

**The American Geophysical Union  
Chapman Conference on**

**Eco-Hydrology of Semiarid Landscapes: Interactions and Processes**

**Sagebrush Inn  
Taos, New Mexico  
9-13 September 2002**



**CONVENERS**

*Bradford P. Wilcox*, Rangeland Ecology and Management Department, Texas A&M University, College Station, TX USA  
*Brent D. Newman*, Earth and Environmental Sciences Division, Los Alamos National Laboratory, Los Alamos, NM USA  
*Oswaldo E. Sala*, Department of Ecology, University of Buenos Aires, Buenos Aires, Argentina

**PROGRAM COMMITTEE**

*James Reynolds*, Duke University, Durham, NC USA  
*Ignacio Rodriguez-Iturbe*, Princeton University, Princeton, NJ USA  
*Rob Jackson*, Duke University, Durham, NC USA  
*David D. Breshears*, Los Alamos National Laboratory, Los Alamos, NM USA  
*Tom Dunne*, University of California, Santa Barbara, CA USA  
*John Ludwig*, CSIRO Wildlife and Ecology, Darwin, Australia USA  
*Mark Seyfried*, Northwest Watershed Research Center, Boise, ID USA  
*Dave Goodrich*, Southwest Watershed Research Center, Tucson, AZ USA  
*Laura Huenneke*, New Mexico State University, Las Cruces, NM USA

**COSPONSORS**

Los Alamos National Laboratory, Earth and Environmental Sciences Division  
Los Alamos National Laboratory, Institute for Geophysics and Planetary Physics  
National Science Foundation  
Ecological Society of America, Applied Ecology Section  
SAHRA-Sustainability of Semi-Arid Hydrology and Riparian Areas, NSF S&T Center

**COVER**

A view of the May 2000, Cerro Grande Fire, looking west across the Pajarito Plateau  
(photo by Craig Allen)

# MEETING AT A GLANCE

## **Sunday, 8 September 2002**

5:00 p.m. – 9:00 p.m. Registration  
6:30 p.m. – 10:00 p.m. RECEPTION AND DINNER

## **Monday, 9 September 2002**

6:30 a.m. – 8:30 a.m. BREAKFAST  
8:30 a.m. – 12:00 p.m. Oral Presentations  
10:00 a.m. – 10:30 a.m. BREAK  
12:00 p.m. – 1:30 p.m. LUNCH  
1:30 p.m. – 2:30 p.m. Informal Discussion  
5:30 p.m. – 5:50 p.m. Student Presentations  
6:10 p.m. – 6:55 p.m. Invited Presentation  
6:55 p.m. – 10:00 p.m. Poster Session / Dinner

## **Tuesday, 10 September 2002**

6:30 a.m. – 8:30 a.m. BREAKFAST  
8:30 a.m. – 12:00 p.m. Oral Presentations  
10:00 a.m. – 10:30 a.m. BREAK  
12:00 p.m. – 1:30 p.m. LUNCH  
1:30 p.m. – 2:30 p.m. Informal Discussion  
5:30 p.m. – 5:50 p.m. Student Presentations  
6:10 p.m. – 6:55 p.m. Invited Presentation  
7:10 p.m. – 10:00 p.m. Poster Session / Dinner

## **Wednesday, 11 September 2002**

6:30 a.m. – 8:30 a.m. BREAKFAST  
7:30 a.m. Bus departs for Los Almos  
6:30 p.m. Bus Returns from Los Almos  
7:15 p.m. SOUTHWEST BBQ

## **Thursday, 12 September 2002**

6:30 a.m. – 8:30 a.m. BREAKFAST  
8:30 a.m. – 12:00 p.m. Oral Presentations  
10:00 a.m. – 10:30 a.m. BREAK  
12:00 p.m. – 1:30 p.m. LUNCH  
1:30 p.m. – 2:30 p.m. Informal Discussion  
6:00 p.m. – 7:30 p.m. Banquet  
7:30 p.m. – 8:30 p.m. Invited Presentation  
8:30 p.m. – 10:00 p.m. Poster Session

## **Friday, 13 September 2002**

6:30 a.m. – 8:30 a.m. BREAKFAST  
8:30 a.m. – 12:20 p.m. Oral Presentations  
10:00 a.m. – 10:30 a.m. BREAK  
12:00 p.m. – 12:20 p.m. Final Remarks  
12:20 p.m. – 2:00 p.m. LUNCH  
2:00 p.m. – 3:00 p.m. Informal Discussion

ADJOURN

# SCIENTIFIC PROGRAM

## Sunday 8 September 2002

5:00-9:00 p.m. Registration  
6:30-10:00 p.m. Reception-Dinner/Beer and Wine

## Monday 9 September 2002

6:30-8:30 a.m. Breakfast

### **Horizontal Fluxes: Scaling Relationships, Modeling Strategies, Field Observations, and Indicators**

*Organizers: John Ludwig and Tom Dunne*

#### Morning

*Chair: Tom Dunne*

8:30 a.m. **Anton Imeson**, Can Vegetation Patterns and Fluxes be Used as Indicators of Disturbance and Climate at Different Scales in Southern Europe?  
9:15 a.m. **Chris Duffy**, The Hydrologic Cycle and Closed Basins: From Conceptual Model to Low-Dimensional Dynamics  
10:00 a.m. Break  
10:30 a.m. **John Ludwig**, Raging runoff: quantifying obstructions to flows on semiarid hillslopes  
11:15 a.m. **Jane Belnap**, The role of biological soil crusts in local and landscape hydrologic cycles  
12:00 p.m. Lunch  
1:30-2:30 p.m. Informal discussion, coordinated by Chairs

#### Evening

5:30 p.m. Student Presentation, **Jill Welter**, Hot Spots for Nitrogen Retention in Arid-Land Watersheds: Interactions Between Horizontal and Vertical Fluxes  
5:50 p.m. Student Presentation, **Eduardo Zea**, Plant Water-Use Strategies: Linking Hydrological Fluctuations and Physiological Response  
6:10 p.m. Invited Presentation, **Keith Beven**, Uncertainty in the Sources and Estimation of Semi-Arid Runoff  
6:55-10:00 p.m. Poster Session/Dinner/Beer and Wine

1. Lawrence Allen, Evaluating Wetlands Sustainability Using a Hierarchical Systems Approach
2. P W Barnes, Temporal and Spatial Variation in Hydraulic Lift, Plant/Soil Water Relations and Competition/Facilitation in a Subtropical Savanna: Implications of Woody Plant Increase for Rangeland Hydrology
3. Laura Grant, Mark Seyfried, and Karen Humes, Calibration of Soil Moisture Instrumentation to Variable Soil, Temperature, and Water Content
4. Tara Greaver, and Leonel Sternber, Soil Water Conditions and Plant Water Use in Fore and Back Dunes of Coastal Sandy Beaches
5. A R Groffman, T Caldwell, and R Gray, Infiltration/Ground Water Linkages in the Southwest: Response of Shallow Ground Water to Interannual Variations of Precipitation, Jemez Mountains, New Mexico
6. A Guntner, and A Bronstert, A Strategy for Structuring Semiarid Landscapes to Link Processes Across Scales in Large-Scale Hydrological Models
7. M S Haroutunian, Current Land and Vegetation issues essential for Armenia
8. A T Harris, and G P Asner, Effects of Managed Grazing on Vegetation Structure and Range Condition in Grand Staircase-Escalante National Monument, UT: Combining Imaging Spectroscopy and Field Studies

9. J E Herrick, D A Gillette, and M Remmenga, Sensitivity Testing of the Gap Intercept Method, a Simple, Rapid Indicator of Changes in Vegetation, Soil Erosion and Hydrologic Function
10. Tamara Hochstrasser, Katherine Mitchell, and Debra Peters, A Comparison of Three Daily Time Step Models to Simulate Water Dynamics in Semi- Arid Grass- and Shrub-dominated Ecosystems
11. T E Huxman, J M Cable, D D Ignace, A J Eilts, N English, J Weltzin, and D G Williams, Geomorphic Influence on Ecosystem Precipitation Pulse Response in a Semi-Arid Grassland
12. J.M. Mangan, R.S. Webb, C. Wessman, and A.F.H. Goetze, Assessing Vegetation in Relation to Sand Dune Mobilization Potential in Nebraska: A Study Using Landsat TM Data, the CENTURY Ecosystem Model, and a Digital Elevation Model Soil Controls Over N Oxide Emissions From Texas Savannas Vegetation Sequence, Trans-Pecos Texas Surface Processes at Multiple Scales
13. R.E. Martin, G.P. Asner, R.J. Ansley, and A.R. Mosier, Vegetation, Climate and
14. A K McDonald L E Loomis, and R J Kinucan, Resource Partitioning Within a
15. N.L. Miller, and L.Bastidas, A Non-uniform Grid Scheme for Coupling Land
16. Mark T. Murphy, Richard H. Hawkins Richard Meyerhoff WR Osterkamp, and E. Linwood Smith, On the Ecology of Effluent?Dependent Bottomlands in the Arid and Semi-arid Southwest
17. K Ogle, R L Wolpert, and J F Reynolds, An Inverse Modeling Approach to Reconstructing Plant Water Uptake Profiles
18. R L Scott, D C Goodrich, D G Williams, and W J Shuttleworth, Groundwater - Vegetation - Atmosphere Interactions in Semiarid Riparian Ecosystems: Mesquite Eco-hydrology on the San Pedro River, Arizona
19. J D Tauxe, Integrating Hydrologic and Biologically-Induced Contaminant Transport at Arid Radioactive Waste Disposal Sites in a Probabilistic Context
20. J.E. Villinski, J. M. Hamblen, M. H. Conklin, and P. B. Brooks, Characterizing microbial respiration in a meander bend point bar before erosion events in a semiarid stream, southeastern Arizona
21. Zou, Songbing Zhaodong Feng, Yong Liu, and Xiaowen Zhang, Spatially Distributed Model of the Potential Ecological Environments in the Western Chinese Loess Plateau

## **Tuesday 10 September 2002**

6:30-8:30 a.m. Breakfast

### **Horizontal Fluxes: Role of Disturbance, Threshold Responses**

*Organizers: Brad Wilcox and Dave Breshears*

#### Morning

*Chair: Dave Breshears*

- 8:30 a.m. **Brad Wilcox**, Runoff from Semiarid Landscapes: What do We Really Know?
- 9:15 a.m. **Nancy Grimm**, Nutrient Retention in Stream Channel and Riparian Hotspots of Semi-Arid Watersheds
- 10:00 a.m. Break
- 10:30 a.m. **Jim Reynolds**, Disturbances, Thresholds, and Models: A Guise Revealed! A Call to Arms!
- 11:15 a.m. **Danny Marks**, (to be announced)
- 12:00 p.m. Lunch
- 1:30-2:30 p.m. Informal discussion, coordinated by Chairs

#### Evening

5:30 p.m. Student Presentation, **Kevin Hultine**, Transpiration by Mesquite on a Desert River Floodplain

- 5:50 p.m. Student Presentation, **Darrel Jenerette**, Soil Carbon and Nitrogen Heterogeneity: Combining Spatially Explicit Data and Spatially Interactive Models in the Urbanized Sonoran Desert
- 6:10 p.m. Invited Presentation, **Oswaldo Sala**, Vertical water fluxes control carbon and nutrient cycling in semiarid ecosystems
- 6:55 p.m. Overview of Pajarito Plateau Field Trip
- 7:10-10:00 p.m. Poster Session/Dinner/Beer and Wine

1. N N Barger, Impacts of Disturbance on Runoff and Nutrient Fluxes from Biologically Crusted Soils
2. R E Brazier, Modelling Runoff in Semi-Arid Areas from the Hillslope to the Watershed Scale
3. D D Brehsears, O B Myers, and F J Barnes, Vertical and Horizontal Heterogeneity in Plant Available Water: Trends from a Semiarid Woodland Army Yuma Proving Ground
4. T G Caldwell, Soil Degradation and Hydrologic Response at the National Training Center (NTC), Ft. Irwin, California
5. E.A Charles, Land degradation and its Environmental Impact: A View of Semiarid African Regions
6. T W Ellis, Exploring Design Limits for Semiarid Banded Production Systems Using Ecological Optimality Considerations and a Probabilistic Approach
7. J H Flores, Surface and Subsurface Flow Paths in Gullies and Arroyos in Colorado - Observations
8. E J Gabet, The Role of Vegetation, Fires, and Grazing in the Hydrological Response from Hillslopes in a Mediterranean Landscape
9. K R Hubbert, and P.M. Wohlgemuth, Weathered Granitic Bedrock: Implications to Erosional and Subsurface Hydrologic Processes in Burnt Watersheds
10. S J Lite, and J C Stromberg, Hydrologic Thresholds for Maintaining Cottonwood-Willow Stands Along the San Pedro River, Arizona
11. E V McDonald, and E Hamerlynk, Developing Effective Ecosystem Monitoring Strategies for Military Activities in Deserts: Preliminary Results From the US
12. A Rango, J Herrick, R Gibbens, and S Moran, Reconsideration of Using Water Ponding Dikes to Re-establish Native Grasses in Shrub-Invaded Areas of the Southwest
13. L J Schmidt, The Role of Vegetation Ground-Cover in Modifying High-Intensity Short-Duration Storm Runoff: A Conceptual Model
14. A E Springer, R M Mullen, T E Kolb, and M A Amentt, Measuring Evapotranspiration Changes in Semiarid Pine Forests Due to Fire and Thinning
15. L M Thomas, and J F Weltzin, Biotic and Abiotic Constraints on Woody Plant Seedling Establishment in Semi-Arid Savannas
16. C.J. Tucker, M E Brown, and J E Pinzon, Dry-season albedo and antecedent rainfall in the desert-savanna transition zone of West Africa
17. C J Wilson , H E Canfield, J W Carey, K J Crowell, L J Lane, S G McLin , and S L Reneau, Predicting the Impacts of the Cerro Grande Fire on Floods, Hillslope Erosion and Channel Sediment Transport
18. P M Wohlgemuth, and K R Hubbert, The Effects of Fire on Soil Hydrologic Properties and Sediment Fluxes in Semiarid Steeplands, Southern California

## **Wednesday 11 September 2002**

6:30-8:30 a.m. Breakfast

### **Field Trip-Los Alamos National Laboratory and Bandelier National Monument**

*Organizers: Craig Allen, Dave Breshears, Brent Newman, and Cathy Wilson,*

7:30 a.m. Leave for Field Trip to Los Alamos

Field presenters include:

**Craig Allen, Dave Breshears, Sue Cannon, Bruce Gallaher, Danny Katzman, Greg Kuyumjian, Pat Longmire, Deb Martin, John Moody, Bill Stone, and Cathy Wilson.**

6:30 p.m. Return to Taos

Evening

7:15 p.m. Southwest BBQ

## **Thursday 12 September 2002**

6:30-8:30 a.m. Breakfast

### **Vertical Fluxes: Evapotranspiration, Scaling Relationships, Linking Across Scales**

*Organizers: Rob Jackson and Ignacio Rodriguez-Iturbe*

#### Morning

*Chair: Oswaldo Sala*

8:30 a.m. **Rob Jackson**, (to be announced)

9:15 a.m. **Brent Newman**, Assessing Impacts of Environmental Change: Why We Need to Understand Temporal Scales of Semiarid Ecohydrologic Processes

10:00 a.m. Break

10:45 a.m. **Dave Goodrich**, Vegetation: A Key Indicator in Identifying Dominant Hydrologic Behavior Over a Range of Scales in Water-Limited Environments

11:15 a.m. **Stan Smith**, Evapotranspiration from Aridland Vegetation: The Potential Role of Canopy Architecture and Morphology In Regulating ET

12:00 p.m. Lunch

1:30-2:30 p.m. Informal discussion, coordinated by Chairs

#### Evening

6:00 p.m. Banquet

7:30 p.m. Invited Presentation, **Ignacio Rodriguez-Iturbe**, Impact of Stochastic Hydrologic Dynamics on Vegetation Structure of Water Controlled Ecosystems

8:30-10:00 p.m. Poster Session

1. M E Brown, Precipitation, Temperature and Vegetation Interactions in the West African Sahel: Using Canonical Correlation Analysis to Measure Covariance
2. J R Cleverly, Evapotranspiration responses to climate and vegetation forcing above the Middle Rio Grande riparian corridor, New Mexico
3. M D Dixon, Modeling the Influence of Climatic Change and Groundwater Pumping on Riparian Vegetation Along the Upper San Pedro River, Arizona
4. S A Kurc, and E E Small, Dynamics of Evapotranspiration in Semiarid Grassland and Shrubland during the Summer Monsoon Season, central NM
5. T Meixner, and M E Fenn, Importance of Hydrologic Controls On Nitrogen Deposition Impacts in Seasonally Dry Ecosystems - the Asynchrony Hypothesis

6. R N M Ngalim Sakah J Tatah, and Douala Colis Postaux, The Dynamism of Land Uses and their Effects on Water Catchment, A Contemporary Developing World Approach
7. N Ninari, P R Berliner, and Ben-Gurion, Night-Time Vertical Fluxes of Latent Heat in Arid Regions
8. P M Rich, and M S Witkowski, Solar Radiation Interception, Microclimate, and Water Balance in Complex Terrain
9. E E Small, and J Elliott, Coupled Water and Nutrient Cycling in Semiarid Ecosystems: the Influence of Spatial Variability of Infiltration on "Islands of Fertility"
10. Xinping Wang, and Ronny Berndtsson, Water Balance Change for a Re-vegetated Xerophyte Shrub in Semiarid Area
11. Y A Wood, and Thomas Meixner, Hydrologic Controls on Soil Nitrogen Concentrations along an Air Pollution Gradient in a Semi-Arid Climate
12. Liukang Xu, and Dennis D. Baldocchi, Comparative Study of Energy Flux and Evapotranspiration of Oak/grass Savanna and Grazed Grassland Under Extreme Soil Water Deficit and High Temperature
13. A. Yair, Desertification Processes induced by Increased Rainfall at a Desert Fringe
14. Zhan, Zhiming, Feng, Zhaodong, and Zhang, Xiaowen, Estimation of land surface evapotranspiration in the western Chinese Loess Plateau using remote sensing and GIS Techniques

## **Friday 13 September 2002**

6:30-8:30 a.m. Breakfast

### **Vertical Fluxes: Climate and Vegetation Interactions**

*Organizers: Mark Seyfried and Osvaldo Sala*

#### Morning

*Chair: Mark Seyfried*

- 8:30 a.m. **Steve Running**, The Role of Water Balance in Carbon Cycling: Are Arid Regions Different From Temperate Regions?
- 9:15 a.m. **Michelle Wolvoord/Fred Phillips**, Connections Between Vegetation and Deep Vadose Zone Hydraulics in Semiarid and Arid Environments
- 10:00 a.m. Break
- 10:30 a.m. **Roger Pilke, Sr.**, Atmosphere-Land Surface Interactions in Semi-Arid Regions
- 11:15 a.m. **Susan Schwinnig**, Constraints and Opportunities for Plant Growth in Water-Pulse Driven Arid Environments
- 12:00 p.m. Final Remarks (**Brent Newman, Osvaldo Sala, Brad Wilcox**)
- 12:20 p.m. Lunch
- 2:00-3:00 p.m. Informal discussion, coordinated by Chairs

**End of Conference**

