Mapping wetland dynamics with multi-temporal ALOS PALSAR SCANSAR imagery

Bruce Chapman[1], Laura Hess[2], Laurent Durieux[3], Eduardo Arraut[4], Bruce Marshall[5], and Kyle McDonald[1]

[1] Jet Propulsion Laboratory, California Institute of Technology
[2] University of California, Santa Barbara
[3] Inst. de Recherche pour le Développement – Brésil
[4] Remote Sensing Dept., National Institute for Space Research, Brazil – INPE
[5] National Institute for Amazonian Research – INPA

The extent and seasonal, inter-annual, and decadal variation of inundated wetland area play key roles in ecosystem dynamics. Despite their importance, current knowledge of the extent of global wetlands and the seasonal variability of surface waters is poor. Global land cover datasets derived from moderate-resolution optical sensors generally include few or no wetland classes other than open water, and do not capture the high temporal variability of surface waters. Coarse-resolution global mapping of seasonal inundation allows consistent multi-year comparison of inundated areas; however, the spatial resolution is not sufficient for some applications and validation of coarse-resolution results is difficult without finer-resolution datasets for comparison.

A NASA funded research task will be generating an Earth Science Data Record for global inundated wetlands (IW-ESDR). Wetland extent and dynamics will be characterized using ALOS PALSAR imagery and other sensors. The IW-ESDR will include wetland products generated from ALOS ScanSAR imagery over major wetland areas (see Figure 1). These ScanSAR images are 350 km wide, and are typically acquired in strips thousands of kilometers long that range from coast to coast. Complete coverage may be obtained every 46 days.

The ScanSAR imagery will be ortho-rectified to the best available DEM, and radiometrically calibrated. Both the bright "double bounce" reflection from inundated forests, and the dark specular scatter over open water are identifiable in the imagery. A time sequence of image strips will allow wetland dynamics to be characterized. This data will be used in conjunction with dual polarization fine beam ALOS PALSAR data, and lower resolution passive and active sensors to derive the wetland products that will make

up IW_ESDR. Preliminary results from this project are as expected, and reveal the dynamic nature of the wetlands.

Due to the dense multi-temporal sampling by ALOS ScanSAR, this task will also facilitate generating customizable image mosaics and products at the project website, where a user will be able to search for available imagery, and select which images or products are to be mosaicked.
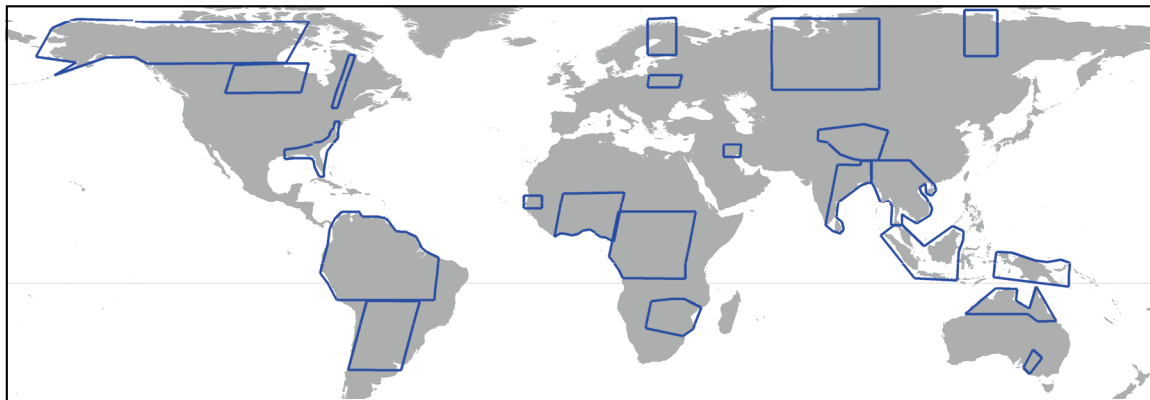
Figure 1: ALOS SCANSAR acquisition coverage

References:

Chapman, Bruce, Laura Hess, Laurent Durieux, Eduardo Arraut, Bruce Marshall, and Kyle McDonald ," Mapping Central Amazon Wetland Dynamics with Seasonal ALOS ScanSAR imagery", AGU Fall 2009.

Chapman, Bruce, Kyle McDonald, Laura Hess, Mahta Moghaddam, Jane Whitcomb, "ALOS PALSAR image mosaics of North and South America: an image layer for wetlands mapping", IGARSS 09.

Podest, Erika, Kyle McDonald, Bruce Chapman, John Kimball, Laura Hess, Mahta Moghaddam, Elaine Matthews, Catherine Prigent, "Assembly of an inunated wetlands Earth System Data Record: global monitoring of wetland extent and dynamics", IGARSS 09.