

# "FLOWPATH 2012" Hydrogeology pathways

I edition

Bologna, June 20th-22nd 2012

Monumental Complex of San Giovanni in Monte Via San Giovanni in Monte, 2 - Bologna, Italy



## DEFINITIVE TIMETABLE OF KEY-NOTE LECTURES (including a short biography of the key-note speakers), ORAL PRESENTATIONS AND POSTERS

Wednesday, June 20<sup>th</sup>

**Key note lecture n°1** - 9.15: "New Applications of Environmental Isotopes in Organic Contaminants Studies in Groundwater". (Ramon Aravena, University of Waterloo).

**Ramon Aravena** is a research professor in the Department of Earth and Environmental Sciences, University of Waterloo, with more than 25 years experiences in the application of isotope and geochemical techniques in hydrology. He has been involved in numerous ground water studies in Latin America, Canada, the U.S. and Europe related to evaluation of ground water resources and groundwater contamination. Dr. Aravena consults as part of the expert pool of the International Atomic Energy Agency, Vienna, Austria, for their projects worldwide. His current research focuses on ground water contamination caused by agricultural, industrial and urban activities.

**SESSION 1: "Aquifer parameterization"** (Conveners / Chairmen: Paolo Fabbri, Vincenzo Piscopo).

**Oral presentations (the names of the presenting authors are underlined)**

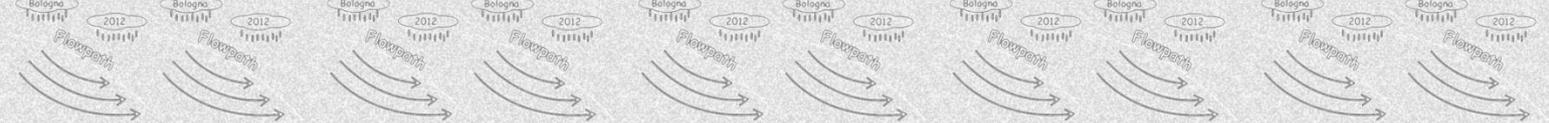
**Act I:** 10.00: "A multidisciplinary approach to the physical and geometrical characterization of multi-layered aquifers" (Fabbrocino S., Di Maio R., **Forte Giovanni**, Piegari E.); 10.15: "Problems in the application of the environmental isotope to the hydrogeological analysis of high mountain aquifers" (**Tazioli Alberto**, Nanni T., Vivalda P. M.); 10.30: "Groundwater monitoring network in the classical karst" (**Zini Luca**, Cucchi F., Calligaris C.); 10.45: "The snow melting process" (**Vigna Bartolomeo**, Banzato C.).

**11.00: Coffee break**

**Act II:** 11.30: "Flow and transport in fractured media at different spatial scales" (**Cherubini Claudia**, Giasi C., Pastore N.); 11.45: "Analysis of borehole dilution tests by a numerical modeling approach" (Ortombina M., Fabbri P., **Piccinini Leonardo**); 12.00: "Borehole flowmeter logging for the accurate design and analysis of tracer test" (**Basiricò Stefano**, Frattini P., Villa A., Godio A., Crosta G. B.); 12.15: "Use of tracer tests for the assessment of the relationship between surface water and drinking-water spring (Quincinetto, Turin)" (Lasagna M., **Clemente Paolo**, De Luca D. A., Dino G. A., Forno M. G., Gattiglio M.).

**Posters (in alphabetical order according with author's surname)**

12.30: "Drainage index calculated with artificial tracers" (Banzato C., Marchionatti F., Vigna B.); "Unconfined and confined aquifers close to the Po river in the Emilia-Romagna region : geological setting and groundwater monitoring" (Biavati G., Guadagnini L., Severi P.); "Flow velocity evaluation with point dilution method using thermic and saline tracers" (Bosio B., Clemente P., De Luca D., Lasagna M.); "Springs as main groundwater dependent ecosystems" (Cantonati M., Gargini A., Segadelli S., Angeli N., Spitale D., De Nardo M. T.); "The groundwater dependent ecosystem of Sagittario river, central Italy: relationships between surface/groundwater and nitrogen cycle" (Caschetto M. C., Barbieri M., Galassi D., Mastroiillo L., Petitta M., Rusi S., Saladini V., Schipani I., Aravena R.); "Vulnerability assessment by fuzzy logic in a coastal aquifer of northern Sicily" (Cimino An., Cimino Ad., Oieni A.); "Climatic change and water resources in central Italy: an update" (Dragoni W., Melillo M., Valigi D., Belardinelli M., Cambi C., Giontella C., Di Matteo L.); "Hydrogeological analysis of land subsidence in the Campanian plain" (Fabbroncino S., Lanari R., Paduano P.); "Hydrogeology of the "maiolica" and "scaglia" carbonatic aquifers in the northeastern flank of mt. Paganuccio (Furlo mountains, Marche, Italy )" (Farina D., Bisiccia C., Severini A.); "Hydraulic behavior of karst aquifers during dry periods" (Fiorillo F.); "The effect of the temperature increase on the aquifer recharge processes" (Fiorillo F., Pagnozzi M.); "Cost- and time-effective methodology to evaluate aquifer parameters in coastal aquifers" (Giambastiani B. M. S., Colombani N., Mastrocicco M., Severi P.); "Conceptualization and parametrization of a karst aquifer using long term monitoring data and quantitative hydrogeology: the Acque Albule case" (La



Vigna F., Mazza R., Capelli G.); [“Hydraulic conductivity distribution and hydrogeological behaviour of some aquitards in southern Italy”](#) (Petrella E.); [“Groundwater field measurements for stream seepage estimation”](#) (Vettorello L., Berti M., Pedron R., Sottani A.); [“Parameterization of hard rock aquifers in the Romagna sector of northern Apennines, Ravenna and Forlì-Cesena provinces \(Italy\)”](#) (Vincenzi V., Gargini A., De Nardo M. T., Zani O.); [“Resurgence belt discharge as environmental indirect indicator”](#) (Zini L., Calligaris C., Treu F.).

**Key note lecture n°2** - 15.00: [“Contaminant Plume behaviour in fractured sedimentary rock”](#) (Beth Parker, University of Guelph).

**Beth Parker**, PhD is a Professor at the School of Engineering, University of Guelph, Ontario, Canada and has been awarded the Natural Sciences and Engineering Research Council of Canada Industrial Chair in Fractured Rock Contaminant Hydrogeology. She has more than 30 years of experience investigating subsurface contamination at numerous sites around the world. Her current research activities emphasize field and laboratory studies of industrial contaminants in sedimentary rocks, clayey deposits and sandy aquifers, and focus on the effects of diffusion in low permeability zones, plume attenuation and hydrogeologic controls on remediation. She is currently involved in research and technology demonstration projects at Superfund and RCRA facilities in the United States and similar sites in Canada, Europe and Brazil. She also received the 2009 John Hem Award from the Association of Groundwater Scientists and Engineers of the United States National Groundwater Association.

**SESSION 2: “Contaminant transport in groundwater”** (Conveners / Chairmen: Fulvio Celico, Marco Petitta).

**Oral presentations (the names of the presenting authors are underlined)**

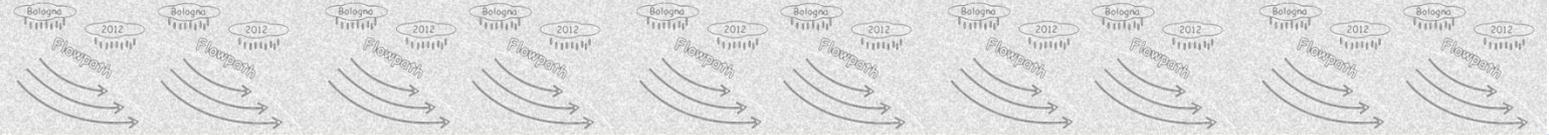
**Act I:** 16.00: [“Single and dual-domain models for the interpretation of numerical transport experiments in alluvial sediments”](#) (**Baratelli Fulvia**, Cattaneo L., Vassena C., Giudici M., Parravicini G.) - 16.15: [“Anaerobic transformation of chlorobenzene in highly contaminated groundwater”](#) (**Schmidt Marie**, Wolfram D., Klein B., Devakota S., Birkigt J., Richnow H. H., Nijenhuis I.) - 16.30: [“Arsenic mobility under anaerobic conditions – a laboratory study”](#) (Accoto V., Bullo P., **Piccolo Sabrina**.) - 16.45: [“Long term monitoring of chlorinated solvents using carbon isotopes: effects of source removal and natural attenuation”](#) (**Marchesi Massimo**, Palau J., Aravena R., Otero N., Soler A.).

**17.00: Coffee break**

**Act II:** 17.30: [“Characterizing origin and fate of groundwater nitrate contamination \(Catalonia, NE Spain\) using multi-isotopic data”](#) (Puig R., **Otero Neus**, Torrentò C., Folch A., Menciò A., Widory D., Soler A., Mas-Pla J., Bach J.) - 17.45: [“Polluted aquifer inverse problem solution using artificial neural networks”](#) (**Foddìs Maria Laura**, Ackerer P., Montisci A., Uras G.) - 18.00: [“Characterization and modeling of a BTEX plume originated by a sulphur rich NAPL source”](#) (Mastrocicco M., **Colombani Nicolò**, Gargini A.) - 18.15: [“Geostatistics simulation of hydraulic conductivity field applied on groundwater flow and transport modeling in heterogeneous aquifer”](#) (**Carloni Andrea**, Cappucci S., Maffucci M., Guastaldi E., Gallo C.).

**Posters (in alphabetical order according with author’s surname)**

18.30: [“Application of the integral pumping test method in north-east area of Milan for contaminants source identification”](#) (Alberti L., Cantone M., Lombi S., Zanini A.); [“Application and comparison among three methodologies to calculate aquifer vulnerability in a municipality of Vercelli province \(Piedmont - Italy\)”](#) (Amanzio G., Suozzi E., Ghione R., Zhao Y., De Maio M.); [“Automated multi parameters monitoring as indicator of groundwater inflow”](#) (De Zorzi N., Bertoldo S., Pedron R., Sottani A.); [“Water flow and transport of hexavalent chromium in unsaturated soil and remediation by “soil flushing””](#) (Ghirardi C., Beretta G. P.); [“Ammonia fate transport from landfill leachate and flowpath numerical modeling: a case-study of Alice Castello landfill \(Italy\)”](#) (Lazovic N., Bretti V., Nanni D., Carucci V.); [“Hydrodynamic and isotopic characterization of a site contaminated by chlorinated solvents: Chienti river valley, central Italy”](#) (Pacioni E., Petitta M., Corvatta G., Fanelli M., Aravena R.); [“Iron, manganese and boron distribution in the Abruzzo region groundwaters”](#) (Palmucci W., Rusi S.); [“First results of the characterization of some heavy metals concentration in an industrialised area at north of Rome”](#) (Sappa G., Trotta A., Vitale S.).



Thursday, June 21<sup>st</sup>

**Key note lecture n°3:** 9.00: "Recent advancement of the research in karst hydrogeology" (Nico Goldscheider, University of Karlsruhe).

*Nico Goldscheider, Professor for Hydrogeology and Director of the Institute of Applied Geosciences at the Karlsruhe Institute of Technology (KIT\*) in Karlsruhe, Germany. Chairman of the Karst Commission of the International Association of Hydrogeologists (IAH). Expert for karst hydrogeology, tracing techniques, ecological and microbiological aspects of groundwater research, groundwater protection and water-quality monitoring.*

**SESSION 3: "Hydrogeological and hydrochemical modeling"** (Conveners / Chairmen: Marco Masetti, Marco Tallini).

**Oral presentations (the names of the presenting authors are underlined)**

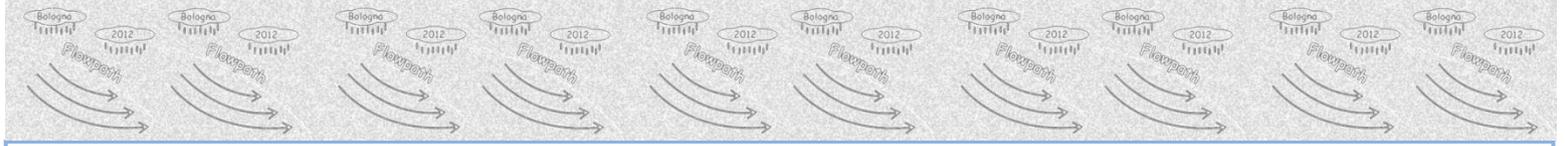
**Act I:** 10.00: "Modeling groundwater flow in heterogeneous media with YAGMod" (Cattaneo Laura, Giudici M., Vassena C.) - 10.15: "The GIS embedded SID&GRID hydrological model" (Rossetto Rudy, Borsi I., Schifani C.) - 10.30: "Groundwater flow model management: examples in Emilia-Romagna (Italy)" (Chahoud Andrea, Gelati L., Palumbo A., Patrizi G., Pellegrino I., Zaccanti G.) - 10.45: "The alluvial aquifer of the river Roja in Ventimiglia Numerical flow modelling in temporary regime and instructions concerning transportation" (Capacci Fausto, Migliorini J., Barazzuoli P., Rigati R.).

**10.45: Coffee break**

**Act II:** 11.30: "Modeling the impact of dewatering in the Acque Abule basin (Tivoli, Italy): options for a more sustainable groundwater use" (Brunetti Elio, Jones J., Petitta M., Rudolph D., Bianchi Fasani G., Esposito C., Prestininzi A.) - 11.45: "Analysis of the interactions between overlapping aquifers in the Viterbo hydrothermal area (central Italy) from pumping tests" (Baiocchi A., Lotti Francesca.) - 12.00: "Numerical modeling to support the management of coastal karstic aquifer (Salento)" (Polemio M., Romanazzi Andrea.) - 12.15: "Groundwater vulnerability assessment using positive and negative weights-of-evidence methods to correct for sampling bias" (Sorichetta Alessandro, Robinson G. R.).

**Posters (in alphabetical order according with author's surname)**

12.30: "Impact of the NAO on the hydrological cycle of karst aquifers in southern Apennines" (Allocca V., De Vita P., Manna F.); "Preliminary relation between different spring vulnerability methods applied on two alpine springs (regione autonoma Valle D'Aosta)" (Amanzio G., Suozzi E., Crepaldi S., De Maio M.); "Numerical simulation of vertical flow within monitoring wells in a sloping layer" (Basiricò S., Villa A., Crosta G. B., Frattini P.); "Preliminary groundwater model of the Aosta valley aquifer (northern Italy)" (Bonomi T., Fumagalli L., Capodaglio P.); "Activities of the Arno River Basin Authority to support the Environmental Observatory AV Florence as regards to the modeling of groundwater flows in the Florentine subsoil" (Brugioni M., Consumi F., Sulli L.); "Groundwater movement in a terraced slope: comparison of the results of two different scale models" (Camera C., Apuani T.); "Modeling groundwater recharge in an alluvial aquifer of Somaliland with the new groundwater flow model YAGMOD" (Cattaneo L., Vassena C., Giudici M., Petrucci B.); "Groundwater modelling application: an operating tool in groundwater resource evaluation" (Chahoud A., Gelati L., Zaccanti G.); "A 3D hydrostratigraphic modeling to aquifer features assessment in an urban environment" (Ducci D., Sellerino M.); "Data-driven modelling applied to multiple groundwater scenarios" (Doglioni A., Simeone V.); "TRIAD approach in Italy" (Falconi M.); "Interpretation of hydrogeochemical data of the western Po Plain (Piedmont) based on the theory of metamorphization of chemical composition of water" (Fetisov V., De Maio M.); "Modelling the carbonatic aquifer system of Salento (Puglia, southern Italy): a sensitivity analysis" (Giudici M., Margiotta S., Mazzone F., Negri S., Vassena C., De Filippis G.); "Vertical thermal aquifer stratification related to an open-loop ground-water heat pump system: numerical modeling results and experimental evidences" (Lo Russo S., Taddia G., Gnani L., Rocca E.); "Hydrogeological characterization of volcanic areas: the Sabatini volcanic complex" (Manca F., Viaroli S., Mazza R.); "Hydrological changes due to the Irpinia earthquake, Cervialto M. aquifer numerical model, preliminary results" (Mariani I., La Vigna F., Mattei M., Tallini M.); "Temporal evolution of the volumetric water content profile in a homogeneous soil layer from analytical solutions" (Menziani M., Pugnaghi S., Vincenzi S.); "Large scale 3D groundwater flow modeling in fractured rocks: the case of Mt. Amiata volcanic aquifer (southern Tuscany, Italy)" (Nocchi M., Salleolini M.); "Maintenance and rehabilitation of an infiltration gallery for water supply based upon hydrogeological investigation and numerical model" (Panini G., Cingi M., Pedrazzoli P., Voltolini C.); "A semi-automatic method in ground water modelling calibration" (Patrizi B.); "A new hydrothermal conceptual and numerical model of the Euganean geothermal system - NE Italy" (Pola M., Fabbri P., Zampieri D.); "The contribution of shallow electrical and seismic imaging to the study of the hydrogeology of mud volcanos: an example from Abruzzo" (Rainone M. L., Rusi S., Signanini P., Torrese P.);



[“Preliminary conceptual model of groundwater contamination by Mn, Fe, & As in a multi-layer alluvial aquifer, the case study of Cremona \(northern Italy\)”](#) (Rotiroti M., Bonomi T., Fumagalli L.); [“Considerations on hydrogeochemical characteristics of groundwater from carbonate aquifers of southern Latium region”](#) (Sappa G., Ergul S., Ferranti F.); [“Bias between flowmeter measurements and numerical model in a contaminated coastal aquifer”](#) (Colombani N., Sbarbati C., Masticco M., Petitta M.); [“Modeling riverbank infiltration into an unconfined aquifer in central Italy: evidences and remarks from <sup>222</sup>Rn and hydrochemical tracers”](#) (Stellato L., Marzaioli F.).

15.00: “Early report on hydrogeological and geotechnical effects caused by the earthquake in Emilia-Romagna Region on May 2012” (Bertolini Giovanni - Geological, Seismic and Soil Service, Emilia-Romagna Region).

**Key note lecture n°4** - 15.30: “Role of aquitards in groundwater flow systems” (John Cherry, Director of University Consortium for Groundwater Contamination Research, Canada).

**John A. Cherry** is a hydrogeologist who holds geological engineering degrees from the University of Saskatchewan and University of California, Berkeley, and earned a PhD in hydrogeology from the University of Illinois in 1966. He joined the faculty at the University of Waterloo in 1971 for field research on the migration and fate of contaminants in groundwater and their remediation. He retired from Waterloo in 2006, where he is now a Distinguished Professor Emeritus. He co-authored the textbook “Groundwater” with R.A. Freeze (1979), which is still in print, and co-edited and co-authored several chapters in the book “Dense Chlorinated Solvents and Other DNAPLs in Groundwater” (1996). He has participated in the development of technologies for groundwater monitoring and remediation, co-holds several patents, is a Fellow of the Royal Society of Canada and has received awards from scientific and professional societies in Canada, the U.K. and the United States, most recently from the California Groundwater Resources Association. He held the Research Chair in Contaminant Hydrogeology at the University of Waterloo from 1996 to 2006 and currently, as an Adjunct Professor, is the Director of the University Consortium for Field-Focused Groundwater Contamination Research, established in 1988 at the University of Waterloo and now based at the University of Guelph, Guelph, ON, and he is an Honorary Professor at the University of Hong Kong.

**Final Open Session** – 16.30: “Defining flowpaths in Hydrogeology: research development”, with the attendance of the 4 key-note speakers (Chair: Alessandro Gargini).