



<b>Advances in Nonlinear and Linear Solvers for Water Resources Applications</b>													
Conveners: Carol Woodward, Lawrence Livermore National Laboratory, and Mario Putti, University of Padua													
<b>Room: Technology</b>													
<b>Tuesday, June 19, AM-1</b>													
9:40		Walker											Anderson Acceleration: Algorithms and Implementations
10:00		Woodward											Anderson Acceleration of Modified Picard Iteration for Variably Saturated Flow
10:20		White											A scalable nonlinear solver for modeling coupled hydromechanical processes i
<b>AM-2</b>													
11:00		Bergamaschi	(Mario Putti to present)										Low rank acceleration of symmetric/nonsymmetric preconditionersfor the nonlin
11:20		Ferronato	(Castelletto to present)										Block FSAI Performance with Graph Partitioning in Large Size Subsurface Pro
11:40		Thum											The Algebraic Multigrid Method (AMG) for the Acceleration of Advanced Groun
12:00		Nguyen											Adaptive Accuracy Control of Nonlinear Newton-Krylov Methods for Multiscale
<b>PM-1</b>													
2:20		Mills											Solver strategies to ameliorate barriers to scalable performance for subsurface
2:40		Ababou											Numerical Analyses of Nonlinear (Semi)Discrete Richards Equation for Finite D
3:00		Hannoun											Simulating Non-Dilute Transport in Porous Media Using a TCAT-Based Model
<b>PM-2</b>													
3:40		Jenkins											Mass Conserving Schemes for Saturated Groundwater Flow
4:00		Saibaba											Dimensionality reduction in the Geostatistical approach for Hydraulic Tomograp
4:20		Miglio											LEVEL SET IMMERSSED BOUNDARY METHOD FOR THE SOLUTION OF SHA
4:40		Sandve											Mass conservative domain decomposition for fractured porous media
5:00		Aricò	(Tucciarelli to present)										A novel procedure for the solution of heterogeneous anisotropic transportproble

**Advancing the Prediction Skill and Efficiency of Flood Inundation Models in a Data-Rich Environment: Algorithm Design, Meshing, Coupling and Paramete**

Conveners: Brett Sanders, UC Irvine, and Paul Bates, Bristol University

Featured Speakers: Guy Schumann, University of Bristol; Ryota Tsubaki, Hiroshima University

**Room: Quad**

**Monday, June 18, PM-1**

2:10		Guy Schumann (Invited)	Assessing forecast skill of a large scale 2D inundation model of the Lower Zambezi River with multiple
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2:30		Jochen Schubert	Building treatments for urban flood inundation models and implications for predictive skill and modelin
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2:50	Riadh	Ata	A WAF scheme for shallow water equations with source terms and pollutant transport on unstructur
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**PM-2**

3:30		Ryota Tsubaki (Invited)	Structure of inundation flow over complex topography
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3:50		Timu Gallien	Flood Prediction in an Urbanized Embayment: Advancing the predictive skill of urban flood models th
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4:10		Mustafa Altinakar	GIS-Based Decision Support System for Integrated Two-Dimensional Flood Analysis and Consequen
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4:30		Cesar Simon	Coupling of 1D and 2D hydrodynamic equations for stream and floodplain interaction
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4:50		Nigel Wright	Analysing the Uncertainty from using Different Representations of Physical Processes in Inundation
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<b>Applying High-Performance Computing for Scientific Discovery within Real-World Problems</b>												
Glenn Hammond, Pacific Northwest National Laboratory, and Haibing Shao, Helmholtz Center for Environmental Research - UFZ												
<b>Room: Technology</b>												
<b>Wednesday, June 20, PM-1</b>												
2:20		Michael Commer		MPiTOUGH2-EMGeo – A massively parallel data inversion framework for joint hydrogeophysical real-								
2:40		Vicky Freedman		Simulation of Technetium-99 migration at the Hanford BC Cribs Site Using HPC								
3:00		Glenn Hammond		The role of HPC on subsurface simulation of U(VI) transport at the Hanford 300 Area								
<b>PM-2</b>												
3:40		Satish Karra		Modeling Enhanced Geothermal Systems using the Massively Parallel Sub-surface Reactive Flow an								
4:00		Jitu Kumar		Contaminant plume modeling at Oak Ridge Integrated Field Research Challenge site using High Perf								
4:20		Alexis Navarre-Sitchler		Metal Release and Transport in Potential Drinking Water Aquifers Impacted by Stored CO2								
4:40		Haibing Shao		High-performance computing techniques applied to the characterization and optimization of a thermo								
5:00												
<b>Thursday, June 21, AM-1</b>												
9:40		Scott Small		An Asynchronous Solver for Differential Equations Arising from River Basin Models								
10:00		Velimir (Monty) Vesselinov		Agni: Coupling Model Analysis Tools and High-Performance Subsurface Flow and Transport Simulat								
10:20		Enrique Vivoni		Real-world Hydrologic Assessment of a Fully-Distributed Hydrological Model in a Parallel Computing								

<b>CO2 Sequestration</b>			
Conveners: Ruben Juanes, MIT, and Holger Class, University of Stuttgart			
Featured Speaker: Jan M. Nordbotten, University of Bergen			
<b>Room: Lincoln</b>			
<b>Monday, June 18, PM-1</b>			
2:10	Nordbotten (invited)		Novel approaches for modeling migration and trapping at geologic s
2:30	MacMinn		Gravity currents arrested by convective mixing
2:50	Castelletto		CO2 Geological Sequestration: a Numerical Study in a Real Multi-C
<b>PM-2</b>			
3:30	Szulczewski		Convective mixing at late times: simulations and experiments
3:50	Gasda		Effective Models for CO2 Migration in Geological Systems With Var
4:10	Martinez		Coupled Multiphase Flow and Geomechanics for Analysis of Capro
4:30	Tao		Estimating Wellbore Permeability of Potential CO2 Leakage Pathwa
4:50	Walter		Modeling concepts to address risk of brine infiltration into shallow gr
<b>Tuesday, June 19, AM-1</b>			
9:40	Neuweiler		A multi-rate dual porosity model for improved simulation of immiscib
10:00	Mehmani		A Multiscale Approach to Upscaling Multi-Species Reactive Transp
10:20	Ravi Ganesh		Characterizing small-scale migration behavior of sequestered CO2 i
<b>AM-2</b>			
11:00	Backhaus		Laboratory Measurements of Large-Scale Flows in Carbon Sequest
11:20	Fu		Three dimensional high-resolution simulation of convective mixing
11:40	Elenius		Impact of tight horizontal layers on dissolution trapping in geological
12:00	Riaz	(given by D. Daniel)	Natural Convection in Saline Aquifers with Heterogeneous Permeab
<b>PM-1</b>			
2:20	Li		Modeling Fine-scale Capillary Heterogeneity in Multiphase Flow of C
2:40	Javaheri		Counter-Current Relative Permeability and Immobilization of CO2 in S
3:00	Zhao		Capillary Pinning of CO2 Gravity Currents
<b>PM-2</b>			
3:40	Tchelepi	(given by Wang )	Nonlinear solver based on flux-function trust-regions for accurate m
4:00	Hidalgo		Effect of heterogeneity on the miscible displacement of fluids
4:20	Karvounis		Modeling Flow and Transport during Enhancement in EGS Reservo
4:40	Scotti		An unfitted method for two-phase flow in fractured porous media
5:00	Lu		Model for CO2 leakage through a fault with multiphase and non-isot
5:20	Lomov	(ezzedine presents?)	Uncertainty Quantification in Three dimensional Flow, Transport and
<b>Wednesday, June 20, AM-1</b>			
9:40	Sykes		The Hydrogeologic Environment for Carbon Sequestration: An Analy
10:00	Mehnert		Basin-scale Modeling of CO2 Sequestration in the Basal Sandstone
10:20	Wainwright		Uncertainty Quantification of the CO2 Storage System for a Hypothe
<b>AM-2</b>			
11:00	Bauer		Development, verification and application of a coupled multiphase fl
11:20	Garcia-Cabrejo		Sensitivity analysis in numerical simulation of multiphase flow for C
11:40	Gonzalez-Nicolas		Stochastic analysis of factors affecting the leakage of CO2 from injec
12:00	Sun		A Global Sampling-Based Method for Integrating Physics-Specific S



<b>Coupled Atmosphere-Surface-Subsurface Models</b>												
Conveners: Reed Maxwell, Colorado School of Mines, and Stefan Kollet, Bonn University												
<b>Room: Alma Mater</b>												
<b>Monday, June 18, PM-1</b>												
<b>2:10</b>		Reed	Maxwell		High-resolution, Continental-scale simulations with an integrated hydrologic model.							
<b>2:30</b>		Morten Andre	Larsen		The effect of two-way dynamical coupling in a climate-hydrological model setup							
<b>2:50</b>		John	Williams		Applying Land surface – Atmosphere Interactions to Improving Wind Energy Forecasting S							
<b>PM-2</b>												
<b>3:30</b>		Jehan	Rihani		Subsurface-Landsurface-Atmospheric Feedbacks under a Range of Climate Conditions							
<b>3:50</b>		Jean-Pierre	Vergnes		Regional and global off-line evaluation of the ISBA-TRIP groundwater scheme							
<b>4:10</b>		Daniel	Caviedes-Voullième		Numerical simulation of groundwater-surface interactions by external coupling of the 3D R							
<b>4:30</b>		Koen	Verbist		Influence of soil texture on the first-order exchange coefficient coupling for simulating surfa							
<b>4:50</b>		Iryna	Rybak		Coupling Concepts for Multiphase Porous Medium and Free Flow Systems							





<b>General Session</b>												
Session Chair: Praveen Kumar, University of Illinois												
<b>Room: Humanities</b>												
<b>Tuesday, June 19, PM-1</b>												
2:20		Tiangang	Cui		Parameter Estimation and Uncertainty Quantification of Multiphase Subsurface Flow Models							
2:40		Corey	Winton		Analysis of Accuracy in Formation of Reduced Order Model							
3:00		Christian	Frias		Numerical flow field characterization of the ripple-dune amalgamation process							
<b>PM-2</b>												
3:40		Ali	Zidane		Analytical-numerical solutions for density dependent flow in a free flow media							
4:00		Gabriele	Manoli		Two-phase simulation of a variable rate infiltration experiment							
4:20		Natalie	Schröder		Effect of root water and solute uptake on solute transport in soils: a 3D simulation study							
4:40		Marco	Massabo		Fugacity-based modeling of contaminant transport during floods							
5:00		Gorti	Kasi Viswanadh		ASSESSMENT OF LAND USE LAND COVER CHANGES IN MIDDLE GODAVARI (G-5)							
5:20		Gunnar	Nützmänn		Advection in bioirrigated muddy sediments – can it be relevant? A model study.							

<b>High-Dimensional Computational Modeling of Rivers and Streams</b>												
Conveners: Marcelo Garcia, University of Illinois, and Xiao Feng Liu, University of Texas-San Antonio												
<b>Room: Quad</b>												
<b>Tuesday, June 19, AM-1</b>												
<b>PM-1</b>												
2:20		Hutoff		Modelling Hydro- and Morphodynamic Responses of River Training Structures								
2:40		Liu		Simulation of Flow Field around and inside Porous Scour Protection with Physical and Realistic Partic								
3:00		Tavakoli		Investigation of Parallel Scalability and Speedup for Computation of Stream Flow River Networks Mod								
<b>PM-2</b>												
3:40		Jiang		Numerical Investigation of Density Current over Rough and Uneven Bottom								
4:00		Tokyay		Lock-exchange gravity currents with small volume of release propagating over bottom-mounted obsta								
4:20		Dordevic		Application of 3D numerical models in confluence hydrodynamics modelling								
4:40		Martin		A History of Hydraulic Modeling at the Waterways Experiment Station								
5:00		Sinha		Three Dimensional Hydrodynamic Modeling of the Chicago River: Comparative Study between EFDC								

<b>Honoring the Career and Contributions of University of Illinois Alumnus, George Pinder</b>											
Convener: Mike Celia, Princeton University											
<b>Room: Illinois Ballroom</b>											
<b>Monday, June 18</b>											
10:20-10:45	Rien van Genuchten			Attempts at describing nonequilibrium vadose zone flow and transport processes at the f							
10:45-11:10	Linda Abriola			Coupled Hydrologic and Geophysical Inversion for Characterization of Nonaqueous Phase							
11:10-11:35	David Ahlfeld			Groundwater Management Models: Balancing Model Sophistication with Practical Applica							
11:35-noon	William Gray			George F. Pinder ???!							

<b>Hybrid Multiscale Models in Subsurface Flow and Transport</b>											
Tim Scheibe, Pacific Northwest National Laboratory, Qinjun Kang, Los Alamos National Laboratory, Matthew T. Balhoff, University of Texas											
Featured Speakers: Ilenia Battiato, Clemson University, and Tim Scheibe, Pacific Northwest National Laboratory											
<b>Room: Quad</b>											
<b>Tuesday, June 19, AM-1</b>											
9:40		Battiato (Invited)	Hybrid models of reactive transport in porous media								
10:00		Coon	Coupling lattice Boltzmann and continuum equations for the solution of multiscale flow and reactive tr								
10:20		Carle	A Triple-Porosity Dual-Permeability Model for Assessment of Radionuclide Transport in Transient Varia								
<b>AM-2</b>											
11:00		Scheibe (invited)	MAP: An Analysis Platform for Multiscale Hydrogeologic Modeling with Emphasis on Hybrid Multiscale								
11:20		Alyaev	Multiscale simulation of non-Darcy flows								
11:40		Sheng	Multi-scale simulation study: integrated coupling of a steady-state two-phase dynamic pore-scale mod								
12:00		Balhoff	Multiscale simulation via direct substitution of pore-scale models for Darcy-scale grids near wells								



<b>Mixing and Reactions across Scales in Porous Media</b>			
Conveners: Marco Dentz, Institute of Environmental Assessment and Water Research (IDAEA), Spanish National Research Council (CSIC), Barcelona			
<b>Room: Alma Mater</b>			
<b>Wednesday June 20, AM-1</b>			
9:40	Marco Dentz	Mixing and Reaction in Heterogeneous Media	
10:00	Daniel McInnis	Modelling of Non-Fickian Transport in Laboratory Sand Columns: The Role of Solute Hete	
10:20	Roesanna Neupauer	Comparison of Chaotic Flows for Plume Spreading in Aquifers	
<b>AM-2</b>			
11:00	Olaf Cirpka	Transverse Mixing in Heterogeneous Aquifers	
11:20	Pietro De Anna	Upscaling of transport in correlated non Gaussian velocity fields: consequences for modelin	
11:40	Diogo Bolster	Anomalous Transport as a Driver for Incomplete Mixing and Anomalous Reactions	
12:00	Birendea Jha	A reduced-order model of fluid mixing in strongly heterogeneous porous media	
<b>PM-1</b>			
2:20	Tanguy Le Borgne	Persistence of incomplete mixing in heterogeneous porous media	
2:40	Erica Sirila	Evaluating effective reaction rates of kinetically driven solutes in large-scale, statistically a	
3:00	N. Suciú (Knabner will present)	Global Random Walk Solutions to PDF Evolution Equations	
<b>PM-2</b>			
3:40	Daniel Lester	Lagrangian Chaos and Mixing in Porous Media	
4:00	Ricky Villarreal	Quantifying Mixing and Subsequent Reactions Across a Heterogeneous Porous Interface	
4:20	Kalyana Nakshatrala	A novel computational framework for bimolecular diffusive-reactive systems	
4:40	Valentina Prigiobbe	Anomalous transport of strontium in reactive porous media	
5:00			
<b>Room: Alma Mater</b>			
<b>Thursday June 21, AM-1</b>			
9:40	Jiang Jianguo	The Pruned-enriched Method for Simulations of Continuous Time Random Walks	
10:00	Peter Kang	Macroscopic Modeling of Anomalous Transport on Heterogeneous Lattice Networks	
10:20	Gabriele Chiogna	Transverse mixing enhancement in heterogeneous anisotropic porous media	

<b>Modeling and Analytics for Hydrologic Impact Assessments due to Climate Change</b>												
Auroop Ganguly, Northeastern University, and Mukesh Kumar, Duke University												
Featured Speakers: David Pierce, Scripps Institution of Oceanography, and Karsten Steinhaeuser, University of Minnesota												
<b>Room: Quad</b>												
<b>Thursday, June 21, AM-2</b>												
11:00		Karsten	Steinhaeus	Invited		Exploring Data Mining and Machine Learning Methods for Hydrology						
11:20		Evan	Kodra			Toward a Bayesian Approach for Quantifying Regional Uncertainty in Precipitation Extrem						
11:40		Martin	Drews			Coupling the MIKE SHE hydrological modelling tool with the HIRHAM regional climate mo						
12:00		Yanqing	Lian			Integrated Flow and Water Quality Modeling for Ecosystem Restoration in the Lake Calum						
<b>PM-1</b>												
2:20		David	Pierce	Invited		Using Observations to Better Assess Climate Change Impacts on Streamflow in the Weste						
2:40		Debasish	Das			Predictive insights for precipitation extremes under non-stationary climate						
3:00		Nicolas	Flipo			Current and future assessment of the main aquifer units contribution to the river discharge						
<b>PM-2</b>												
3:40		Forrest	Hoffman	(present by Jitendra K		Assessment of Ecohydrological Impacts Under Climate Change Scenarios from CMIP5						
4:00		Charlotte	Thierion	(present by F. Habets)		Estimation of climate change impacts on the coupled surface-subsurface hydrosystem of t						
4:20		Jianming	Chen			Impact of Climate Change on Canadian Surface Water and Groundwater Resources: A Co						
4:40		Olga	Ocampo			Evidences and signals of Climate Change on Tropical Andean Mountain Watersheds: Chir						
5:00		Rachindra	Mawalagedara			The Climatic Effects of Deforestation in South and Southeast Asia						

<b>Multiphase and Pore-Scale Modeling: Challenges and Perspectives</b>												
Malgo Peszynska, Oregon State University, and Vahid Joekar-Niasar, Utrecht University												
<b>Room: Quad</b>												
<b>Wednesday, June 20, AM-1</b>												
9:40		Al Valocchi (Haihu Liu presents)				Pore-scale simulations of gas displacing liquid in a pore network micromodel by						
10:00		Joekar-Niasar (F. Doster presents)				Pore-Network Analysis of Effects of Trapping on Hysteresis in Two-Phase Flow						
10:20		Mark Porter				LATTICE-BOLTZMANN MODELING OF IMMISCIBLE DISPLACEMENT EXPE						
<b>Room: Humanities</b>												
<b>Wednesday, June 20, PM-1</b>												
2:20		Luis	Cueto-Felgueroso			Macroscopic Phase Field Model of Partial Wetting in Confined Geometries: from						
2:40		Alain	Genty			Lattice Boltzmann Method for air-water distribution modeling at the pore scale						
3:00		Espen	Jettestuen			Simulation of Capillary-Controlled Displacements in 3D Rock Images by a Vari						
<b>PM-2</b>												
3:40		Malgorz	Peszynska			Continuum and discrete models of adsorption at porescale and corescale						
4:00		Steven	Mattis			Numerical Modeling of Flow Through Porous Structures and Vegetated Region						
4:20		Anna	Trykozko			Pore-core upscaling of flow and transport with inertia and anisotropy						
4:40		Florian	Frank			Numerics of Charged Transport in Porous Media at Pore and FieldScale						
5:00		Amanda	Dye			Analysis of Capillary Pressure in a Two-Fluid-Phase Porous Medium System						
<b>Room: Humanities</b>												
<b>Thursday, June 21, AM-1</b>												
9:40		Andrea	Ferrari			DIRECT SIMULATIONS OF INTERFACE DYNAMICS: LINKING CAPILLARY I						
10:00		Masa	Prodanovic ( Mehmani will preser			The Effect of Microporosity on Transport Properties of Porous Media						
10:20		Zeyun	Jiang			Representation of pore-scale heterogeneity and prediction of multi-phase flow f						



<b>Numerical Methods for Waves, Circulation and Transport in the Coastal Ocean</b>													
Conveners: Clint Dawson, University of Texas, and Casey Dietrich, University of Texas													
<b>Room: Alma Mater</b>													
<b>Thursday, June 21, AM-2</b>													
11:00		Pierre Lermusiaux		Non-Gaussian Data Assimilation with Stochastic Boussinesq Equations for Coastal Ocean Dynamics									
11:20		Sultan Ahmed		MODELING LAKE MICHIGAN HYDRODYNAMICS: A PARALLEL WAY									
11:40		Ling Zhu		NUMERICAL MODELING OF NONLINEAR WATER WAVES WITH SIGMA COORDINATE AND LAY									
12:00		Aaron Donahue		A Boussinesq Scaling Approach to Solving Near Shore Phase Resolving Nonlinear Waves									
<b>PM-1</b>													
2:20		Clint Dawson											
2:40		Matt Malej		Computationally Efficient Numerical Model for the Evolution of Directional Ocean Surface Waves									
3:00		K. Asghari		Smoothed Particle Hydrodynamics Modeling of Wave Energy Dissipation									
<b>PM-2</b>													
3:40		Randall Kolar		Aspects of a Hydrologic/Hydrodynamic Coupled Model System with Application to Coastal Inundation									
4:00		Joseph Zhang		A fully coupled unstructured-grid model for wind wave-current interaction in large-scale applications									
4:20		S. Gopalakrishnan		Development of a Coastal Inundation Model using a Triangular Discontinuous Galerkin Method									
4:40		Chris Massey		ERDC's Coastal Storm Modeling System: Systems Integration									
5:00		Casey Dietrich		Surface Trajectories of Oil Transport along the Northern Coastline of the Gulf of Mexico									





<b>Transforming Water Resource Management with Open-Source Community Tools</b>									
Conveners: David Moulton, Los Alamos National Laboratory, and Ian Gorton, Pacific Northwest National Laboratory									
<b>Room: Technology</b>									
<b>Thursday, June 21, AM-2</b>									
11:00		Karen	Schuchardt			Akuna – an Open Environment for Advanced Simulation			
11:20		Deb	Agarwal			A Methodology for Management of Heterogeneous Site Characteri			
11:40		John	Moulton			Amanzi: a Parallel Open-Source Flow and Reactive-Transport Simul			
12:00		Jean-Rayna	De Dreuzy			H2OLAB: a numerical platform for the stochastic modeling of comp			
<b>PM-1</b>									
2:20		Thomas	Kalbacher	(presented by Zolfaghari)		OpenGeoSys: An open source project for numerical simulation of T			
2:40		Chris	Kees	(presented by M. Farthing)		Parallel Computational Methods and Simulation for Coastal and Hy			
3:00		Luit Jan	Slooten			Proost, an Open Source framework for geohydrological research ar			

<b>Advances in Algorithms for Three-Dimensional Incompressible Flow</b>													
Bill Layton, University of Pittsburgh, and Chris Kees, US Army Engineer Research and Development Center													
<b>Wednesday PM-2</b>													
<b>Room: Lincoln</b>													
3:40-4:00		Glimm		Algorithms for the Simulation of Incompressible Turbulent Mixing									
4:00-4:20		Layton		Modern ideas in turbulence confront legacy codes									
4:20-4:40		Calderer		A Three-Scale Variational Multiscale Method for Incompressible Turbulent Flows in Domains with Mo									
4:40-5:00		Kees		Higher order methods for turbulent air/water flow interacting with moving structures									
5:00-5:20		Chrispell		An Immersed Boundary Model of Swimming Sheets in a Viscoelastic Fluid									