



WHIS&T 2012 AGENDA

Workshop on Hyperspectral Imaging Science & Technology

M1040, Markin Hall - May 23rd & 24th

Session I - Neuroscience (May 23rd, 8:45 – 12:00)

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| 8:45-9:00 | Event Introduction |
| 9:00-9:45 | Dr. Beaulieu , Professor – University of Alberta
“The molecular diffusion of water: how to measure with MRI and what it can tell us about human brain” |
| 9:45-10:15 | Dr. Sharp , Senior Research Officer – Institute of Biodiagnostics
“A pixel is an artifact” |
| 10:15-10:30 | Dr. Truica , AMETHYST P.D.F. – University of Lethbridge
“Microvasculature Assessment in the Abdomen using diffusion weighted magnetic resonance imaging at 1.5 T” |
| 10:30-11:00 | Break |
| 11:00-12:00 | Round Table (Dr. Beaulieu, Dr. Sharp and Dr. Truica) |
| 12:00-12:55 | Lunch |

Invited Speaker Abstract – Dr. Beaulieu

Magnetic resonance imaging (MRI) is a powerful tool for the non-invasive assessment of the brain in neuroscience. One of MRI's main advantages relative to other imaging modalities is its flexibility in acquiring different types of informative and complementary tissue contrasts. One such image contrast is based on the Brownian motion of water molecules, i.e. diffusion. As water diffuses in tissue, it “samples” the local cellular architecture and thereby provides a sensitive indirect marker of the underlying micro-structure. A key point is that the resulting diffusion maps are quantitative enabling statistical comparisons (e.g. patient group versus healthy controls) in different parts of the brain. The goal of the talk is to (i) demonstrate how MRI can measure water diffusion, (ii) define the quantitative diffusion parameter maps and their potential link to cerebral tissue micro-structure (e.g. axons, myelin), (iii) show how diffusion tensor imaging can yield virtual dissections of white matter tracts (i.e. brain wiring) in 3D, (iv) provide some local human findings using diffusion MRI in stroke, epilepsy, and neurodevelopment / aging, and (v) highlight some advantages such as spatial resolution of acquiring diffusion MRI of human brain at high static magnetic field strengths such as 4.7 Tesla.



Session II – Terrestrial I (May 23rd, 12:55 – 16:05)

- 12:55-13:00 Speaker Introduction
- 13:00-13:45 **Dr. Guo**, Professor – University of Saskatchewan
“Challenges facing grassland remote sensing”
- 13:45-14:00 **Dr. Yang**, ATIC P.D.F. – University of Lethbridge
“Assessing grassland responses to grazing management using remote sensing approaches”
- 14:00-14:15 **Gairik Roy**, M.Sc. Student – University of Lethbridge
“Methodologies for mapping the spatial extent and fragmentation of grassland using optical remote sensing”
- 14:15-14:30 **Iliia Parshakov**, AMETHYST M.Sc. Student – University of Lethbridge
“Automatic class labeling of classified imagery using a hyperspectral library”
- 14:30-15:00 Break
- 15:00-16:00 Round Table (Dr. Guo, Dr. Yang, Roy and Parshakov)
- 16:00-16:05 Wrap-up

Invited Speaker Abstract – Dr. Guo

Remote sensing has been applied on many aspects of grassland study. High, medium, and low resolution images have been used on fine, medium and large scales of grassland health monitoring, productivity estimation, fire/grazing disturbance evaluation, habitat mapping, and interactive effects of climate, external disturbance, and ecosystem succession analysis. Remote sensing not only provides tools for ecological studies, but also helps with economical consideration and management policy making. However, it is challenging to work in grassland ecosystems with remote sensing techniques. First, it is the scale issue; even though remote sensing provides different resolutions, finding the suitable resolution is difficult as it depends on landscape variation, the research question, and scale is spatially and temporally dynamic. Second, grassland is very sensitive to moisture; one precipitation event can change the ecosystem immediately which limits estimation accuracy. One problem specific to grassland is the issue of dead materials, especially in protected areas. The amount of senescent materials within a grassland ecosystem can reverse the relationship between grass vegetation (e.g. biomass) with remote sensing signals (e.g. NDVI).



Session III – Terrestrial II (May 24th, 8:55 – 12:00)

- 8:55-9:00 Speaker Introduction
- 9:00-9:45 **Dr. Coops**, Professor – University of British Columbia
“The use of imaging spectroscopy for plant vegetation functioning”
- 9:45-10:00 **Martin Van Leewuen**, Ph.D. Student – University of British Columbia
“Combining narrow waveband passive sensors and laser scanning technology for modeling vertical variations in light use efficiency”
- 10:00-10:15 **Shiyong Xu**, AMETHYST Ph.D. Student – University of Lethbridge
“Estimates of forest age and biomass using LiDAR data and Landsat imagery”
- 10:15-10:30 **Kevin Riddell**, AMETHYST M.Sc. Student – University of Lethbridge
“A new eye in the sky: lightweight remotely-piloted aircraft platforms for remote sensing”
- 10:30-11:00 Break
- 11:00-12:00 Round Table (Dr. Coops, Leewuen, Xu and Riddell)
- 12:00-12:55 Lunch

Invited Speaker Abstract – Dr. Coops

Recent advances in imaging spectroscopy and Light Detection and Ranging (LiDAR) remote sensing technologies are allowing a more detailed understanding of vegetation biochemistry, a critical driver of the forest carbon and water cycle. In addition this rich data can also provide key insights into tree growth and canopy structure. I will report on advances in using high spectral resolution data to predict changes in canopy pigment concentrations linked to light use efficiency, chlorophyll and other vegetation biochemistry. The use of advanced remote sensing tools and techniques such as those demonstrated in this study can be a useful addition to ongoing efforts to model carbon and water fluxes throughout the landscape.



Session IV - Atmosphere (May 24th, 12:55 – 16:05)

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| 12:55-13:00 | Speaker Introduction |
| 13:00-13:45 | Dr. Degenstein , Associate Professor – University of Saskatchewan
“OSIRIS on Odin - More than a decade of scattered sunlight measurements” |
| 13:45-14:00 | Chad Povey , AMETHYST Ph.D. Student – University of Lethbridge
“Dicke narrowing of acetylene transitions in the v1+v2+v4+v5 band over a range of temperatures” |
| 14:00-14:15 | Gibion Makiwa , Ph.D. Student – University of Lethbridge
“Astronomical spectroscopy with the Herschel-SPIRE instrument” |
| 14:15-14:30 | Dr. Predoi-Cross , Associate Professor – University of Lethbridge
“Synchrotron enabled spectroscopic study of formic acid and C-13 enriched acetylene” |
| 14:30-15:00 | Break |
| 15:00-15:15 | Dr. Boyd Tolton , Chief Scientist – Synodon
“Gas leak detection using the realSens™ technology” |
| 15:15-16:00 | Round Table (Dr. Degenstein, Povey, Makiwa, Dr. Predoi-Cross and Dr. Boyd) |
| 16:00-16:05 | Workshop Conclusion |

Invited Speaker Abstract – Dr. Degenstein

The Canadian built OSIRIS instrument has been in operation onboard the Odin spacecraft since the autumn of 2001. During this time OSIRIS has routinely made measurements of limb scattered sunlight dispersed with approximately 1 nm resolution over the wavelength range from 280 nm to 810 nm. These radiance measurements have been used to retrieve vertical number density profiles of ozone, nitrogen dioxide, sulphate aerosols and bromine monoxide. Within this seminar the radiative transfer model development required to retrieve information from limb scattered sunlight will be discussed in detail. This will also include an overview of the retrieval technique used to infer information once the measurements and model are in place. This talk will also present the OSIRIS highlights including: ozone depletion in the arctic spring of 2011; the use of OSIRIS stratospheric aerosol measurements to determine the impact of volcanoes on climate; the use of OSIRIS data products in various ESA initiatives related to standardized ozone and aerosol data sets and the role of the Asian monsoon in transport from the troposphere to the stratosphere.