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Joint Analysis of GNSS and InSAR for Deformation Monitoring: A Feasibility Study in Johor, Malaysia

by

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Department of Survey and Mapping Malaysia (JUPEM)

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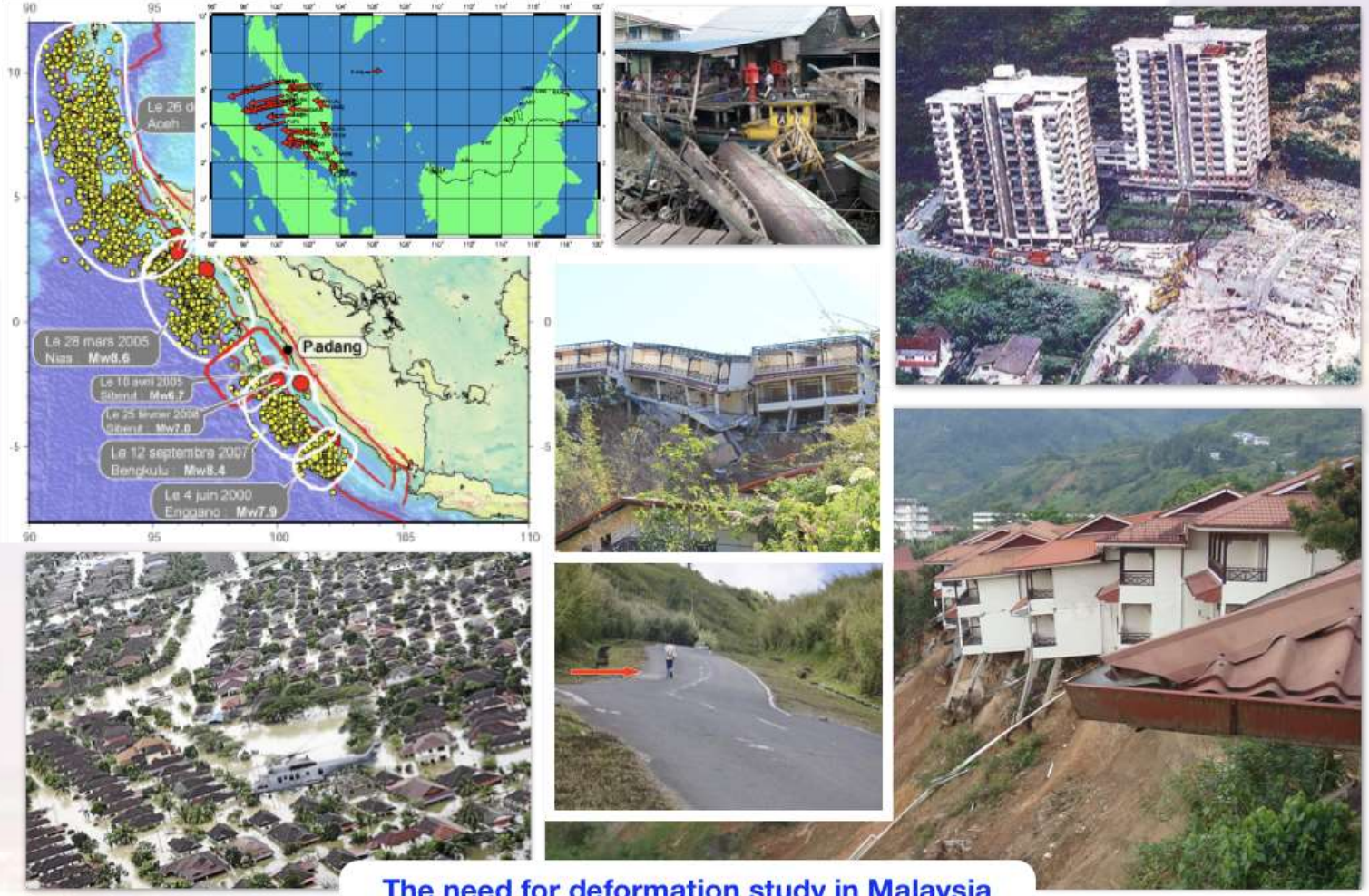
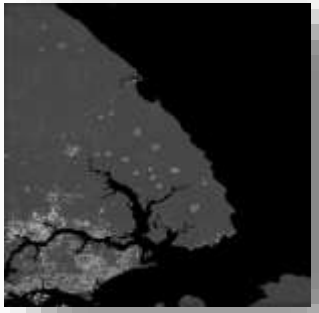


The need for deformation study in Malaysia

International stations
- 27 IGb
- 7 IGS

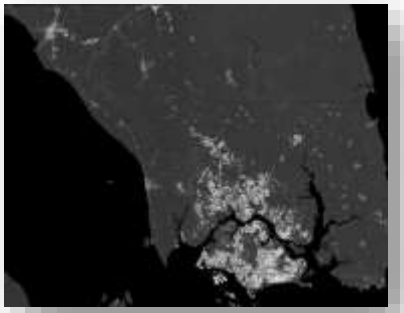
Local stations
- 8 MyRTKnet

GNSS Dataset (2007 - 2011)



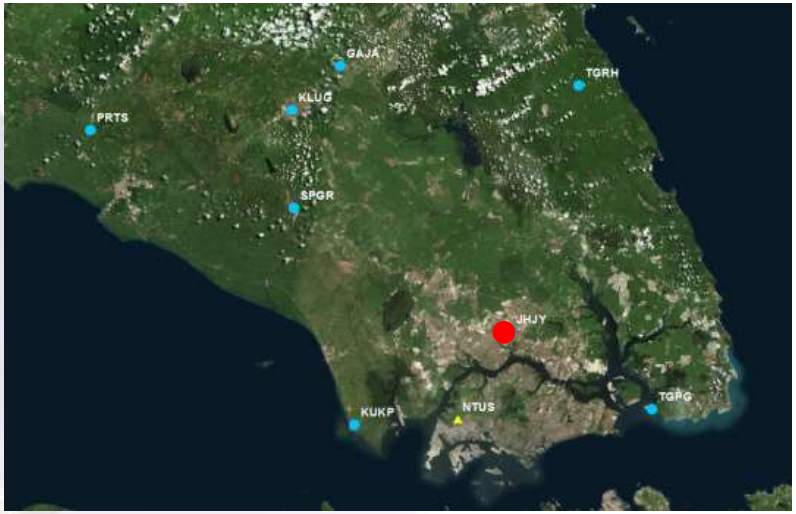
34 ERS-1/2 (Track 75)
5 August 1993 - 23 February 2003

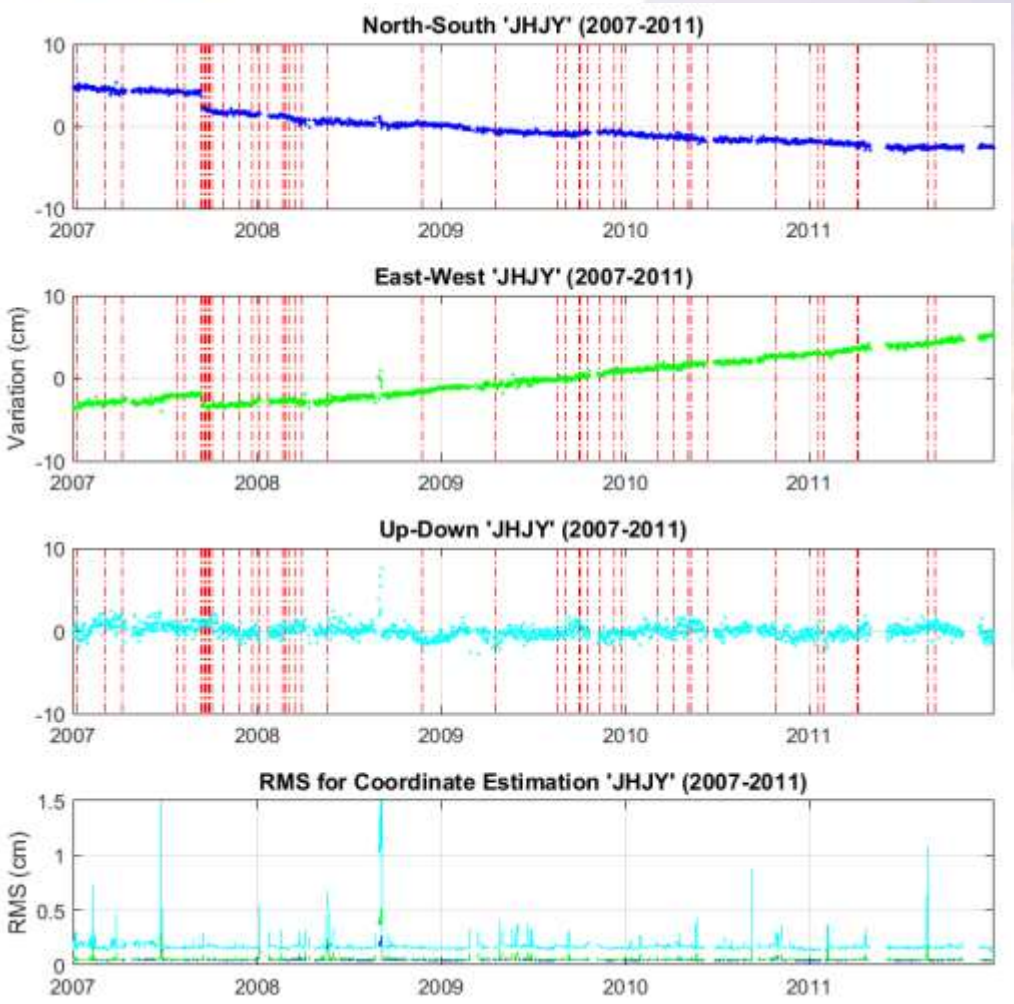
33 ERS-1/2 (Track 347)
4 May 1995 - 12 November 2010



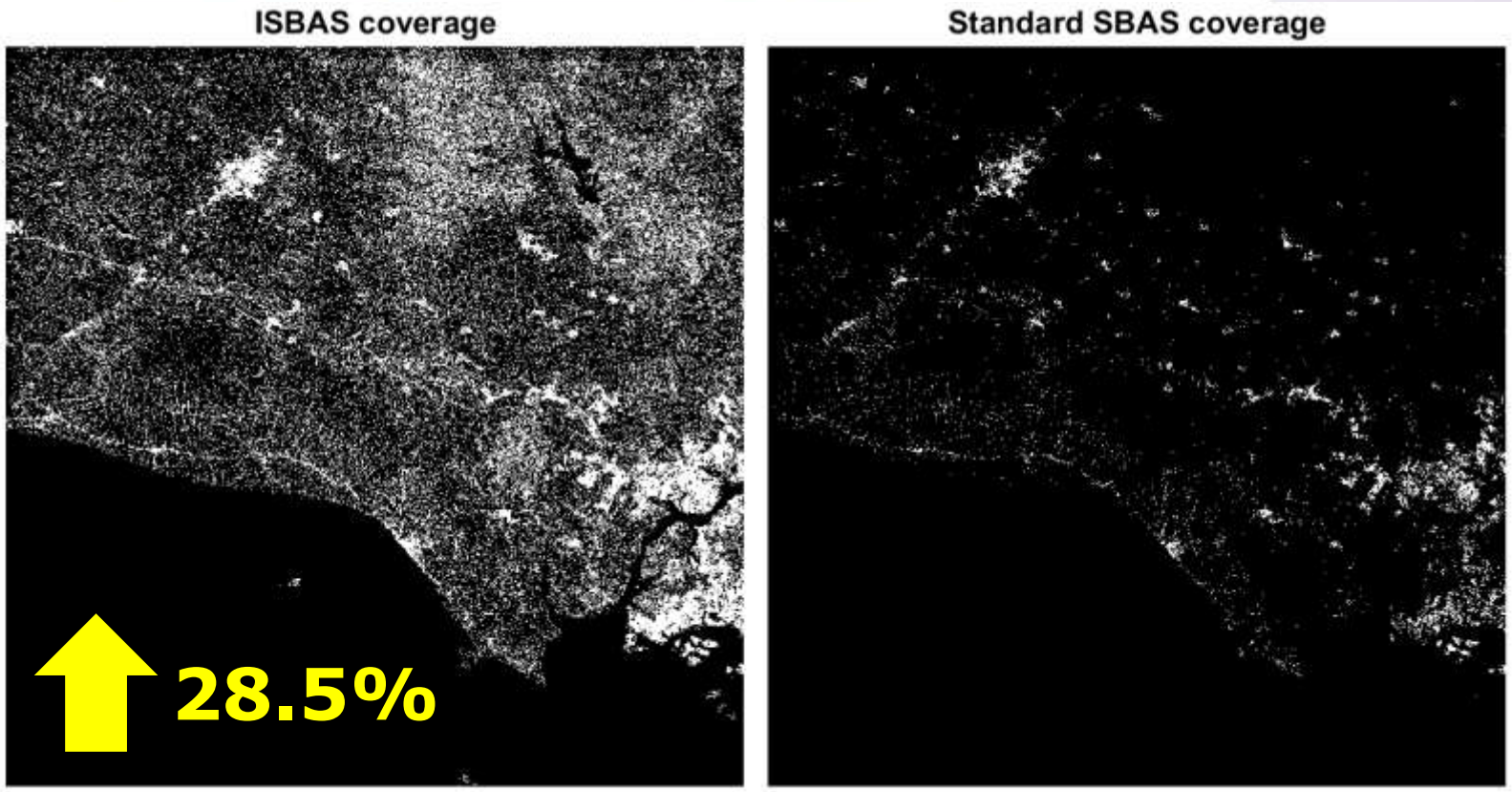
22 Sentinel-1
22 March 2015 - 24 September 2016

SAR Dataset

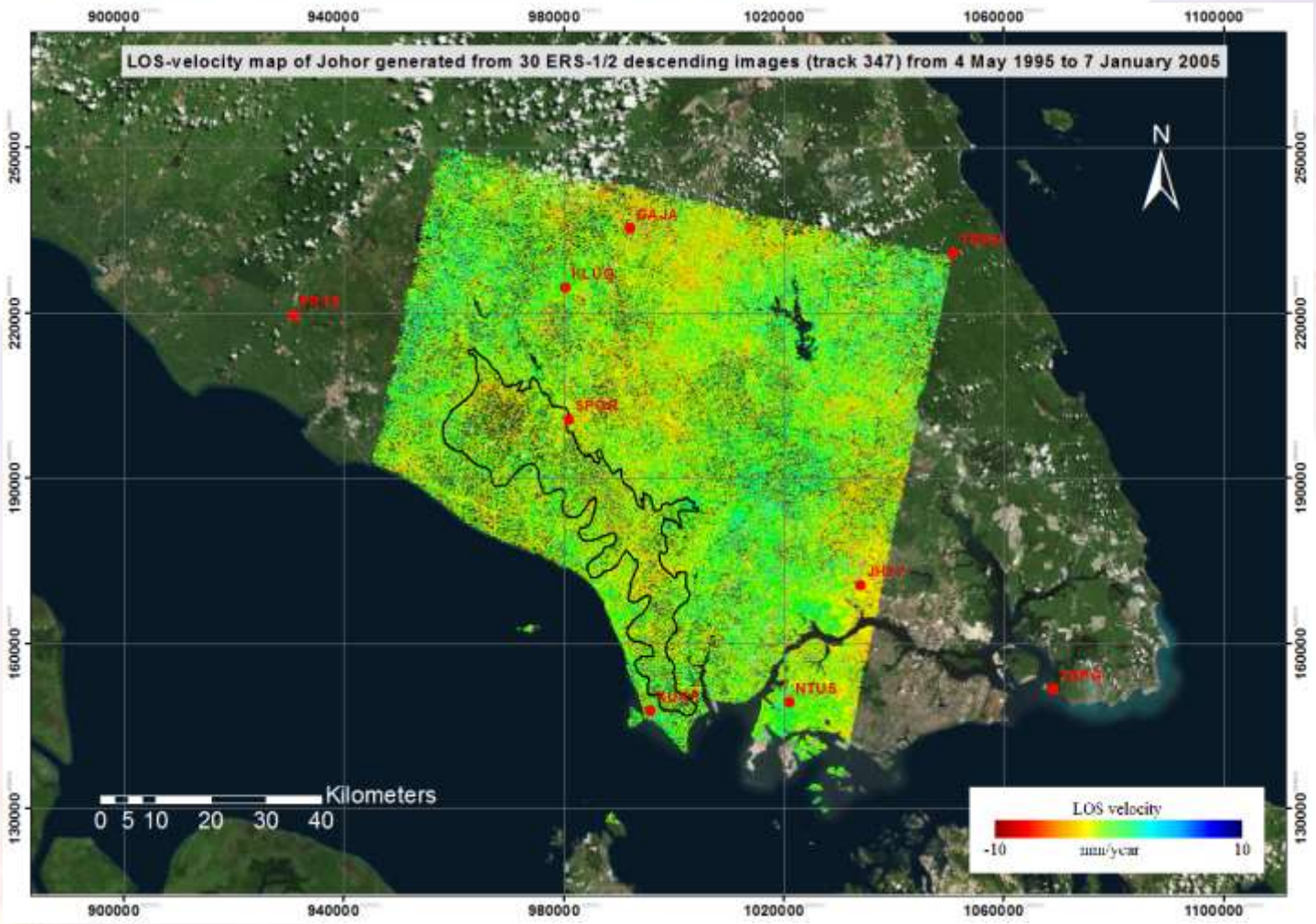




RAW GNSS Time Series for JHJY station



Coverage comparison
ISBAS vs standard SBAS


LOS-velocity map of Johor generated from 30 ERS-1/2 descending images (track 347) from 4 May 1995 to 7 January 2005
900000
940000
980000
1020000
1060000
1100000
250000
220000
190000
160000
130000
N
GAJA
KLUG
SPGR
JHJR
NTUS
Kilometers
0 5 10 20 30 40
LOS velocity
-10
mm/year
10

Conclusions

1. GNSS and InSAR have **complementary features**
   - GNSS - successfully quantified movements from the tectonic motion and earthquakes in the surrounding region
   - InSAR - identified the local subsidence due to the development of tropical peat land and urbanisation
2. Information about the derived velocities from GNSS and InSAR time-series will be **useful to infer the frequency of maintenance works needed for geodetic infrastructures** in the vicinity
3. It is expected that integration of these two techniques will continue to develop in light of the newly available **Sentinel-1** satellites
   - **Short revisit cycle**
   - **Small orbital separation**
   - **Accessible for free**

Thank You

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