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<th>3-6 Coastal Monitoring using L-band SAR image Data</th>
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<td>Author(s)</td>
<td>TANAKA, Akiko</td>
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Kyoto University
SAR is a powerful remote sensing system, and conventional InSAR and PSInSAR has found wide application in the study of Earth surface change. Some applications in coastal regions are introduced. Coastal geomorphology is highly variable as it is affected by sea-level changes and other naturally- and human-induced fluctuations. To effectively assess and monitor geomorphological changes in various time scales is thus critical for coastal management. Asian mega deltas are vulnerable to a sea-level rise due to its low-lying delta plain, and are dynamic region given a large amount of sediment supply. However, limited data availability and accessibility in the deltas have prevented establishment of systematic coastal monitoring. A variety of remote sensing systems can be used to monitor geomorphological changes in coastal areas as it has wide spatial coverage and high temporal repeatability. Especially, analysis using SAR data not affected by the cloud conditions offer potential for monitoring in the monsoon Asia region. I present that L-band SAR data are useful for monitoring coastal areas on a regional scale.

Figure caption: (upper) Map of the study area showing locations of the three river-mouth bars (RM hereafter, small white squares) investigated in this study. Dashed rectangles show the approximate areas of coverage of the ALOS PALSAR data used (path and frame numbers are annotated). (lower) Changes of areal extents of RM1 (upper panels) and RM2 (lower panels) derived by color additive analysis over three periods in this study.
Coastal Monitoring using L-band SAR image Data

L-band SARを用いた沿岸域のモニタリング

Akiko TANAKA

Geological Survey of Japan, AIST
- Coastal monitoring by InSAR?

- Deltas are wet and flat where InSAR is difficult.

- Rapid (groundwater-related?) subsidence was detected by InSAR.

- However, ....
Asian Mega-Deltas
Yellow River Delta

Landsat 7/TM 2000/05/02

http://earthobservatory.nasa.gov
PALSAR Interferogram

Master: 2007/07/15; Slave: 2008/06/01

There has been NO deformation since 2007?

11.8 cm toward the satellite
PALSAR Interferogram

Master: 2008/03/14; Slave: 2010/04/22
PALSAR Interferogram

Master: 2008/03/14; Slave: 2010/04/22

> 30 cm / 2 years subsidence

11.8 cm toward the satellite
PALSAR Interferogram

Master: 2008/03/14; Slave: 2010/04/22
PALSAR Interferogram
Master: 2008/03/14; Slave: 2010/04/22
Quantification of Temporal Changes to River-Mouth Bars from L-band SAR Images: a Case Study in the Mekong River Delta
Schematic illustration showing evolution of Mekong River delta plains. River mouth at 3.3–3.5 ka reflects main incised valley of Mekong River delta. Longshore drift of sand is driven by dominant winter monsoon and associated waves and currents. [Tamura et al., 2012]
Study Area

ALOS (Advanced Land Observing Satellite) PALSAR (Phased Array type L-band SAR)
December 2006 - January 2011
FBS/FBD, off-nadir angle: 34.3°
Thresholding Algorithm

ALOS PALSAR Backscatter Intensity Image of RM1 Acquired on 3 January 2011
Annual Changes of River-Mouth Bars

Calendar Year

Ascending
[Path-Frame: 477-190 (○), 478-180 (□)]

Descending
[Path-Frame: 110-3420 (x), 110-3430 (△)]
Seasonal Changes of River-Mouth Bars

- Area Residuals [km²]
- Tidal Height [mm]
- Relative Sea Level [mm]
- Water Discharge [m³/s]
- Rainfall [mm]

Geological Survey of Japan, AIST
Tidal heights at the time of SAR data acquisition clearly correlated with the emergent areas of the RM bars.
Tidal heights at the time of SAR data acquisition clearly correlated with the emergent areas of the RM bars.
Sedimentation/Erosion Pattern

RM1 sedimentation in dry season

erosion

RM2 in wet season

R: 26 January 2009
GB: 13 June 2009

R: 13 June 2009
GB: 29 January 2010

R: 24 January 2008
GB: 29 January 2010
Conclusions

- Time-series analyses of ALOS PALSAR data show that radar backscatter images can be used to quantitatively delineate changes, spanning several years, of the areal extent of river-mouth bars in the Mekong River distributaries.

- Areal extents of three river-mouth bars revealed annual and seasonal variations.

- Tidal heights at the time of SAR data acquisition clearly correlated with the emergent areas of the river-mouth bars.

- Sequential SAR images of river-mouth bars can also provide an overview of patterns of sedimentation and erosion.