

# Applying RS/GIS Technologies for Causality Analysis of Groundwater Level and Land Subsidence



KATSUYA HOMMA  
PASCO Corporation  
October.2018

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# Background

- Needs for prompt actions against Land Subsidence
- Excessive extraction of groundwater
- Spatial information technologies are becoming essential tool

## Goals of countermeasures against land subsidence

①

Establish  
Monitoring  
structure

②

Control  
volume of  
ground water

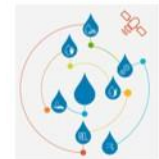
③

Develop  
Alternative  
water resources

④

Increase  
social awareness

*(Quoted from PCLS project in Jakarta)*



# RS/GIS Technologies Support Evidence-based Actions

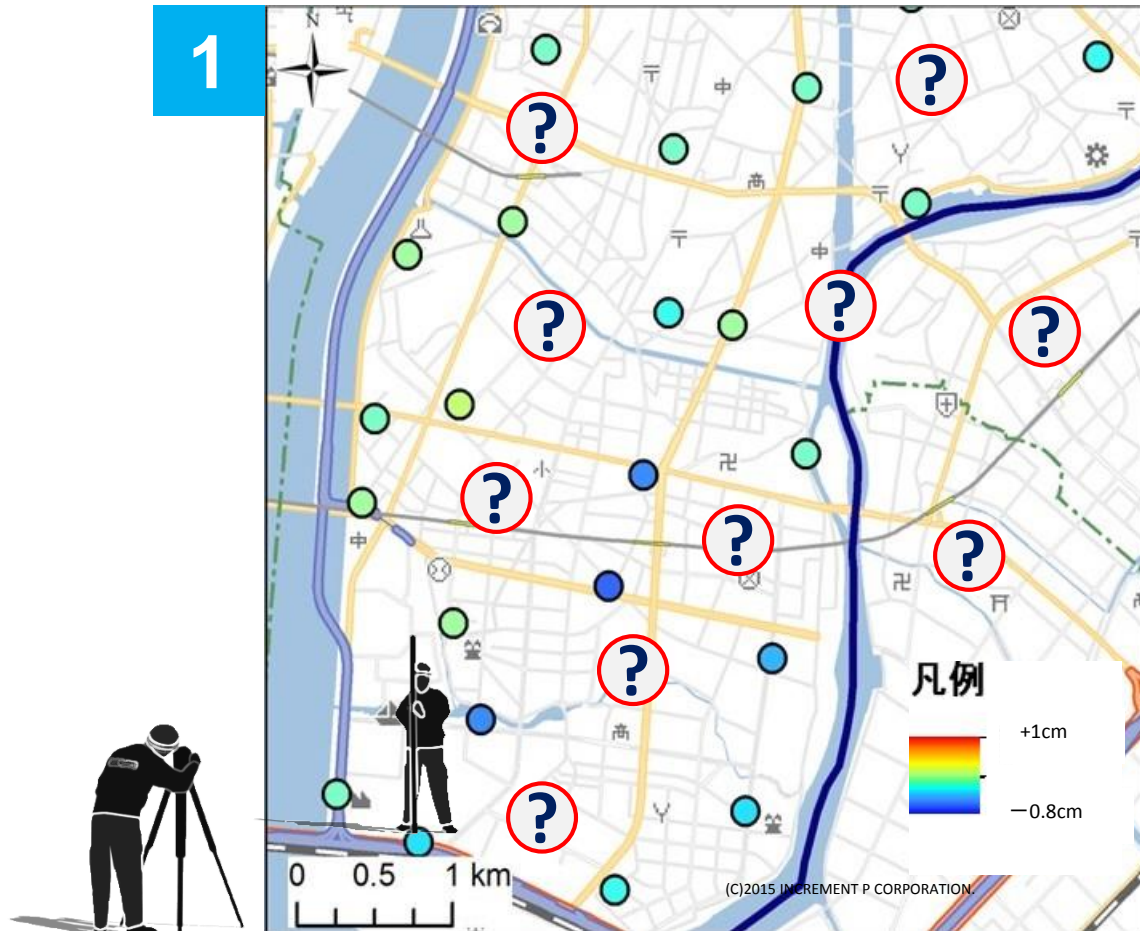
## Capability of RS/GIS

- Integrate spatial/non-spatial data
- Support spatiotemporal scale
- Accelerate communication
- Provide spatial insight
- Produce future image (Modelling)

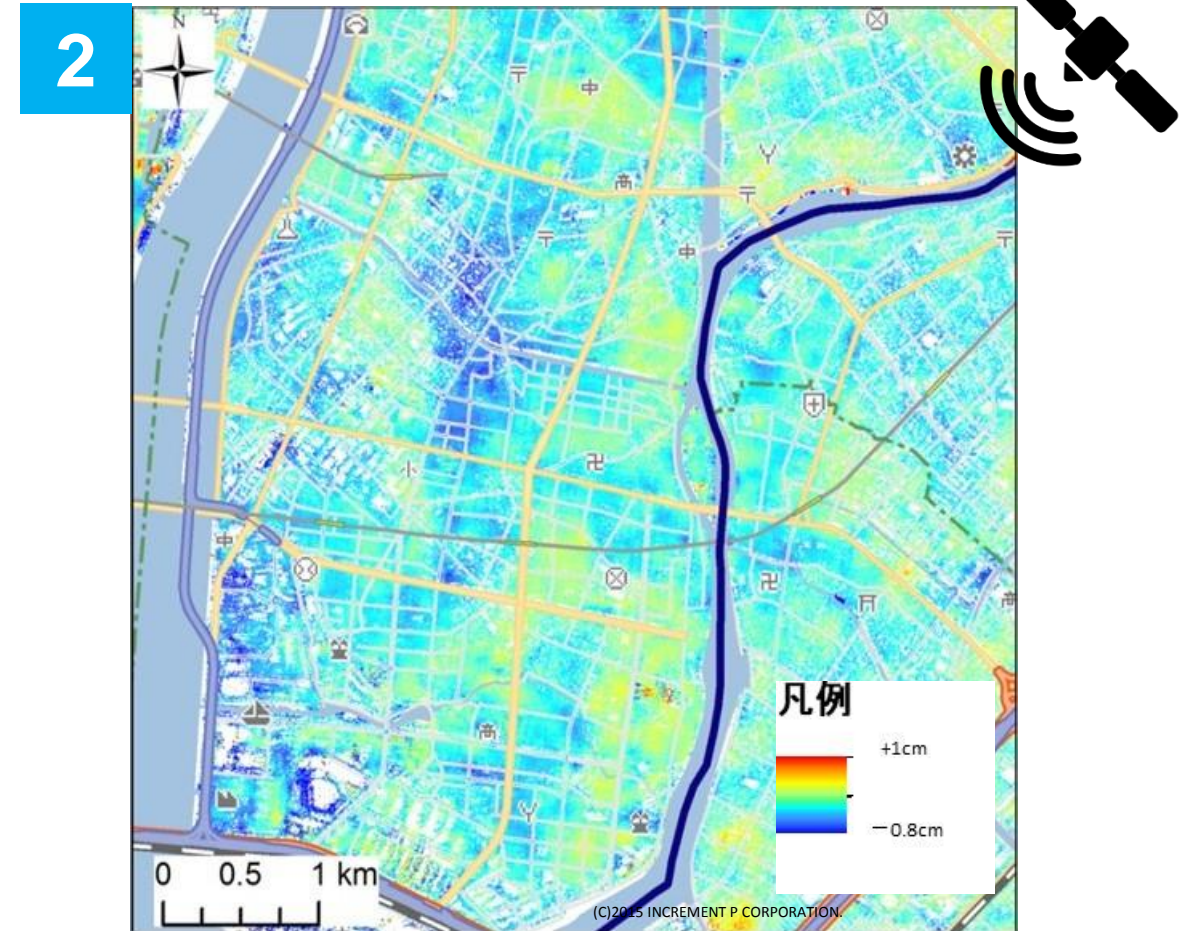




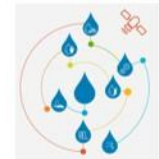
# Use of Satellite Remote Sensing Technology (InSAR)



Levelling

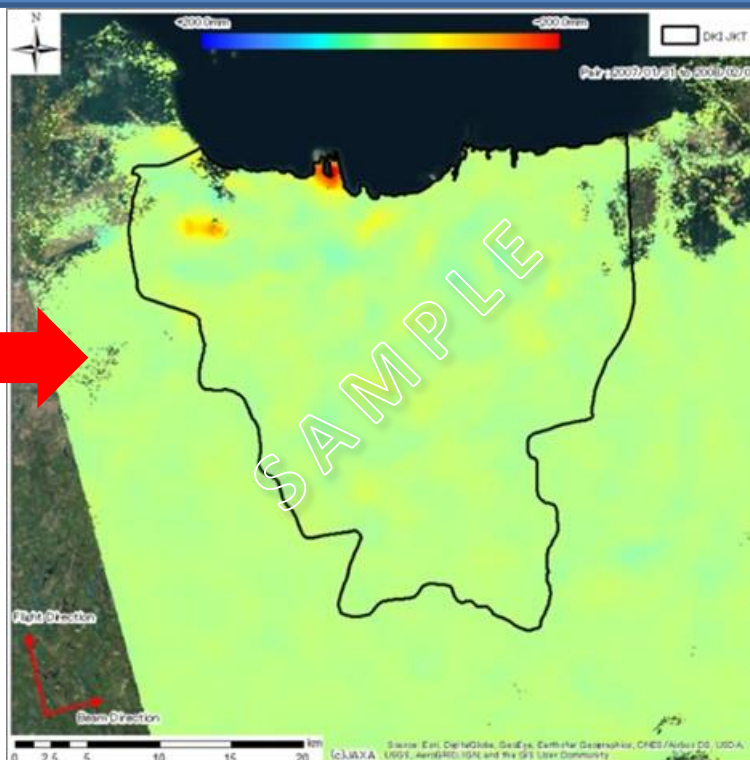
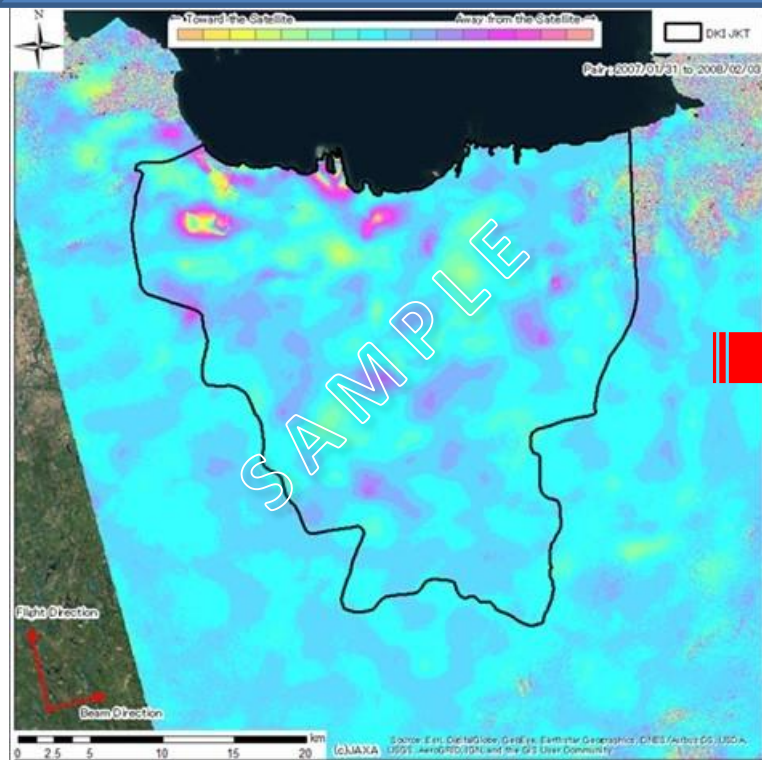


Remote Sensing

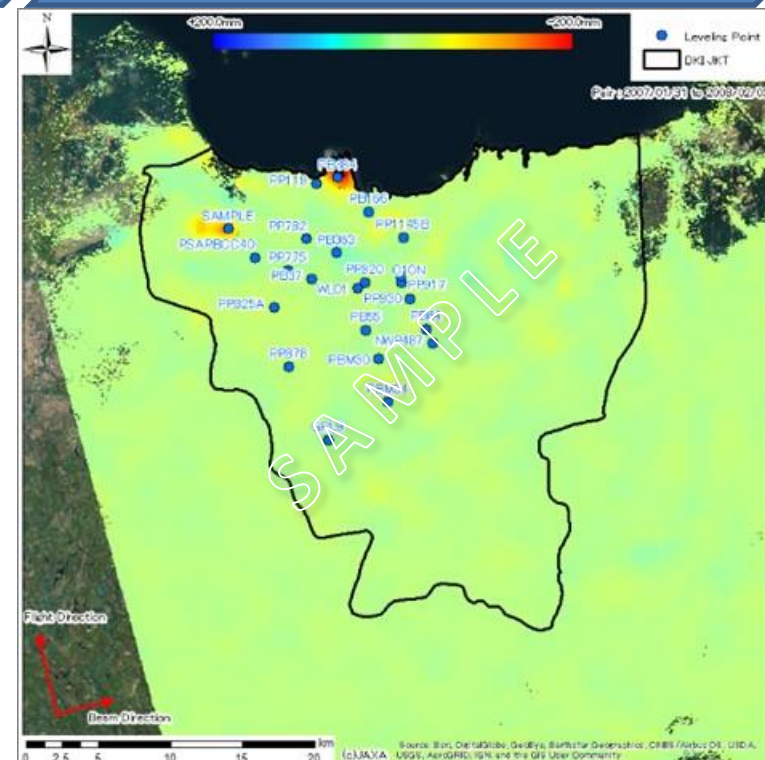


# Procedure of InSAR Data Processing

## SAR Interferometry



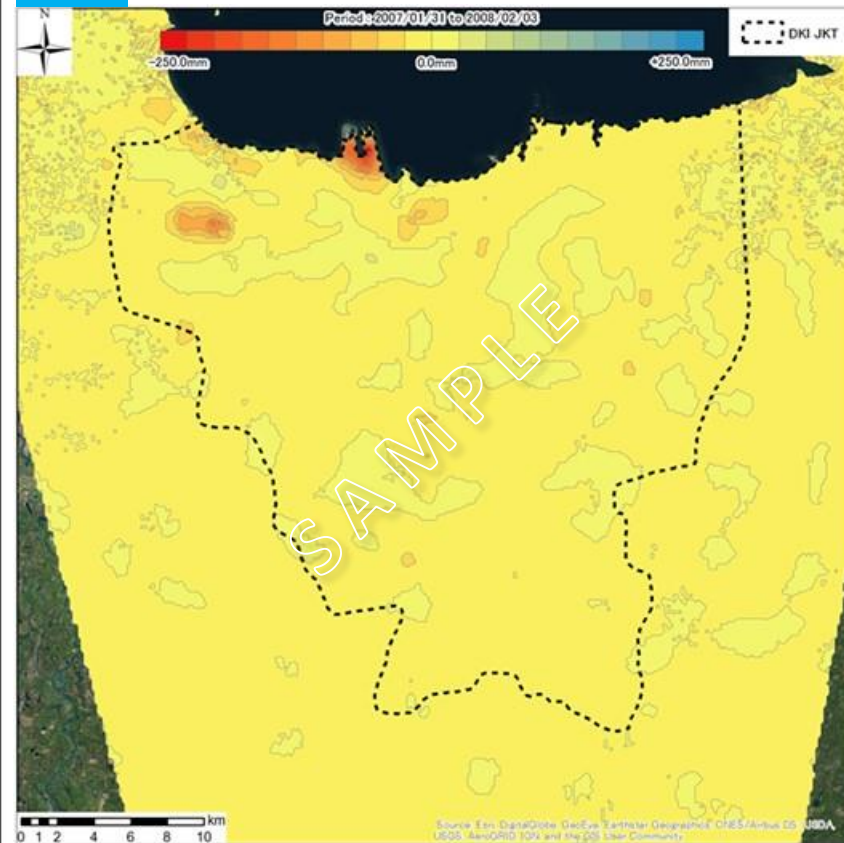
## Accuracy Evaluation





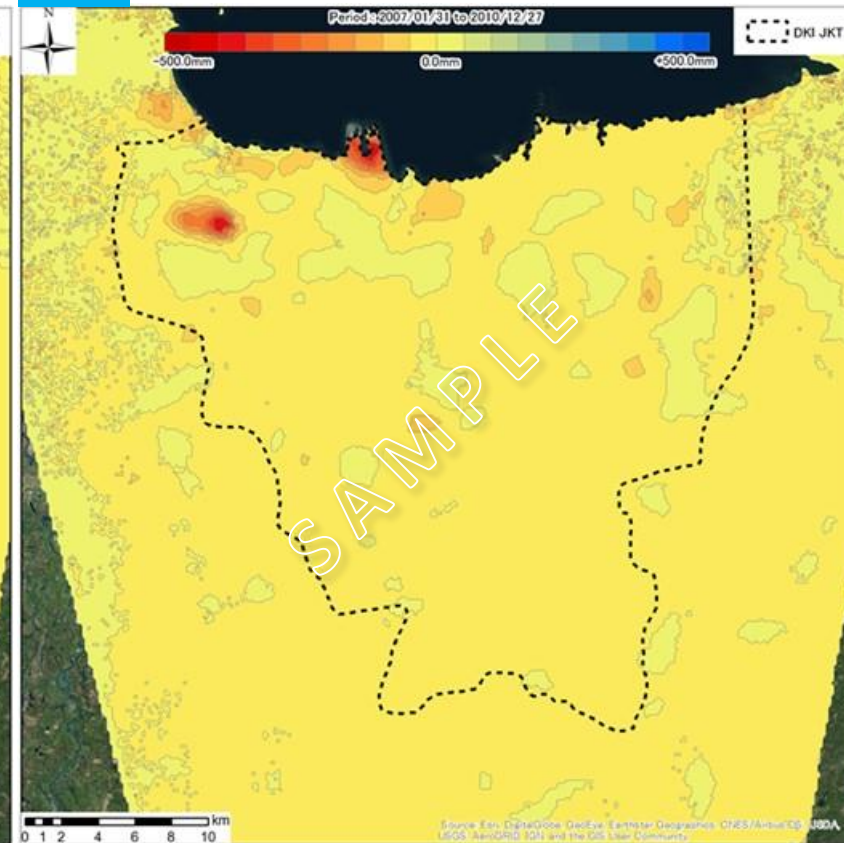
# Output of Analysis : Jakarta (Indonesia)

1



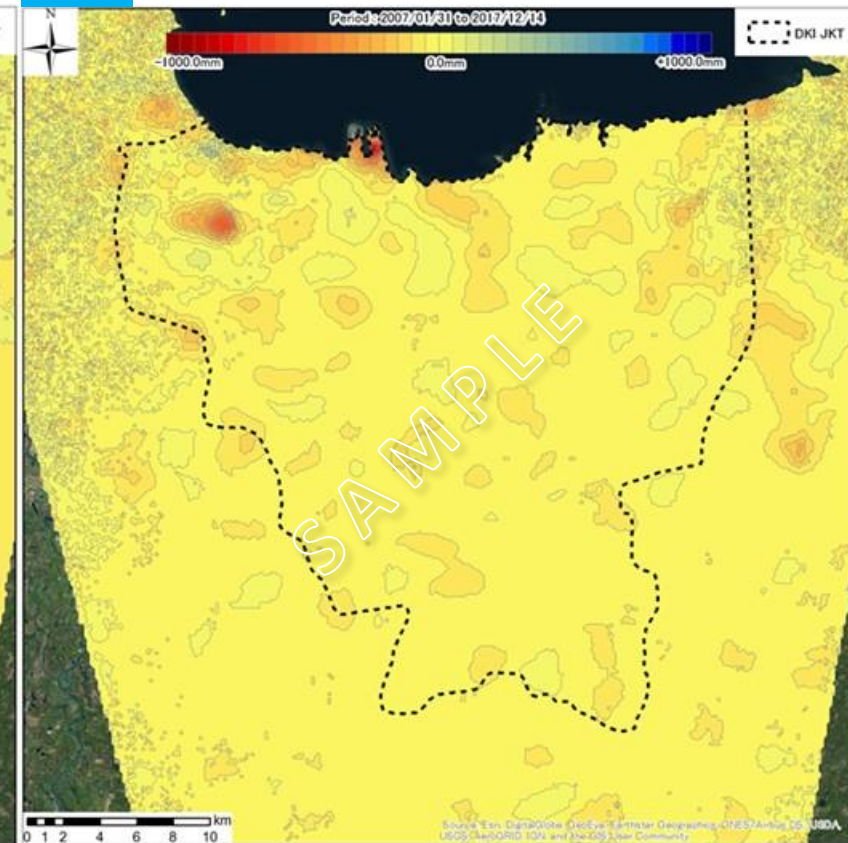
Jan.2007 – Feb.2008

2

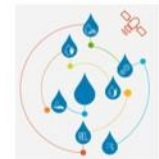


Jan.2007 – Jan.2010

3

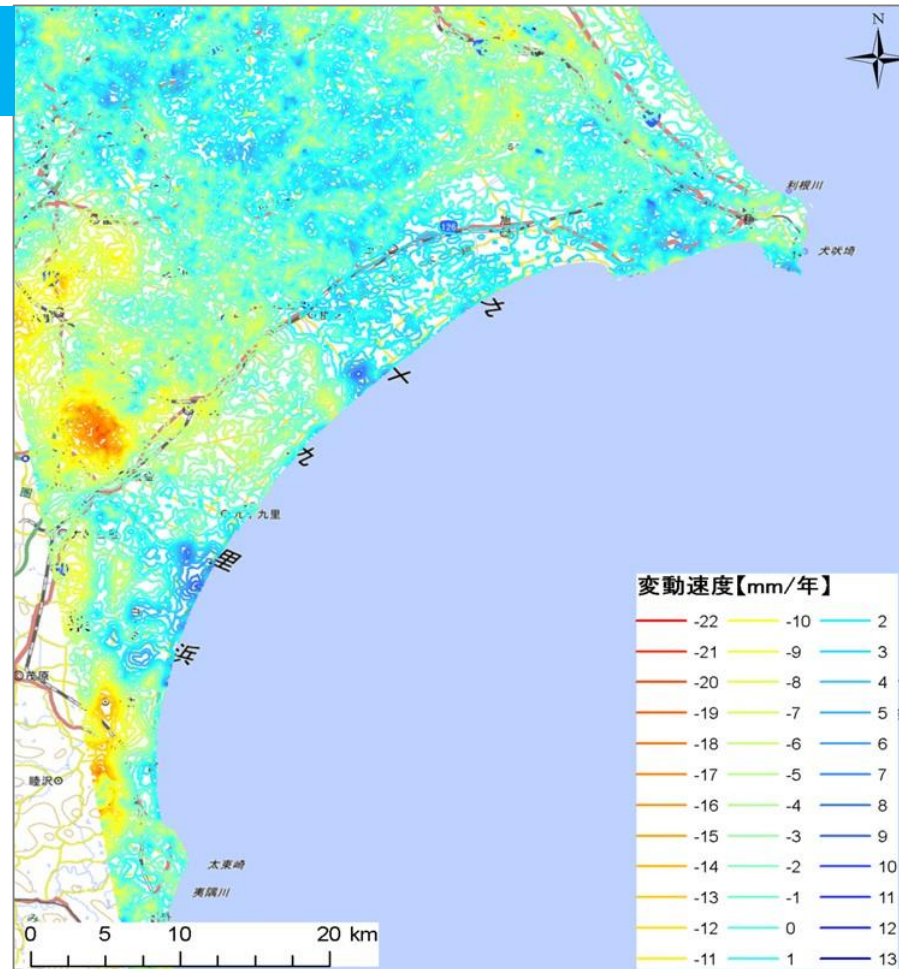


Jan.2007 – Dec.2017



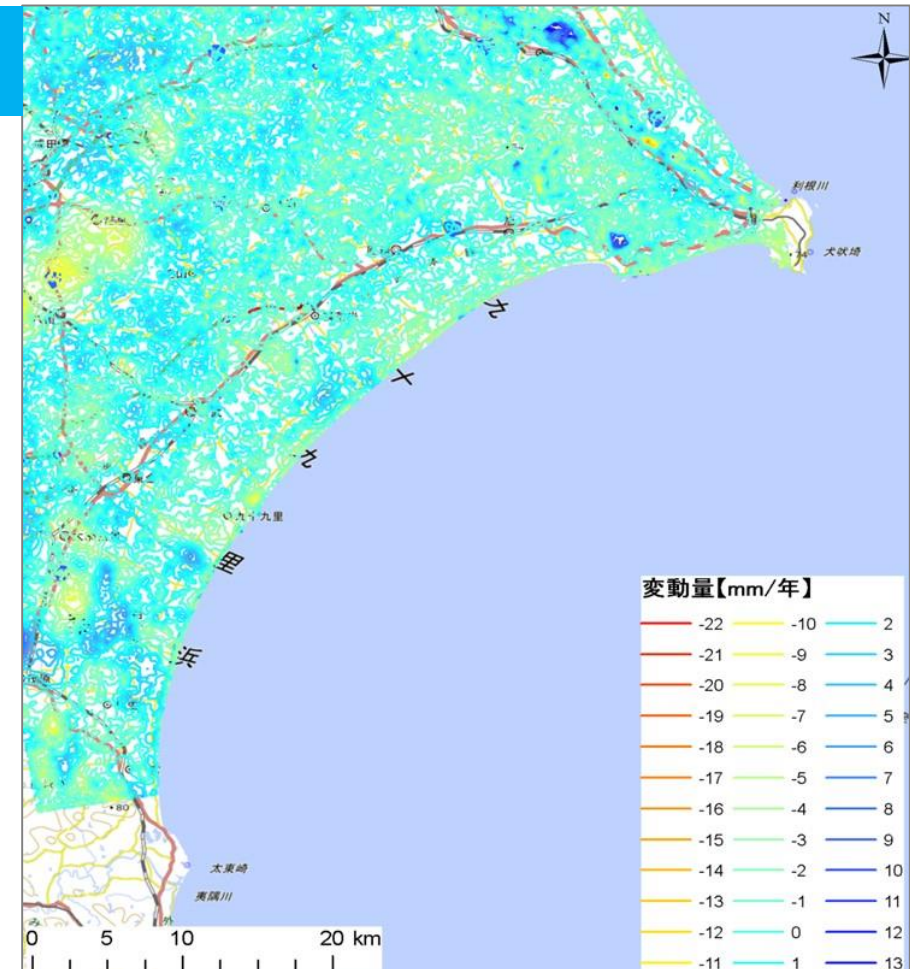
# Output of Analysis : Chiba (Japan)

1



ALOS-1: 24.Apr.2007 – 2.May.2010

2



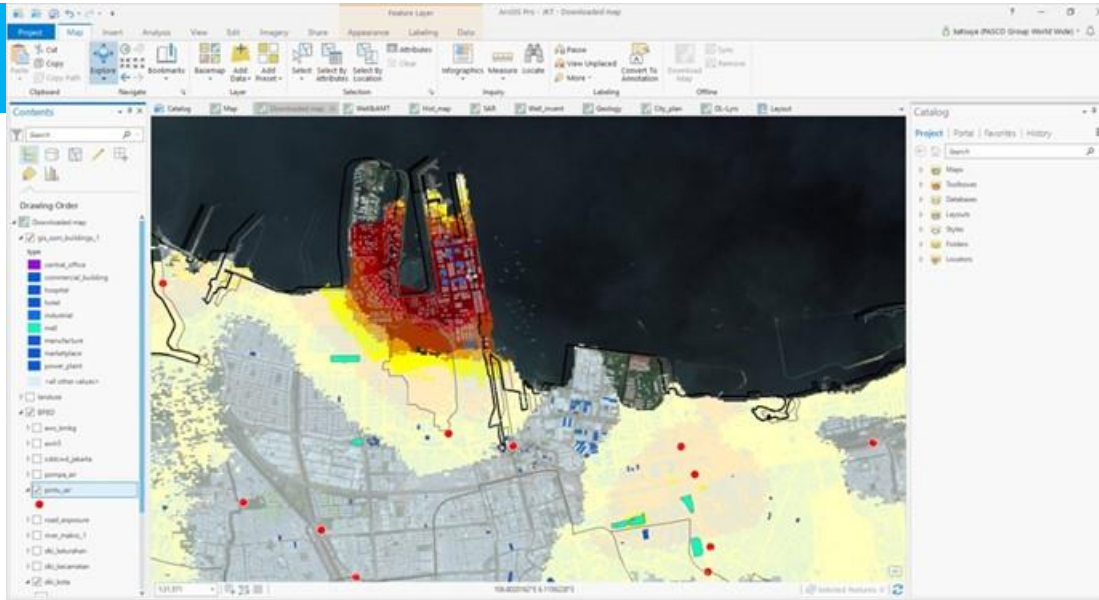
ALOS-2: 31.Aug.2014 – 7.May.2017



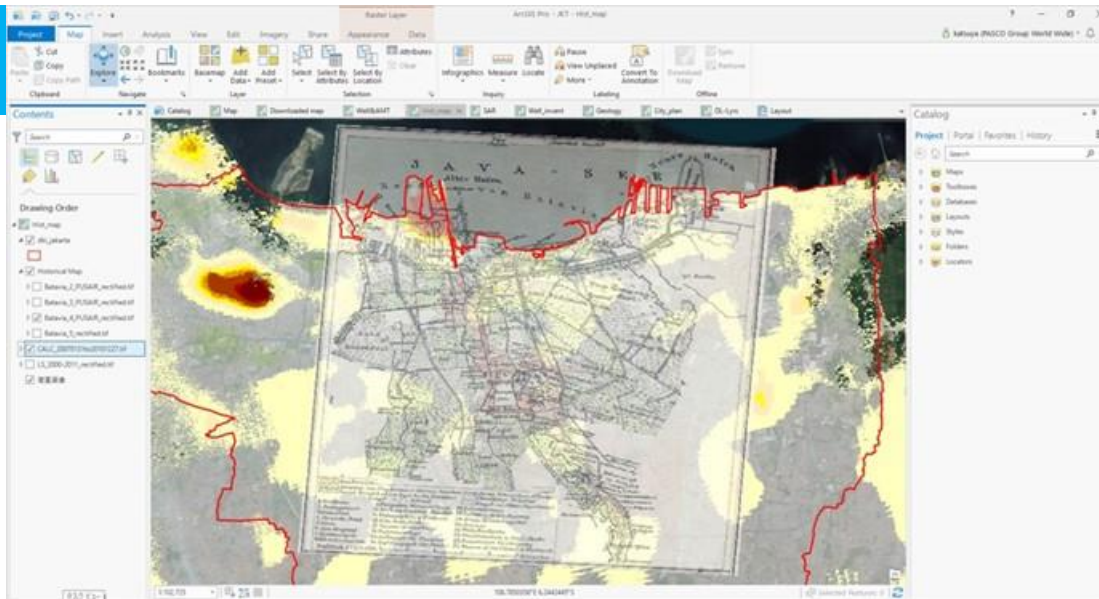


# Data Exploration and Analysis with GIS

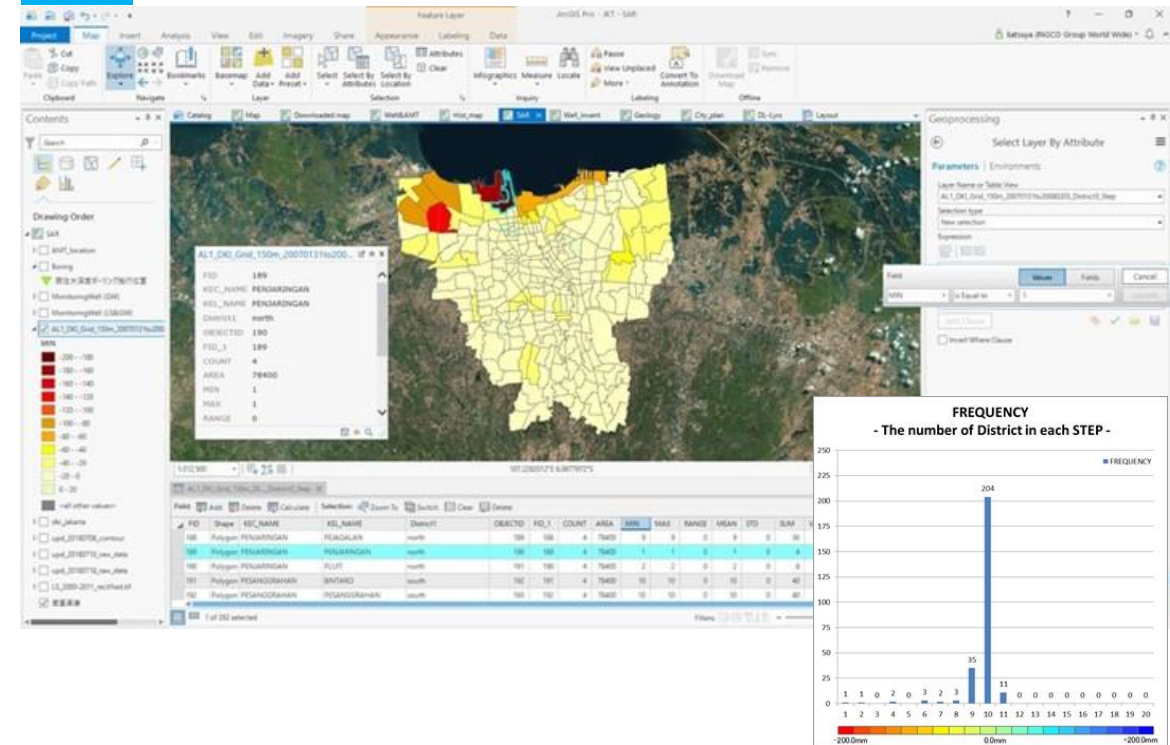
1



2

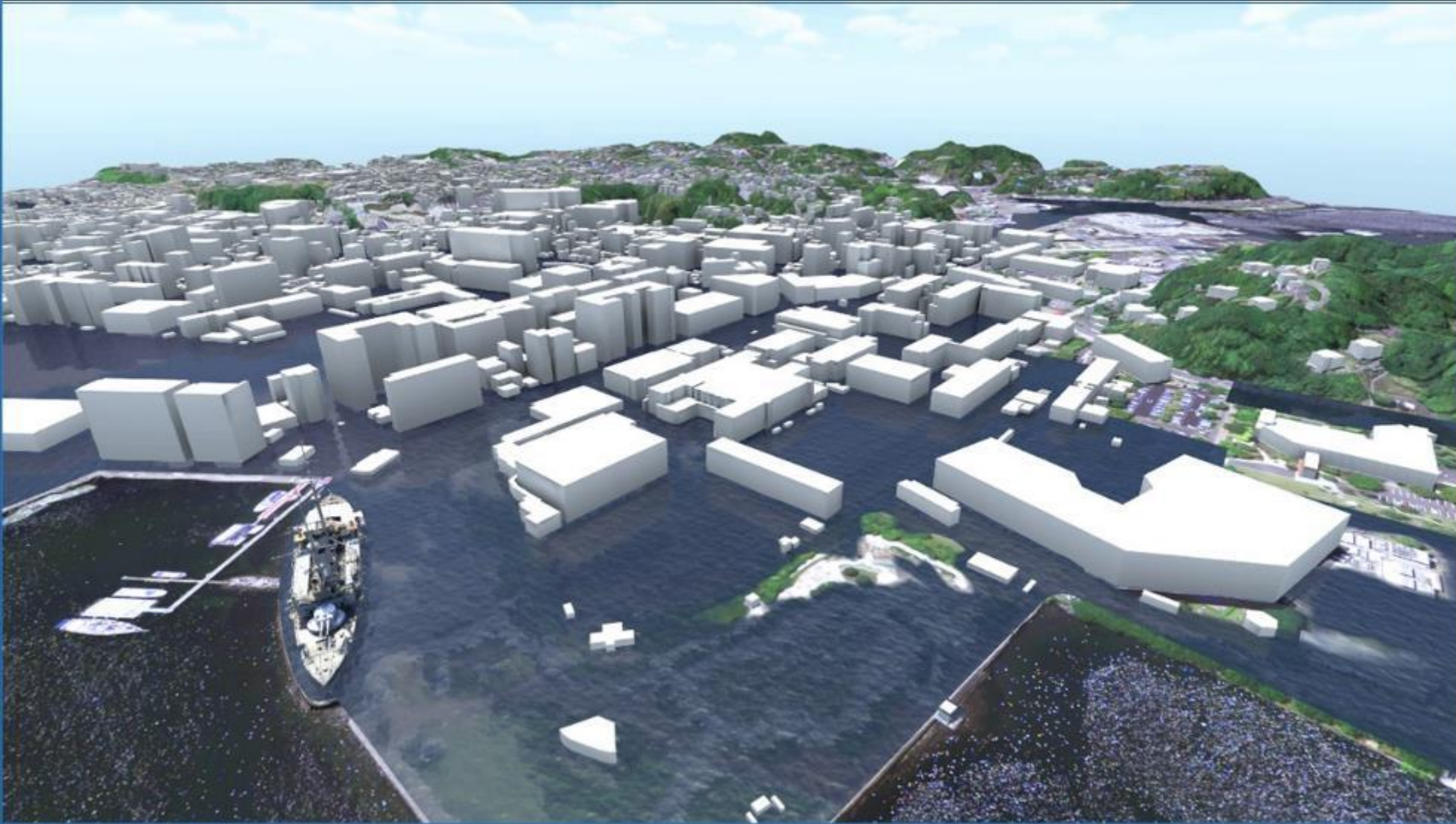


3





# 3D GIS for Visual Communication



*This data is the output of the research on G-spatial city development funded by the Ministry of Internal Affairs and Communications (2014)*





# Ongoing Project

## The Project for Promoting Countermeasures Against Land Subsidence in Jakarta

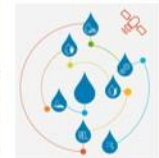
1



2



3





## OBJECTIVES

- Establish an **action plan to promote countermeasures** against land subsidence by implementing pilot activities
- **Strengthen capacity** for planning and implementing countermeasures against land subsidence in Jakarta



*Area: Special Capital Province of Jakarta (662 km<sup>2</sup>)*

*Period: 3 years from May 2018*

