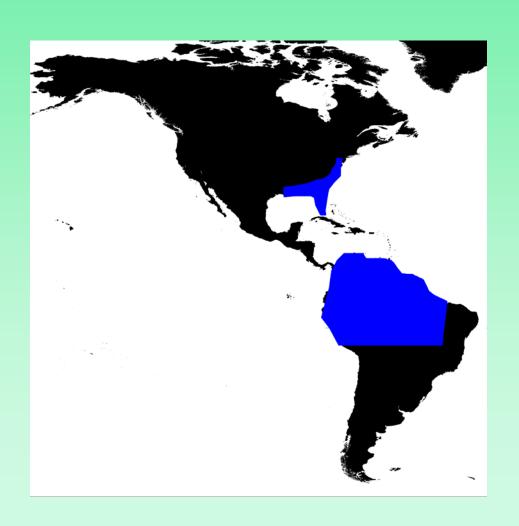
ALOS K&C Product Update for UCSB



Laura Hess

Institute for Computational Earth System Science

University of California Santa Barbara

ALOS KC 9

Products for northern South America (Scan_G1) and Southeastern United States (Scan_F4)

- Wetland extent and vegetation structure
- Seasonal monitoring of inundation and vegetation

Applications

- Carbon cycle: modeling of CH4 and CO2 emissions
- Conventions: wetland inventory for Ramsar and Convention on Biodiversity
- Conservation: SAR-based habitat mapping for reserve location and conservation planning on the varzea

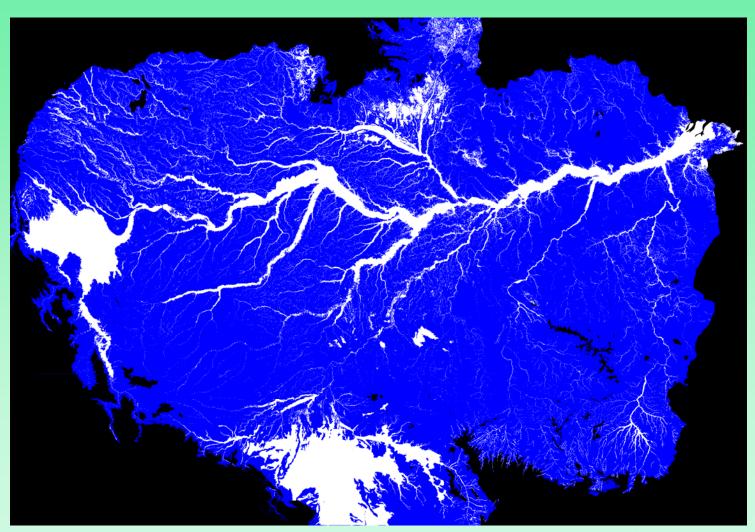
Collaborators

- KC agreement: Maycira Costa, Bruce Chapman, Evlyn Novo (INPE), Bruce Forsberg (INPA), Fernando Pellon (Petrobras)
- Pending FAPESP proposal: Ana Albernaz (Goeldi Museum), Dilce Rossetti (INPE), Bob Pressey (University of Queensland)
- NASA-MEASURES proposal: Kyle McDonald, PI
- KC Wetlands Team

A Global Inundated Wetlands Earth Science Data Record (IW-ESDR)

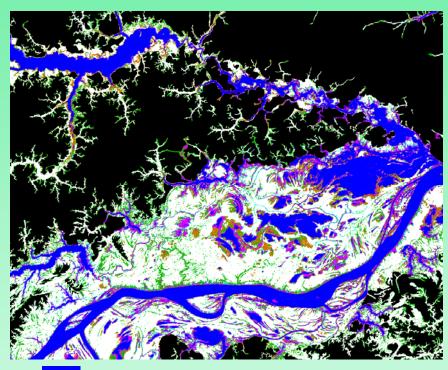
- •This 5-year project funds a major portion of NASA's work with the ALOS Kyoto & Carbon project for the wetlands and mosaicking theme (PI: Kyle McDonald, NASA/JPL)
- Funding is through NASA MEaSUREs (Making EArth System data records for Use in Research Environments), a program dedicated to making science products available to the research community
- •The objective of this task is a global inundated-wetlands Earth System Data Record with an ALOS PALSAR- based high-resolution component and a long-term coarse resolution component derived from multiple satellite data sources including SSM/I and ERS scatterometer
- •The high-resolution mapping will be used to improve and validate existing coarse-resolution algorithms
- · Work during 2008-2009 focuses on our existing KC prototype sites

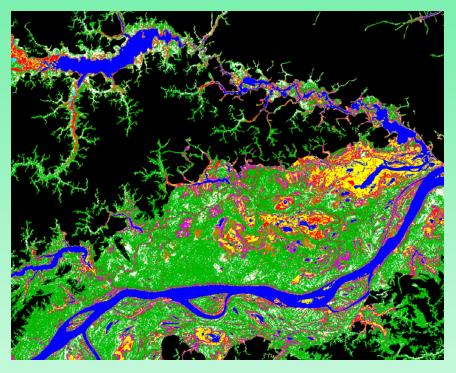
Amazon Basin Wetlands Extent (100 m)



Amazon Basin below 500m: wetlands 17%, uplands 83%

Wetland habitats at Cabaliana site, high and low water stages





Water

Bare/herbaceous, non-flooded

Herbaceous, flooded

Shrub, non-flooded

Shrub, flooded

Woodland, flooded

Forest, non-flooded

Forest, flooded

Processing Status

Amazon (G1)

- fine beam dual-pol, cycle 12-13, Jun 2007 Aug 2007
- ScanSAR every cycle, 7-22 (Nov 2006 Oct 2008)
- -solar flares peaking Nov-Dec 2006 seriously impacted Amazon; assume actual coverage begins cycle 8-9 (Jan 2007)
- Requested processing:

```
FBD SLT: 69 passes (1 coverage);
```

WB SLT: 400 passes (25 passes x 16 coverages)

- Received as of 18 Jan:

FBD: 65 passes (processed 31 Aug - 5 Oct 2007)

- missing passes 68, 71, 116, 117

WB: 8 passes (processed 25 May - 8 June 2007)

Southeast US (F4)

- planned acquisitions cycles 9-16 (Jan 2007 Jan 2008)
- Requested processing:

WB SLT: 200 passes (25 passes x 8 coverages)

- Received as of 18 Jan: O passes

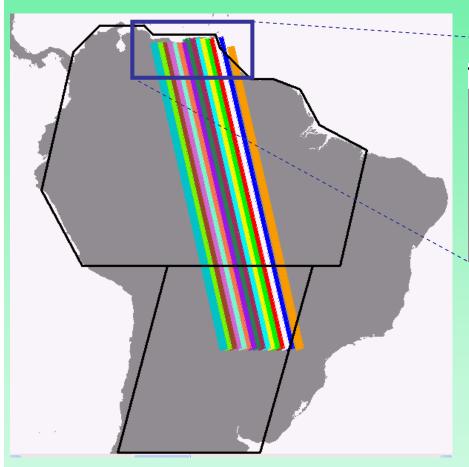
Data Analysis and Delivery Schedule

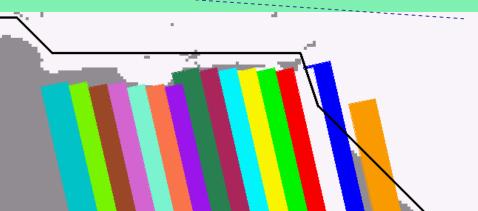
January 2009:

- Final product for Amazon prototype area (central Amazon)
- Final product for Southeast US prototype area (Altamaha River)
- Preliminary product for Amazon (G1) ScanSAR region
- Preliminary product for Southeast US(F4) ScanSAR region

Caveat: delivery depends on KC processing schedule

Data Issues



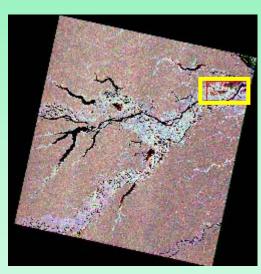


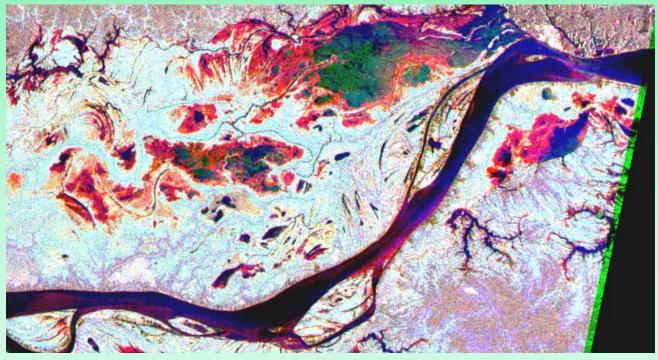
Start time omits coastline for many of the strips

ALOS KC 9 21-24 Jan 2008

ScanSAR (AUIG geocoded; 100 m):

- pass-to-pass geolocation < 1 pixel except for 1 date off by 5 pixels
- Due to scattering from rough water surfaces, near-range portion not useable for mapping; this has implications for systematic acquisition plan: we cannot depend on overlap to make up for missed acquisitions!





Amazon floodplain, 3-date composite

Comparison with JERS

GRFM-based mapping gave poor results for low-return targets such as savannas with low vegetation density



Roraima "lavrado" savanna

Fine Beam Dual Pol (K&C Path Product, slant range):

- lower noise floor and dual polarization provide muchimproved capability for mapping wetland savanna environments, relative to JERS

27 July 2007

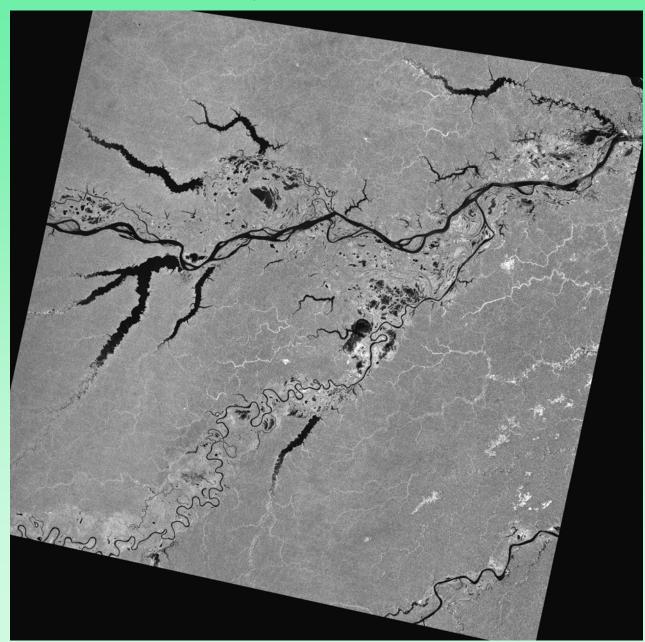
	НН	HV
Pond	-26.7	-33.5
Pond w/sedge	-25.5	-33.5
Bare dry soil	-21.8	-32.6
Campo sujo	-19.5	-30.4
Forest	-7.4	-16.2
Flooded forest	-5.9	-14.1
Flooded palm	-4.9	-24.9

-18 to -15 dB typical for water with JERS



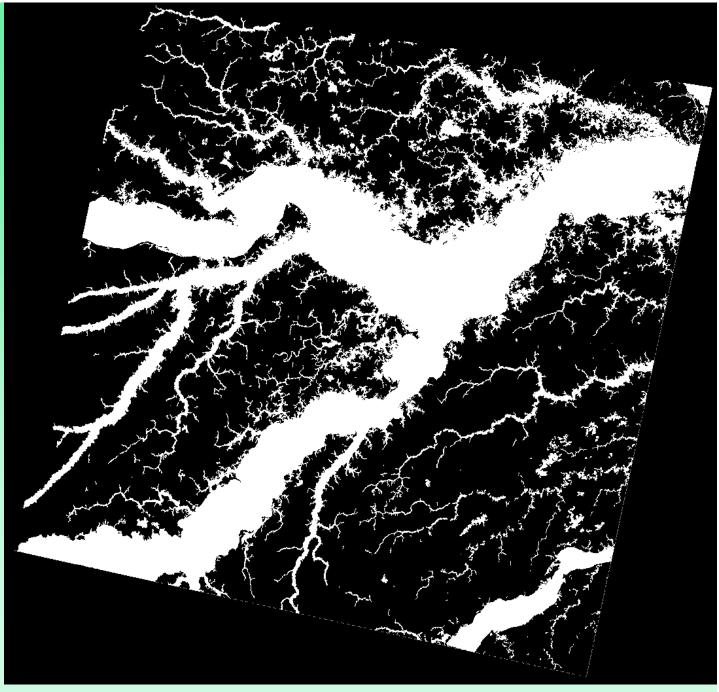
Roraima "lavrado" savanna, RGB=HH,HH,HV

Amazon and Purus Floodplains: ALOS ScanSAR Time Series



ALOS KC 9 21-24 Jan 2008

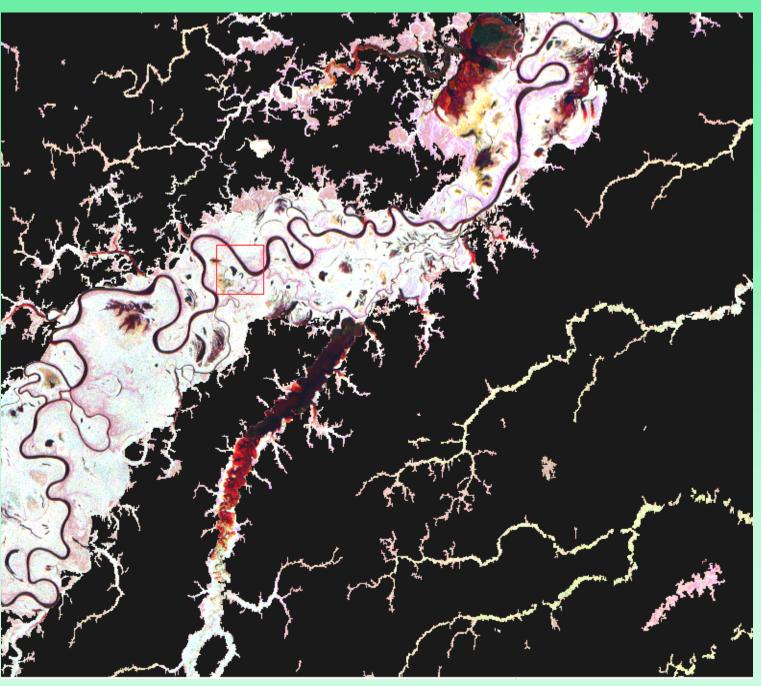
Wetlands mask (prelim.)



ALOS KC 9 21-24 Jan 2008

Purus floodplain (masked)

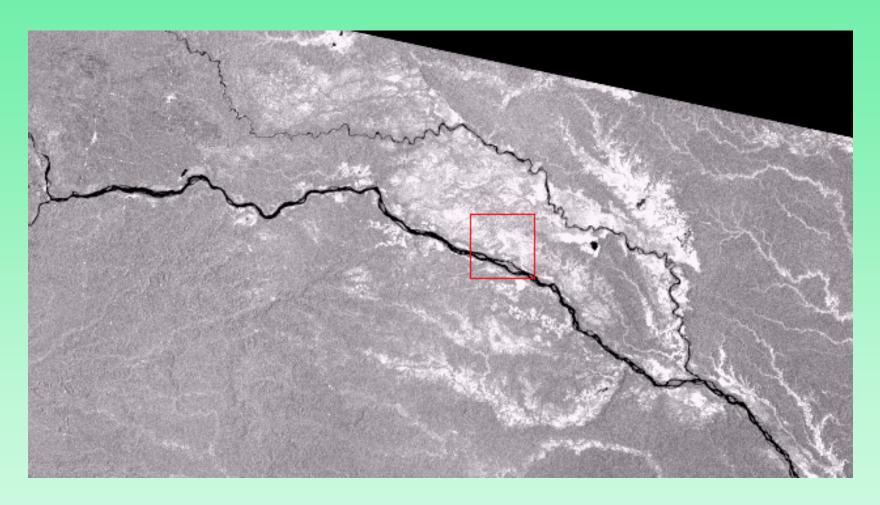
R=20061104 G=20070322 B=20070622



ALOS KC 9

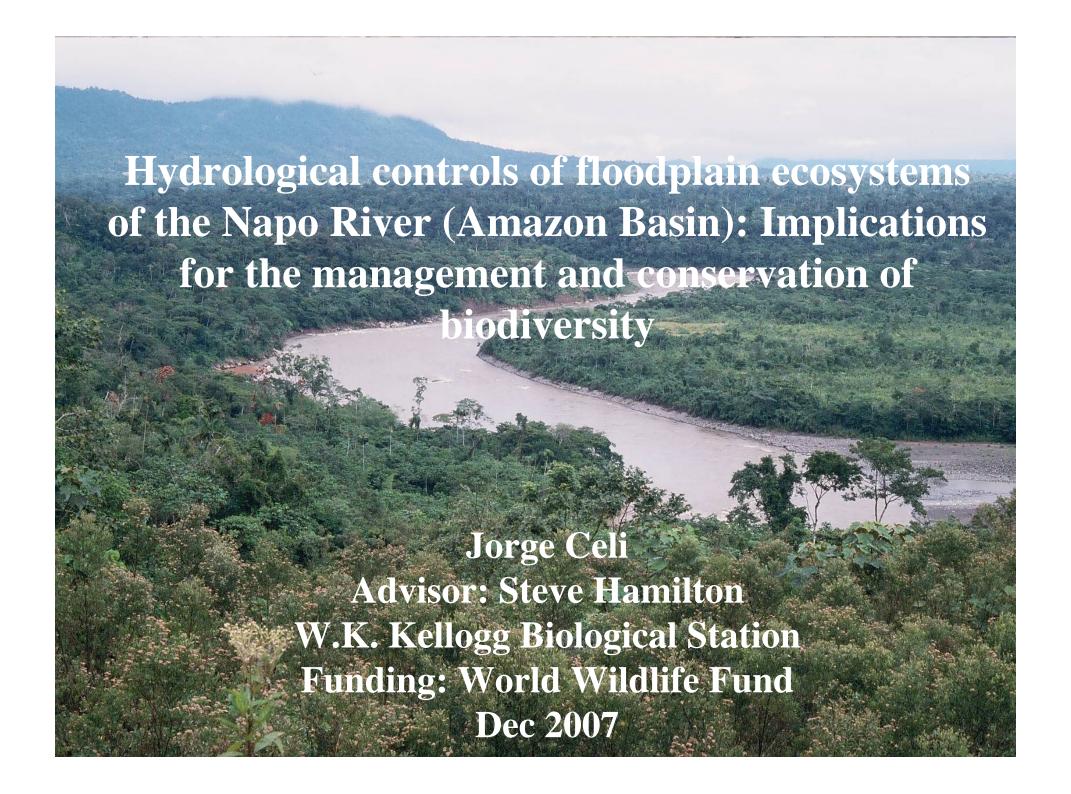
21-24 Jan 2008

Application Example: Napo River



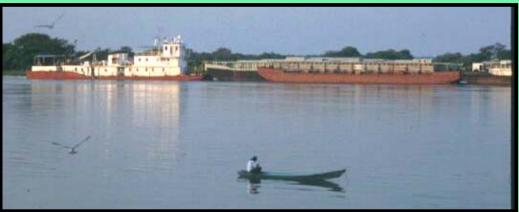
ALOS ScanSAR, 21 June 2007

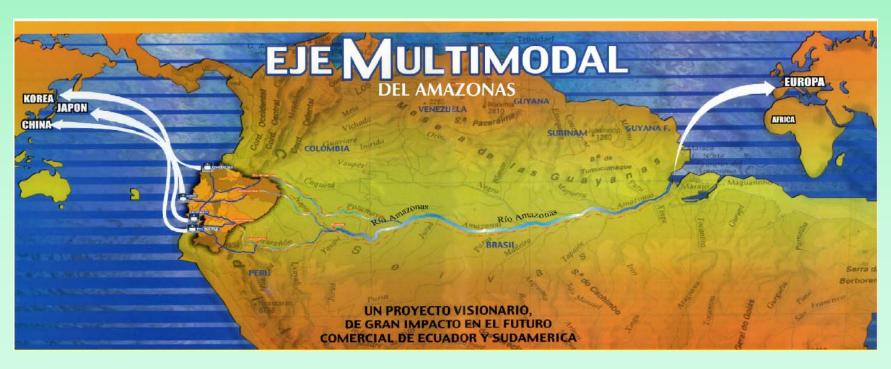
ALOS KC 9



Turning rivers into industrial waterways







Objectives

- 1) To assess the extent and diversity of aquatic environments associated with the Napo River.
- 2) To identify the spatial-temporal variability of areas directly and indirectly flooded by the Napo River, and by local precipitation/runoff.
- 3) To simulate effects of geomorphologic and hydrologic modifications caused by the development of a waterway on the ecohydrology of the river and floodplain environments.







ALOS K&C Global Algorithm for Wetlands Extent (A Modest Proposal)

- Goal: A transparent, published algorithm for distinguishing among:
 1. natural wetland, 2. paddy wetland, and 3. non-wetland for a broad range of wetland types, using ALOS PALSAR as primary dataset
- Results for both object-based and pixel-based algorithms
- Can include (near)-global ancillary datasets such as SRTM, GeoCover
- Show globally optimal vs. regionally optimal results
- Joint work of KC wetlands team members, carried out during 2008, culminating in paper aimed at e.g. Eos (Transactions, AGU)
- Each team member contributes ALOS and training/validation data for representative site/type (Ramsar advises); scenes OK, don't need mosaics
- Collaboration carried out on Wiki
- Promotes compatibility of end products of Forest and Wetland themes
- Useful for teaching and training; article references KC Web Site
- High-profile near-term product for ALOS K&C and JAXA