



m i n d s

www.engineering.sdstate.edu/~physics/wx_minds/index.htm

President's Message
By Larry Browning

Mark Cochrane will be our speaker on Valentine's Day. Mark is new to our area and is part of the new Geographic Information Science Center of Excellence (GIScCE) at South Dakota State University. He's an expert on fires in tropical forests. It should be interesting to meet him and hear about his work.

The officers for the coming year are the same: Joanne Anderson is Vice President, Phil Schumacher is Secretary, and Brian Karstens is Treasurer. Be sure to thank them for their support if you get the chance.

Science and Engineering Fairs will be here soon. We can always use judges. The Brookings Science Fair is March 24 and the Mitchell Science Fair is March 28. This is a little earlier than usual (at least for Brookings) and these are closely spaced so please consider helping with the judging. Links to the WebPages for the South Dakota fairs can be found at http://www.sciserv.org/isef/aff_fairs/fairlist/south_da.asp. Judging Guidelines are available at: <http://www.sciserv.org/isef/judges/judges>

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Weather MINDS

Minnesota - Iowa - Nebraska - DakotaS

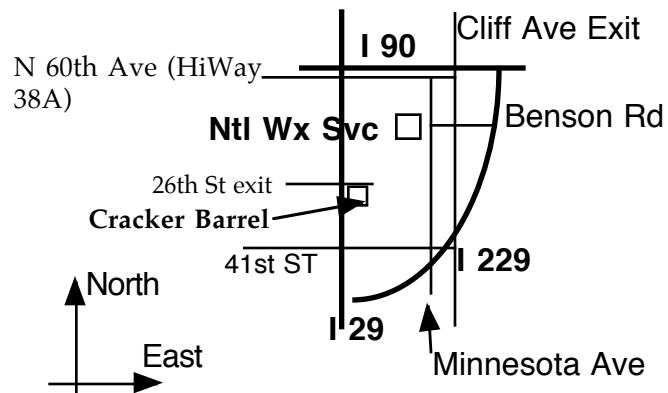
Weather MINDS meeting Tuesday, February 14, 2006.

The meeting will start at 7:30 PM
at the NWS Forecast Office in
Sioux Falls. Meet at "Cracker
Barrel" located at I-29 & 26th ST.
for dinner at 6:00 PM.

Dr. Mark Cochrane will present the program at the February 14th meeting of WxMINDS. His topic will be "Fire and Logging as Agents of Land Cover Change in Tropical Landscapes"

The new fire dynamic for many tropical forests is one of frequent fire incursions and rapidly increasing fire severity. Land cover and climate change are exacerbating the fire problem. Forest fragmentation and land cover change interact synergistically to expose more of the forest to fire and

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[_guidelines.asp](#) . I should caution any of you who are interested in judging that these guidelines are not completely appropriate for us, since we provide a special award, but they do give you some idea of what's involved. As this will be our last meeting before the fairs we need to decide what prizes to have.

Larry



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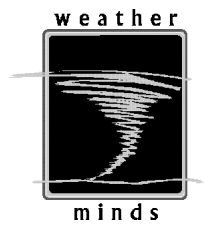
consequently raise the risk of unintended fires occurring across the entire landscape. Selective logging activities and the legacy of previous fires diminish the remaining forests resistance to subsequent fires. Deforestation and ENSO events lead to droughts of increased frequency or intensity. Throughout the tropics, ignition sources continue to grow in number, while the probability that any given ignition event will start a forest fire increases as well. These changes in the frequency, intensity and pattern of forest fires in the tropics represent a major fire regime shift. The tenants of disturbance ecology make it clear that, if fire incidence stays at current levels or increases in frequency, many rain forests will be replaced with less diverse, more fire tolerant, vegetation. Fire is now the greatest single selective pressure upon the species within many forests. Unless these trends are reversed, new ecosystem assemblages will result from the interplay of current evolutionary adaptations and changing fire dynamics?

Dr. Mark A. Cochrane is a Professor at the Geographic Information Science Center of Excellence (GIScCE) at South Dakota State University and is jointly appointed with the Department of Biology and Microbiology and the Department of Geography. He holds a doctorate in Ecology from Pennsylvania State University and a baccalaureate in Environmental Engineering from the Massachusetts Institute of Technology. Dr. Cochrane is internationally renowned for documenting the characteristics, behavior and ecological effects of fire in tropical forests. His research focuses on

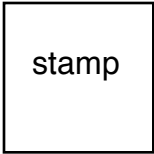
understanding spatial patterns, interactions and synergisms between the multiple physical and biological factors that affect ecosystems. Recently published work has emphasized human dimensions of land-cover change and the potential for sustainable development and has been instrumental in the Brazilian government's recent (2003) program to expand its national forest system in the Amazon to 50 million hectares. In his ongoing research programs, Dr. Cochrane investigates the drivers and effects of disturbance regime changes resulting from various forms of forest degradation, including fire, fragmentation and logging. His interdisciplinary work combines remote sensing, ecology and other fields of study to provide a landscape perspective of the dynamic processes involved in land-cover change. photo and see that this rectangular area is brighter than the background so it must be a car on the road. Researchers can extract even more information if they have a means of obtaining consistent values that are 'radiometrical correct' (i.e. an exact brightness value in watts per square meter can be assigned to an image pixel). To extract radiometric values from satellite imagery, a conversion table must be developed that translates relative brightness (commonly called 'DNs') to absolute radiometric unit. Before a satellite is launched, an initial calibration is performed; however, once the satellite is on-orbit, this calibration must be monitored and subsequently modified to accommodate long-term system drift. One means of doing this is to perform a ground level radiance measurement simultaneous with a satellite overpass ('Vicarious calibration'). The ground data can then be compared to the image data and calibration factors derived. This would work except there is another variable which confounds this data. That is, the very dynamic atmosphere which affects the radiance before the light gets to the satellite.

The job of the Satellite Calibration Group (SDSU has one of the three groups in the nation that do this work), is to perform the ground radiance measurements, measure the atmosphere, model (and thus be able to mathematically 'remove' the atmosphere), and derive satellite calibration factors. This work is done for both NASA sensors and for commercial sensors (such as Digital Globe's Quickbird - often the imagery you see on the nightly news or on Google Earth comes from this platform). The presentation will outline the problem and discuss the tools and techniques that are used to perform these measurements and develop atmospheric models.





Weather MINDS
PO Box 90002
Sioux Falls SD 57109-0002



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WxMINDS webpage address-- http://www.engineering.sdstate.edu/~physics/wx_minds/index.htm

