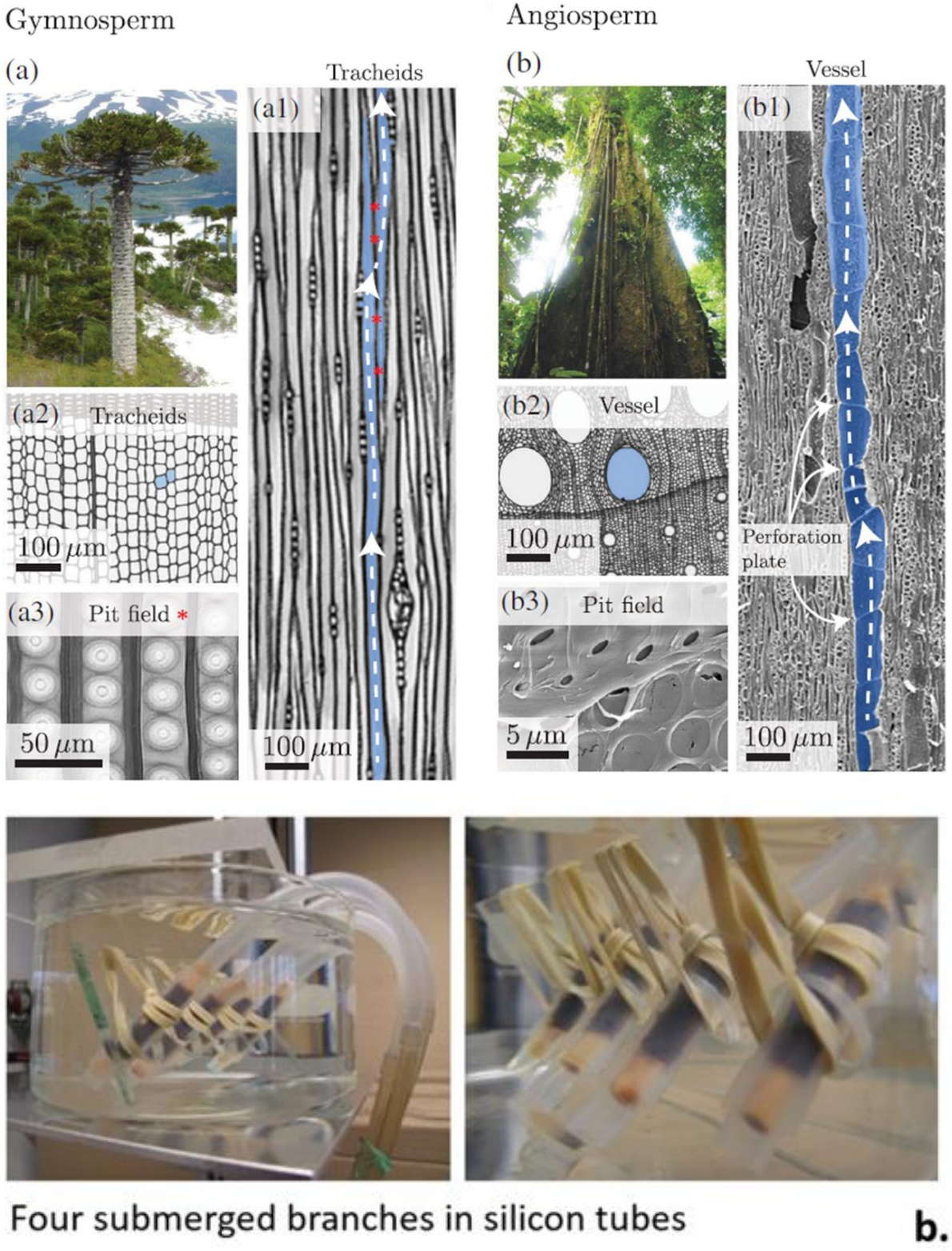


*Figure 3: (top) details of vasculature and water flow in xylem for Gymnosperm and Angiosperm plants, (b) an experiment for measuring flow through branches to estimate the hydraulic conductivity of xylem.*