

## **INUNDATION MAPPING FOR GLOBAL WETLAND REGIONS: THE ALOS KYOTO & CARBON INITIATIVE WETLANDS PRODUCTS**

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The ALOS Kyoto & Carbon (K&C) Initiative, an international program headed by Japan's Aerospace Exploration Agency (JAXA), has completed Phase 1 of a coordinated effort to map inundation for Earth's major wetland regions at a spatial resolution of approximately 100 m. The K&C Wetlands Products were designed to support information needs in the areas of 1) carbon cycle science (particularly modeling of methane emissions), 2) international environmental conventions such as Ramsar, and 3) conservation applications such as biodiversity assessment and resource management. Derived from L-band synthetic aperture radar datasets acquired by the PALSAR instrument aboard JAXA's Advanced Land Observing (ALOS) satellite, the new products include maps of wetland extent, vegetation type, inundation frequency, and freeze-thaw state. During the project's initial phase, the ALOS K&C Wetlands team has developed prototype products for focus sites within broad wetland regions including the Amazon floodplain and Pantanal; the Congo, White Nile, and Zambezi basins and the Okavango Delta; the Mekong basin, Indonesia, Papua New Guinea, and northern Australia; the southeastern U.S.; Alaska and central Canada; and central Siberia. A further set of products focuses on wetland functional types including tropical peat swamps, mangroves, paddy rice, and lakes.

Like its predecessor Japanese Earth Resources Satellite (JERS-1; 1992-1998), the ALOS PALSAR has the ability to penetrate both cloud cover and most woody canopies, enabling it to map seasonal inundation of forested wetlands, regardless of cloud cover. Improved capabilities relative to JERS-1 include standard dual-polarization (L-HH/L-HV) fine beam mode and 5-beam ScanSAR mode (350 km swath width, 46-day repeat cycle), as well as lower noise floor and improved radiometric and geometric accuracy. The science objectives of ALOS K&C are addressed within the framework of a systematic observation strategy geared towards four themes: Forests, Wetlands, Deserts and Semi-arid Regions, and Continental-scale Mosaics. Descending PALSAR passes are dedicated to observation of 27 globally significant wetland regions. Since full global coverage cannot be obtained within a single 46-day cycle, PALSAR acquisitions are scheduled within continental or sub-continental scale polygons. Each wetland region receives 8-9 ScanSAR coverages per year, for at least one year and for some regions continuously, as well as at least one fine-beam (dual-pol) coverage per year, enabling characterization of a complete annual flood cycle for most regions.

To facilitate regional-scale analyses, ALOS K&C data are processed in strip mode at reduced resolution (approximately 50 m fine-beam, 100 m ScanSAR), terrain-corrected using the SRTM DEM, and mosaicked. Classification algorithms and classes vary according to region, application, and utilization of ancillary optical datasets. Classification schemes range from those using basic vegetation structure and cover classes (herbaceous, woody; closed, open) to those incorporating more detailed information on community composition (peat swamps, mangroves, aquatic macrophytes) or on management practices such as number of cropping cycles for paddy rice. However, all products incorporate information on minimum, maximum, and seasonal extent of inundation. Based on validation efforts of individual investigators, Phase 1 results indicate good accuracies for mapping both wetland extent and inundation using ALOS PALSAR. The wetlands products and documentation are being made available through the ALOS K&C web site. During Phase II, K&C team members will expand their products from prototype sites to the larger wetland regions, collectively producing the first high-resolution inundation mapping for global wetland regions.