K&C 13
Wetland Theme Days
Summary

Laura Hess

Science Team meeting #13
JAXA TKSC/RESTEC HQ, Tsukuba/Tokyo, January 18-22, 2010

Post-Copenhagen Considerations

(What Obama Faces in the U.S. Congress)

"If we decrease the use of carbon dioxide, are we not taking away plant food from the atmosphere? . . . All our good intentions could be for vain."

Rep. John Shimkus (Illinois)

"Wouldn't it be ironic if in the interest of global warming we mandated massive switches to wind energy, which is a finite resource, which slows the winds down, which causes the temperature to go up? . . . It's just something to think about."

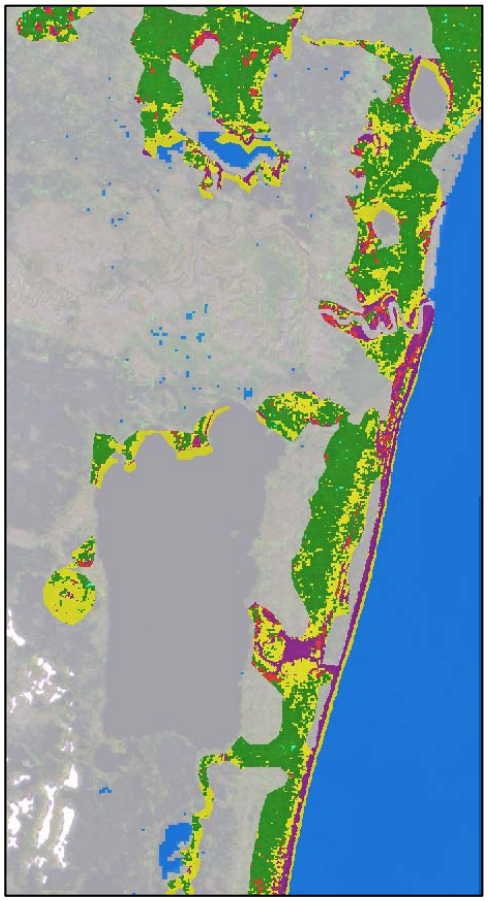
Rep. Bill Posey (Florida)

Source: "Who's the Biggest Fool on the Hill?", Mother Jones magazine, Jan/Feb 2010

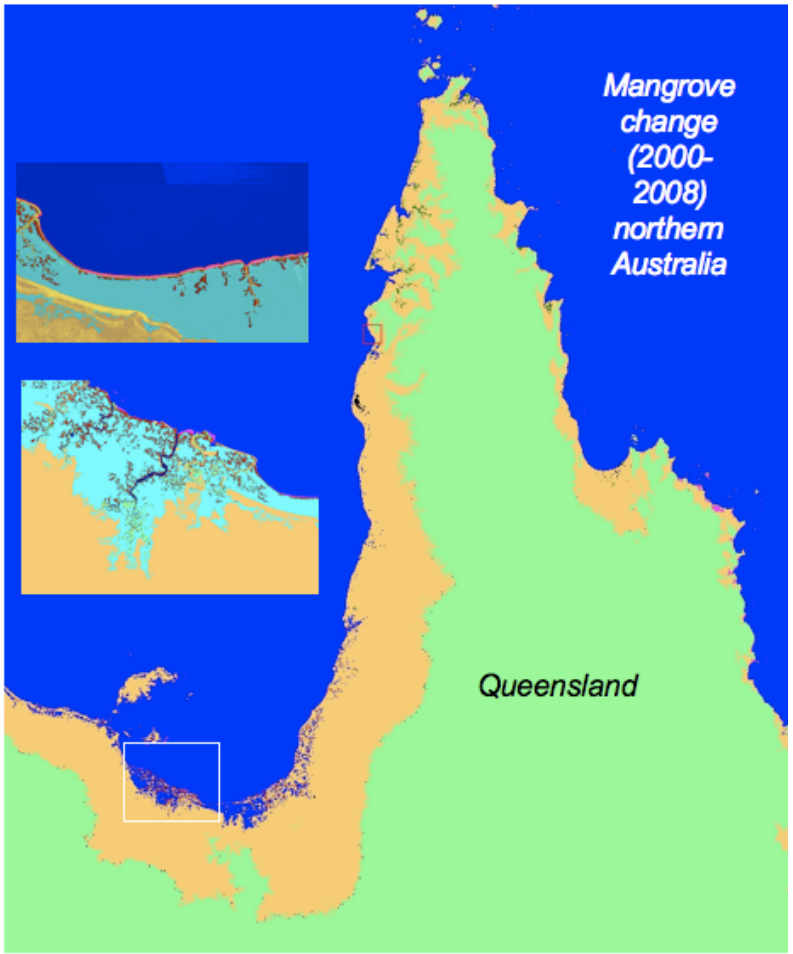
ALOS

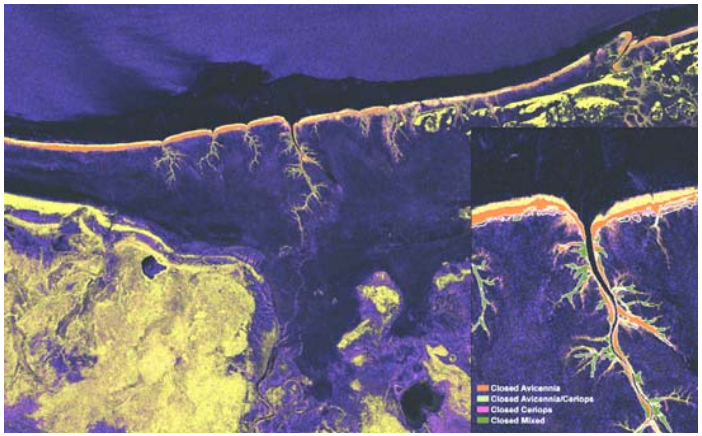
Mapping and Monitoring of Mangroves and Wetlands

Richard Lucas



Mangrove structural types, Belize



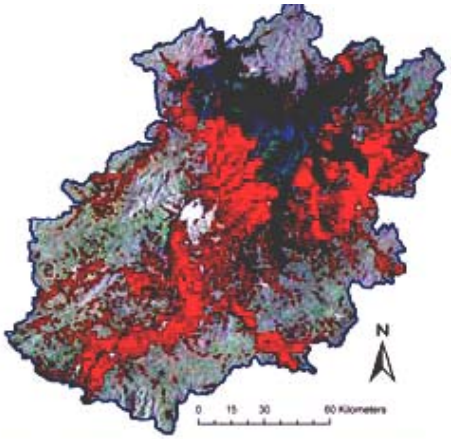


Mangrove change, 2000-2008, northern Australia

ALOS Mapping Rice Paddies and Agroecological Attributes in Monsoon Asia

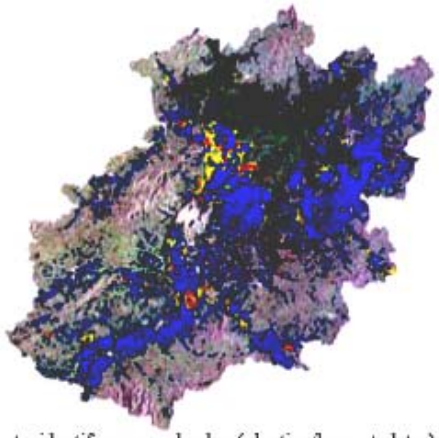
Bill Salas

Poyang Lake Region, China



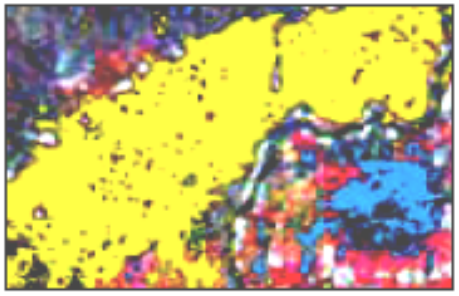
Red shows classified rice paddies derived from multi-temporal, regional PALSAR acquisition strategy; 25% of region rice paddy agriculture

Paddy Area



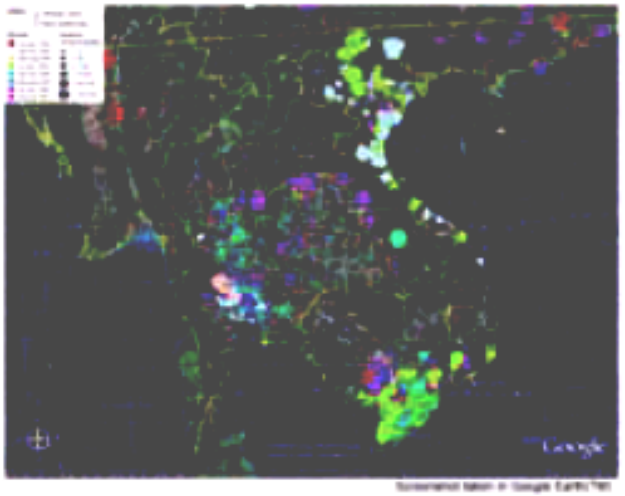
Able to identify crop calendar (planting/harvest dates) based off hydroperiod; 85% of paddies had two distinct hydroperiods

Crop Calendar



Single Rice Crop

Double Rice Crop



Agriculture – bird flu

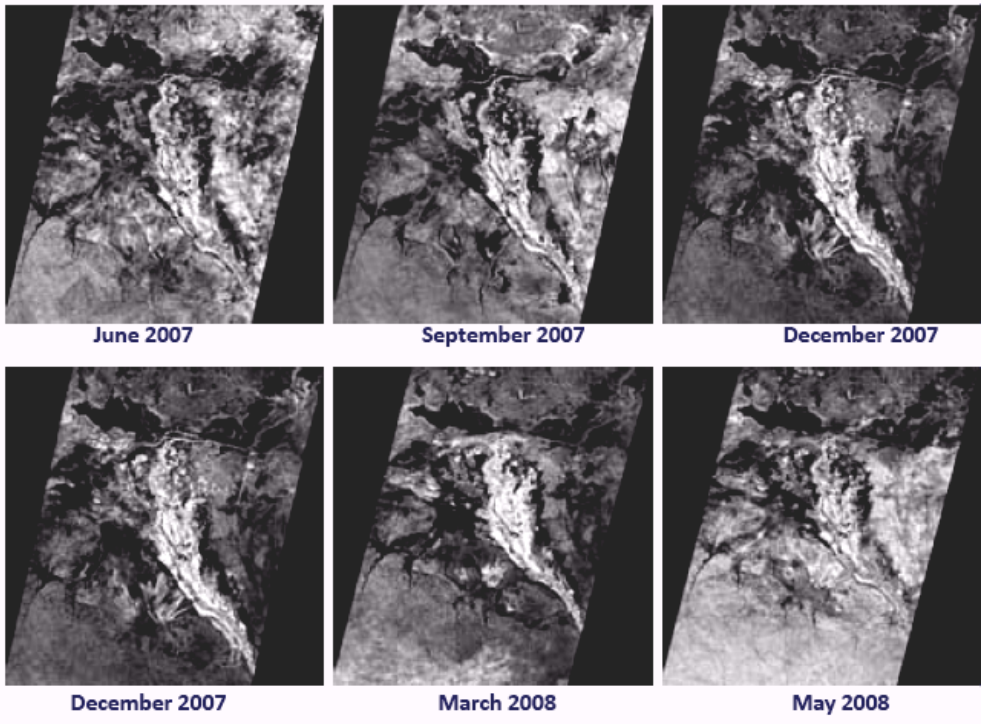
These figures show that H5N1 outbreaks in Thailand and Vietnam were concentrated in those area with multiple cropping systems, in particular, multiple paddy rice system.

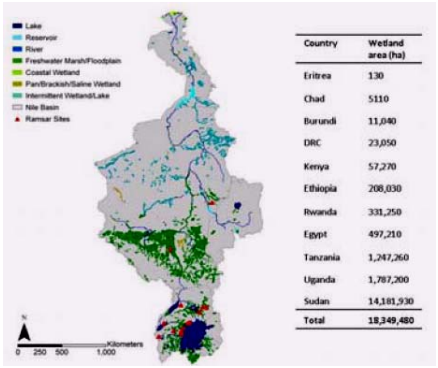
ALOS

Wetlands of the Upper White Nile

Lisa Rebelo

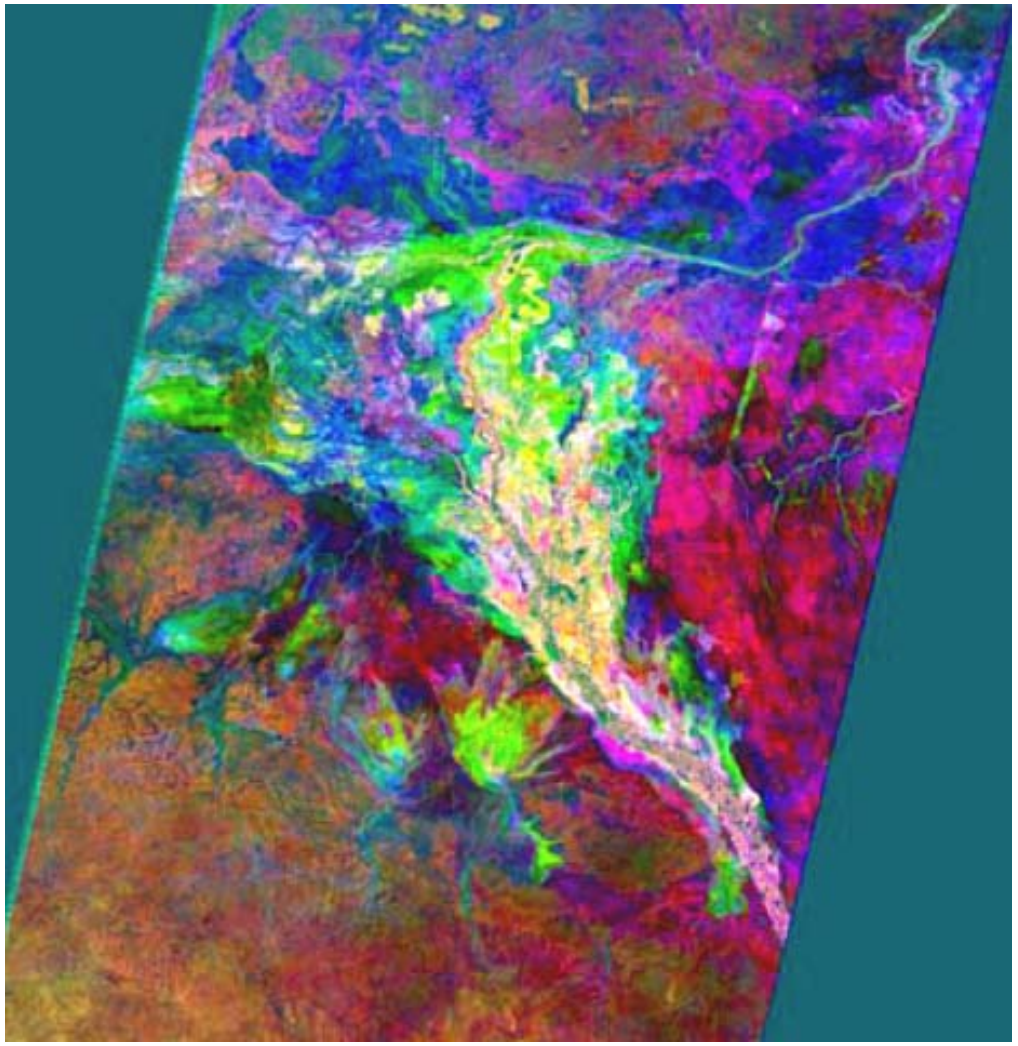
Mapping inundation extent using ALOS PALSAR (ScanSAR)





Country	Wetland area (ha)
Eritrea	130
Chad	5110
Burundi	11,040
DRC	23,050
Kenya	57,270
Ethiopia	208,030
Rwanda	331,250
Egypt	497,210
Tanzania	1,247,260
Uganda	1,787,200
Sudan	14,181,930
Total	18,349,480

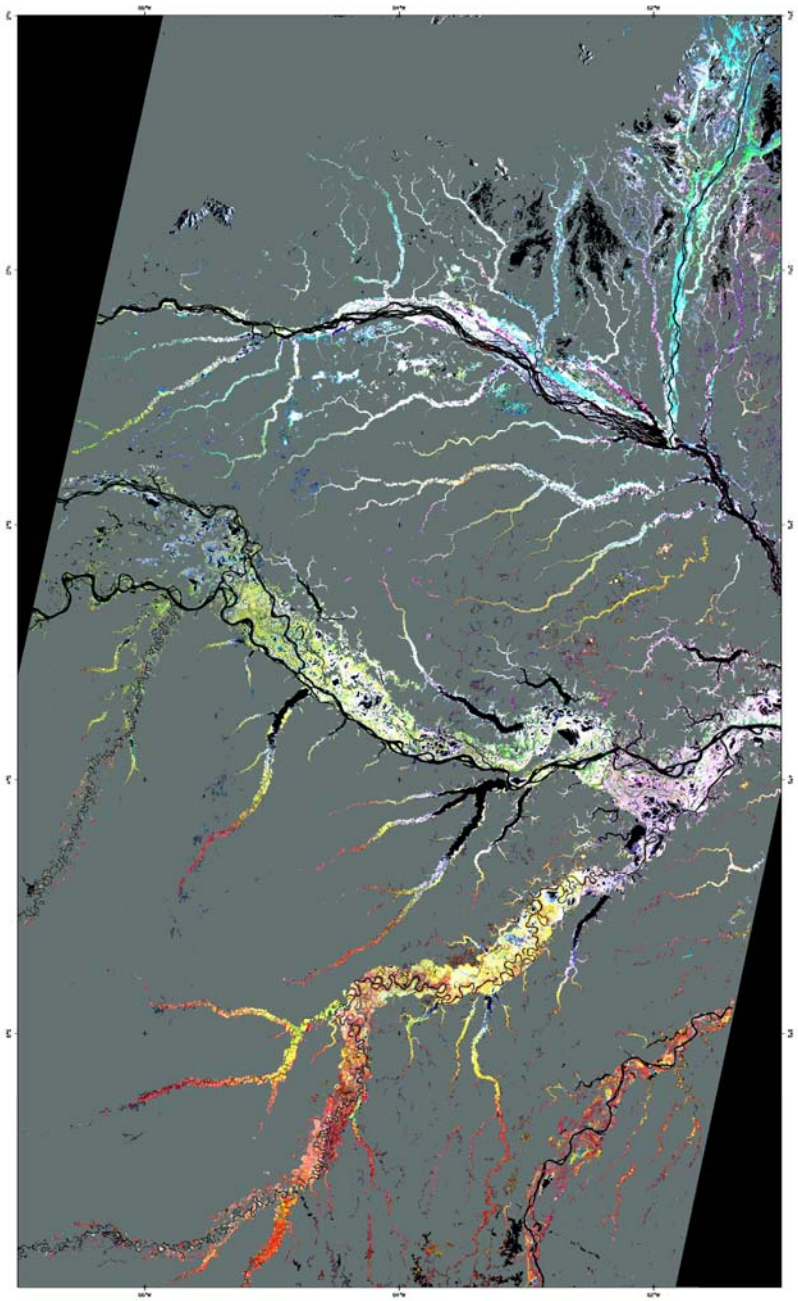
Sudd Marshes

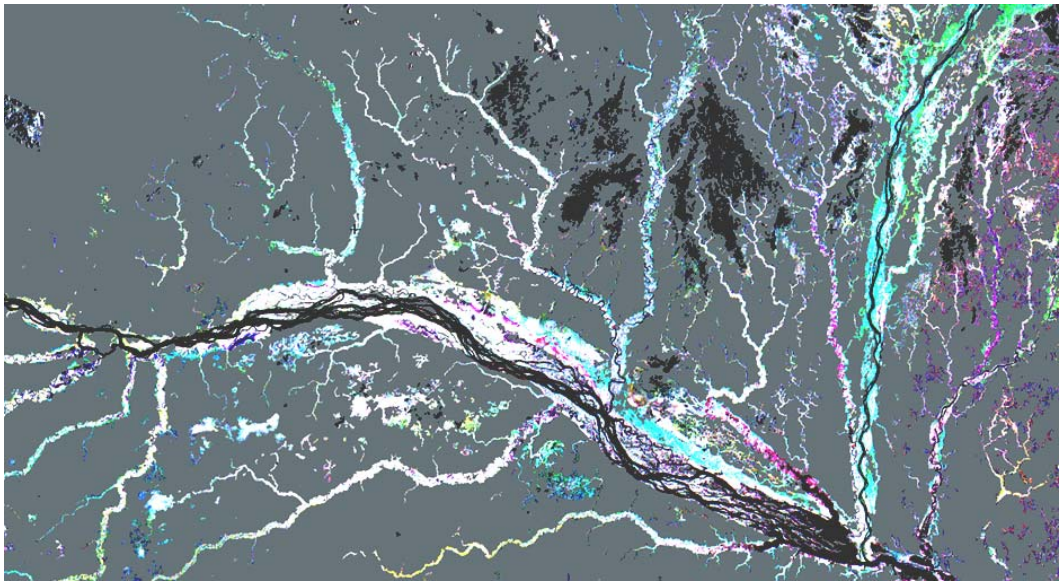


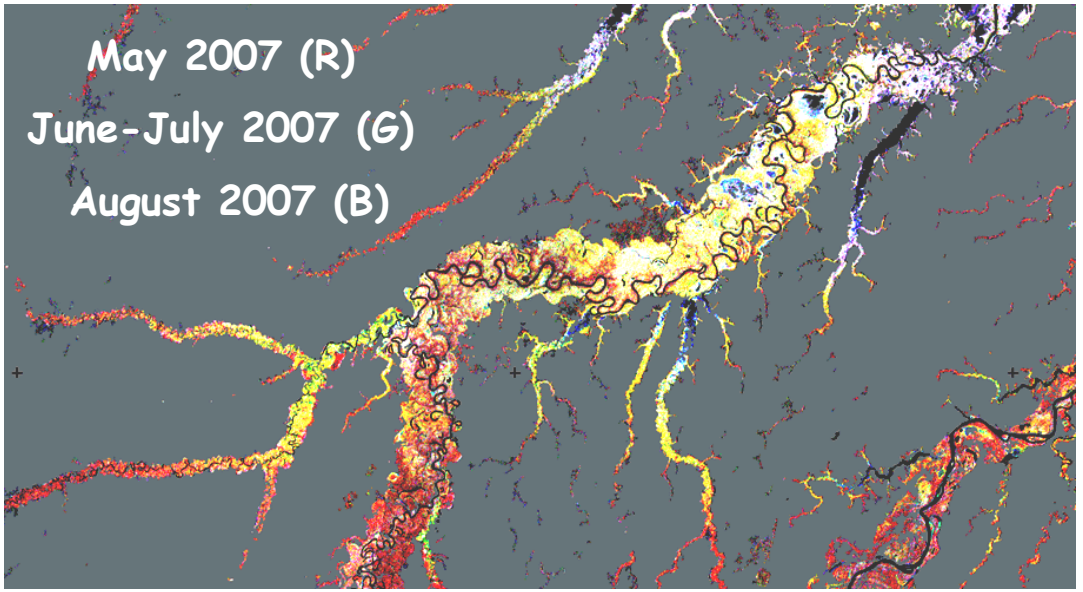
ALOS

Central Amazon Wetlands Inundation Periodicity

Laura Hess



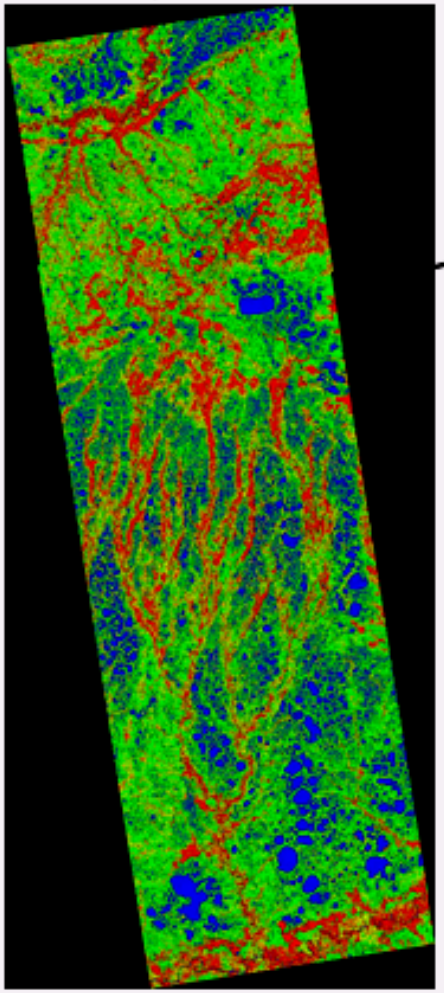




ALOS Global Monitoring of Wetland Extent and Dynamics: Boreal Wetlands

Kyle McDonald

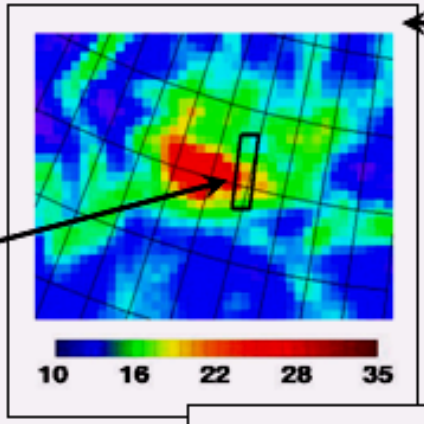
Wetland Classification of Servut Basin, Northern Siberia



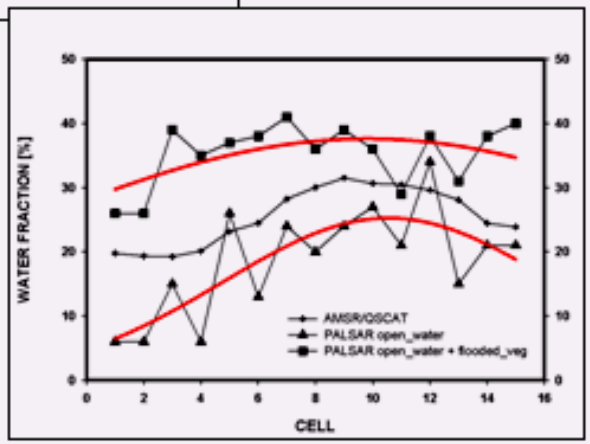
Open water | Inundated Vegetation | Saturated Soil | Vegetation

Harmonization of Data Products

Comparison of PALSAR products with coarse-resolution inundation products



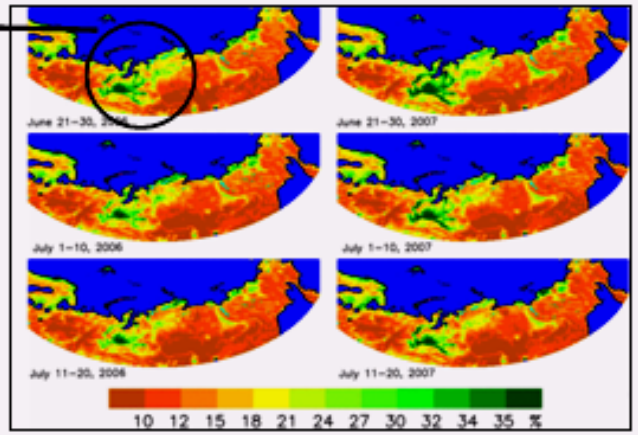
Comparisons of aggregate high resolution ALOS PALSAR surface water fraction (open water plus inundated vegetation) with AMSR-E/QSCAT for July 11, 2006 across the Western Siberian Lowland transect.

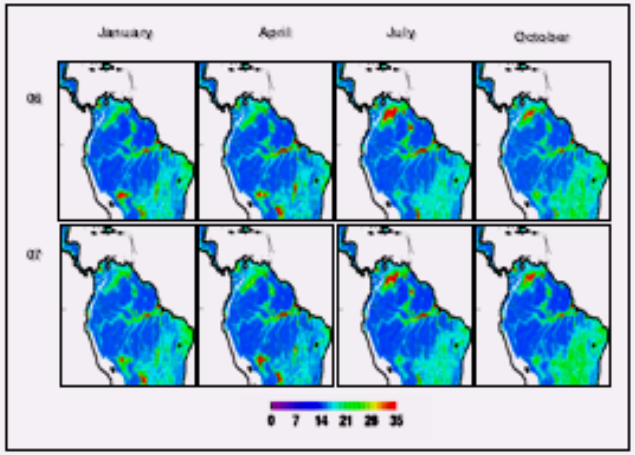


The top figure depicts the compared area delineated with the black box. The graph shows the comparison between high and low resolution data. The AMSR-E/QuikScat product is sensitive to open water and to open water and flooded vegetation.

Landscape Inundation

Inundation Fraction 2006 vs. 2007 from AMSR-E and QuikSCAT





10 day composites of landscape inundation fraction for 2006 and 2007 for Northern Eurasia and the Amazon

K&C deliverables: Mangroves

- A standardized object-orientated method for characterising mangroves and detecting change.
- Mangrove structural classification and change map (Australia) – under-validation and to be revised using finer resolution DEMs (for 2007)
- Mangrove structural classification and change map (Belize) – under validation (for 2007)
- Mangrove change map (Amazon-influenced coast) – under validation
- Mangrove structural classification and change map (2007-2009) (Australia)
- Mangrove change map (2007-2009; Belize)
- Mangrove change map (2007-2009; parts of SE Asia)
- Mangrove change map (2007-2009; Brazil, Amazon-influenced coast).
- Map identifying hotspots of change
- Recommended protocol for structural classification and change detection at a global level using ALOS PALSAR data mosaics.

K&C deliverables: Rice extent, cropping intensity, and hydroperiod

- Poyang Watershed, China 2007
- California, 2007
- SE Asia 2007
- Java 2007
- China & SE Asia 2007
- SE Asia 2008
- India 2008
- California 2008/09
- China & SE Asia 2009

K&C deliverables: Wetland extent, vegetation, and seasonal inundation and/or freeze/thaw

Africa:

Lake Chilwa, Malawi

Lake Urema, Mozambique

Sudd wetland

Ethiopiam wetlands

Tropical and Subtropical Americas:

Pantanal

Amazon floodplain

Amazo basinwide

Tropical-Subtropical Asia and Australia:

Tonle Sap Basin

Murray-Darling Basin

Indonesia and PNG

Boreal N. America and Eurasia:

Alaska

Siberia

Publications

Lucas, R.M., (2009). Characterisation and monitoring of mangroves using ALOS PALSAR data. K&C Phase-1 report

Lucas, R.M., Carreiras, J.M.B., Proisy, C. and Bunting, P.F. (2008). ALOS PALSAR applications in the tropics and subtropics: characterising, mapping and detecting change in forests and coastal wetlands. Proceedings, 2nd Joint PI Symposium of ALOS data notes for ALOS Science Program, Rhodes (Greece), 3-7 November, 2008.

Lucas, R.M., Carreiras, J.M.B., Bunting, P.J. and Armston, J. (2007). Pre-processing and geocoding of ALOS PALSAR data over Queensland, Australia. Proceedings, ALOS PI Workshop, Kyoto, Japan, November, 2007.

Lucas, R.M., Mitchell, A.L., Rosenqvist, A., Proisy, C., Melius, A. and Ticehurst, C. (2007) The potential of L-band SAR for quantifying mangrove characteristics and change. Case studies from the tropics and subtropics. Aquatic conservation: marine and freshwater ecosystems - Special Issue: Radar Applications for Wetlands Management, 17, 245-264.

Lucas, R.M. et al. (2010). Application of ALOS PALSAR data for regional detection of change in mangrove associated with natural events and processes and anthropogenic activity (in prep.)

Lucas, R.M. and Ticehurst, C. (2010). Recent response of mangroves to change in the Gulf of Carpentaria, northern Australia, based on time-series analysis of ALOS PALSAR, Landsat sensor and MODIS data (in prep).

Lucas, R.M., Accad, A., Wilson, B and Li, J. (2010). ALOS PALSAR data for characterising and mapping wetlands: Case studies from Queensland, Australia (in prep).

Publications

Wang, C, Wu, J, Zhang, Y., Pan, G., Qi, J., and W. Salas, 2008, Characterizing L-band scattering of paddy rice in southeast China with radiative transfer model and multi-temporal ALOS/PALSAR imagery, accepted, IEEE Transactions on Geoscience and Remote Sensing..

Zhang, Y., Wang, C., Wu, J., Qi, J., and W. Salas, 2008, Mapping Paddy Rice with Multi-temporal ALOS PALSAR Imagery in Southeast China, accepted, International Journal of Remote Sensing.

Salas, W., Boles, S., Li, C., Yeluripati, J., Xiao, X., Frolking, S., and Green, P., 2007, Role of satellite radar observations and biogeochemical models for regional mapping and modeling of greenhouse gas emissions from rice paddies, Journal of Aquati Conservation, Marine and Freshwater Ecosystems 17, 319-329.

Torbick, Salas, Xiao. Torbick, N. Xaingming, X., Salas, W. 2009. Mapping rice agriculture in monsoon Asia with PALSAR. NA Land Cover Land Use Change Science Team Meeting 2009. Washington DC.

Torbick and Salas. Mapping and Monitoring of Rice with Multi-temporal PALSAR: Developing Spatially and Temporally Explic Products for Modeling Methane Emissions at Regional to National Scales. International GEO Workshop on Synthetic Aperture Radar (SAR) to Support Agricultural Monitoring

Torbick, Salas. Xiao. 2009. Monitoring rice agriculture in the Sacramento Valley, USA with multitemporal PALSAR and MODI imagery. JSTARS (in review).

Torbick, Salas, et al. 2009 Integrating PALSAR, MODIS, and Landsat for regional mapping of agro-ecological paddy attributes the Poyang Lake Watershed, China. IEEE JSTARS Special K&C Issue (in review).

Salas, Torbick, et al. 2010 Assessing California rice agriculture greenhouse gas emissions with PALSAR products. (in prep).

Torbick, Salas, et al. 2010 Mapping rice agroecological attributes to assess methane emissions in the Sacramento Valley. (in prep)

Torbick, Salas, et al 2010. Utilizing multitemporal PALSAR to map rice cropping systems in Indonesia for disease monitoring (

Publications

Rebelo, L-.M.; McCartney, M.P.; Finlayson, C.M. The application of geospatial analyses to support an integrated study into the ecological character and sustainable use of Lake Chilwa. Journal of Great Lakes Research, Accepted Jan 2010

Rebelo, L.-M. Eco-hydrological characterization of inland wetlands in Africa using L-band SAR. IEEE Journal of Special Topics in Earth Observation and Remote Sensing

Rebelo, L.-M., Beilfuss, R., McCartney, M., Finlayson, C.M. Managing wetlands to support livelihoods and wildlife: The case of the Lake Urema ecosystem, Mozambique (Waiting for Special Issue).

Milne, A.K., and Tapley, I.J.,2007. 'Assessment of wetland ecosystems and change in the Tonle Sap Basin, Cambodia, using AIRSAR and JERS-1 radar data'. Asian Journal of Geoinformatics, 7, 2: 21-29.

Milne, A.K and Mitchell, A.L. Remote sensing requirements of Riverbank: monitoring environmental water flows and their effects. Research report prepared for the Department of Environment and Conservation, Sydney, August 2006, pp99.

Mitchell,A., Ge,L., Hsing-Chung Chang and Milne,A.K., Airborne Laser Scanner and Radar Interferometry for Digital Topographic Modelling in Coastal Environments of NSW: Wollongong Local Government Area, Report to NSW Department of Lands and Wollongong Council, March 2007, pp123.

Milne, A.K., Mitchell, A.L., Tapley, I.J. and Powell, M.J. Use of L-band radar to interpret inundation patterns in the Macquarie Marshes and Gwydir wetlands. Unpublished report submitted to the NSW Department of Environment and Climate Change (DECC), Sydney, November 2007,pp77.

Milne, A.K., Tapley, I. , Mitchell, A.L., and Powell, M.J. Trial of L-band radar for mapping inundation patterns in the Macquarie Marshes, Volumes I, II and III, Consultancy Report Prepared for the NSW Department of Environment and Climate Change (DECC), Sydney, December, 2008,pp280

Publications

L. Hess. L-band backscattering from woody vegetation of Amazonian wetlands (in prep.).

L. Hess, E. Novo, L. Durieux, A. Affonso, and E. Arraut. Mapping of Amazonian várzea habitats using combined ALOS PALSAR and optical datasets (JSTARS to be submitted).

L. Hess, L. Durieux, E. Novo, B. Chapman. Seasonal variability of central Amazonian wetland inundation (in prep).

L. Hess, F. Seyler, et al. Relating satellite-measured variability of surface water extent and height in Amazonian wetlands to hydrologic parameters (in prep.)

T J Bohn, D P Lettenmaier, K Sathulur, L C Bowling, E Podest, K C McDonald and T Friborg, 2007. Methane emissions from western Siberian wetlands: heterogeneity and sensitivity to climate change. Environmental Research Letters, doi:10.1088/1748-9326/2/4/045015

J Whitcomb, M. Moghaddam, K McDonald, J Kellndorfer, E Podest, 2009. Mapping vegetated wetlands of Alaska using L-band radar satellite imagery. Canadian Journal of Remote Sensing, vol. 35 no 1. pp 54-72.

R Schroeder, M A Rawlins, K C McDonald, E Podest, R Zimmermann and M Kueppers, 2010. “Satellite Microwave Remote Sensing of North Eurasian Inundation Dynamics: Development of Coarse-Resolution Products and Comparison with High-Resolution Synthetic Aperture Radar Data. Ecological Research Letters, special issue on Northern Hemisphere high latitude climate and environmental change (in review)

Podest, McDonald et al, “land cover classification of selected hydrologic basins in Northern Eurasia with L-band SAR for characterization of land-atmosphere carbon exchange” (2010)

Podest, McDonald et al, “Mapping open water on Alaska with L-band SAR (2010)

McDonald, Schroeder et al (K&C wetlands team?) Assessment of coarse resolution inundation mappings using high resolution K&C wetlands products (2011?)

KC strip data issues

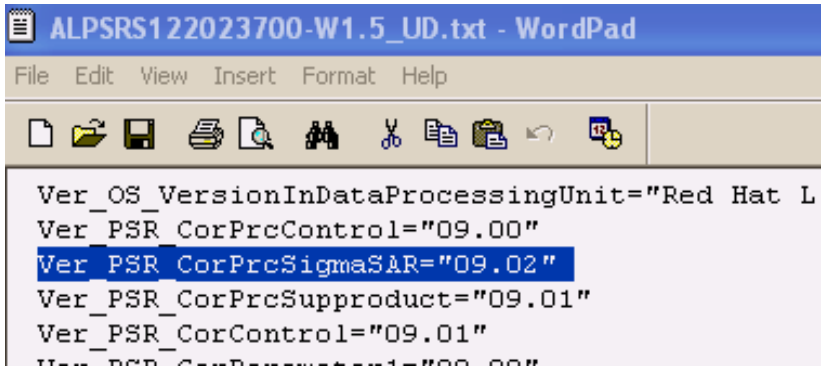
- Small date-to-date geolocation offsets (1-3 pixels), increasing along-track, in Gamma products
  - Maurizio will implement improved Doppler characterization in Gamma
- Occasional large geolocation errors associated with large Doppler (1000 Hz)
  - Problem understood; Doppler steering was turned off during these acquisitions, so software couldn't handle properly; Gamma software will be updated to remedy this
- Cross-swath radiometric variations in ScanSAR
  - dynamic gain correction across swaths is the cause of changes across swath; histogram matching is done between beams; these gain variations show up between dates, esp in band ratios for change detection, causing a problem for automated analysis;
  - no clear systematic solution for this; Francesco's solution: empirical correction for every strip

General data issues

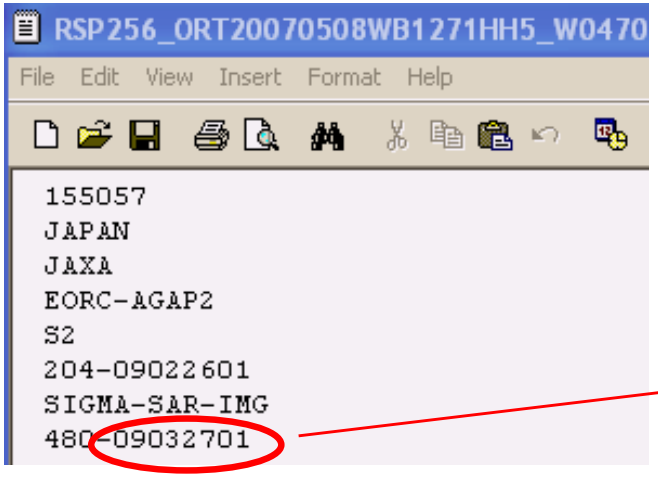
- "Josef's Problem" (for scenes obtained from ASF): areas in the overlap between adjacent frames along the same strip are not consistent (variation usually 0.1 to 0.2 dB, but in worst case up to 1 dB); antenna patterns are not consistent from scene to scene
  - Problem does not seem to exist in strips processed by Masanobu
  - Hypothesis: differences occur when different versions of SigmaSAR processor are used for adjacent scenes
  - Old processor version: 9.00 (before 31 July 2008); new version: 9.02
  - Recommendation to Josef: for products generated with 9.00, submit to ASF for re-processing

How to know which processor version was used?

- AUIG: bytes 61-76 of the volume file (e.g. VOL-ALPSRP073817120-H1.5GUA) give the processing date
- ASF:



- KC format:



YYMMDD-Seq;
before or after 31 July 2008

ALOS-2 Recommendations for Wetlands

1. Consistency of acquisition: ability to estimate inundation periodicity and rice cropping systems is **severely** impacted by dropped passes; team members will identify examples
2. Maintain 'workhorse' modes: FB Dual Pol & ScanSAR Dual Pol
3. Improved spatial resolution is higher priority than full polarimetry; consider 6 m for FBD, 50 m for ScanSAR (KC: 25 m FBD, 50 m ScanSAR?)
4. Team members will provide examples of effect of spatial resolution on classification accuracy
5. Expand coverage of northern latitude wetlands.
6. Timing of global FB cycles: team members will identify changes in timing (e.g., FBD timing) that could improve ability to characterize seasonality of inundation or vegetation

Metadata Update: MDweb, Jean Christophe Desconnets (IRD)

MDweb

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Tool for cataloging and locating environmental resources on the web

MDweb is an open source generic tool designed for such distributed collaborative work. It provides a web service to catalog, and help others locate resources, documents, and services for geographic or non-spatial information. MDweb is based on international geographic-information standards for metadata and communications.

MDweb focuses on the spatial and semantic aspects in resource description, and searches by using thematic and spatial reference bases specific to the target application. MDweb also includes extensive features to automate data entry and manage referential bases such as providing editing templates, building spatial databases and accessing thesauruses.

MDweb is based on JEE technologies, and implements the OGC CSW 2.0.2 specification using the ISO 19115 application schema.

This CSW implementation in the most recent MDweb version draws on the Java language metadata implementation of the Geotoolkit library to support multi-lingual searches while a transactional mode enables the harvesting of remote ISO 19115 Dublin Core, EbRIM compliant catalogs.

42, 28, or 14-day repeat: 28 or 14 could be done at least for particular periods

scansar needs to have equal priority with FB (easier because not competing with optical instruments)

Ake will provide input to JAXA in March

#1 12 looks

#5 30 looks

If 50 m, fewer looks

ScanSAR statistics: Show Masanobu how many strips show stripes