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**Reference Frame in Practice** Kobe, Japan, 29-30 July 2017



# Semi-Dynamic Datum of Indonesia

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### **Regional Tectonic of Indonesia**

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Intersection of 3 major plates, wide range of tectonic environments, including island arc volcanism, subduction zones, and arc-continent collision

### Seismicity of Indonesia Region

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High seismicity, shallow EQs mostly confined at the subduction zone

#### **Tectonic Complexity (Displacement)**

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Data : Stevent et.al., [1999/2000], Nugroho et.al., [2000]. Bock, et.al., [2003] Socquet et.al., [2006], Subarja et.al., [2007]. Abidin et al., [2007], Meilano et al., [2012]

#### **Coordinates displacements**

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A new Geodetic Datum is required to accomodate the active tectonics of Indonesian region, and also to support One-Map Policy of the Indonesian government.



NCG

#### **Geodetic Datum**

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#### **Indonesia Geospatial Reference System 2013**

#### HORIZONTAL

- □ <u>Semi-Dynamic</u> datum.
- Connected to the global ITRF2008 reference frame.
- Reference epoch: 1 January 2012
- Reference Ellipsoid: WGS 1984
  (a = 6378137.0 m; 1/f = 298,257223563).
- If a new version of the ITRF reference frame becomes available, then the IGRS reference frame will also be updated accordingly.
- A velocity model, which incorporates tectonic motion and earthquake related deformation, is used to transform coordinates at an observation epoch to or from this reference epoch.

#### VERTICAL

- □ Vertical datum is Geoid.
- The Geoid is derived from the gravity surveys which was tied to National Gravity Control Network (NGCN).
- NGCN has to be connected to the IGSN71 or its new version.
- In case there is no official Geoid yet, the vertical datum is MSL derived from 18.6 years tide observation or at least from 1 year observation.

#### **Realization of IGRS2013**

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#### **Deformation Model**

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#### **Coseismic Deformation Model**

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#### **Vertical Reference System**

**Tide Gauge Stations** 

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### **Geoid of Indonesia**

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- Borneo & Sulawesi Geoid derived by airborne gravity measurement conducted by DTU & BIG and need to be validated.
- Papua is still on processing.
- Other islands use MSL or EGM2008 as vertical datum





Airborne Gravity Surveys of Java & Sumatra are set for 2018 budget (National Priority)

The rest of Indonesia will be conducted in 2019

#### User services and system access

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- Web based user services to give easiness accessing SRGI2013
- **Type of services:** 
  - Explanation of SRGI2013;
  - Technical guide;
  - SRGI2013, covering horizontal and vertical datum and historycal aspect as well;
  - Description of control station;
  - Real Time Kinematics service
  - Other facilities supporting SRGI2013 utilization.

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#### User services and system access

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#### Remarks

- A new semi-dynamic datum for Indonesia was launched in 2013 called Indonesia Geospatial Reference System 2013.
- 3 component of the IGRS2013 are horizontal geodetic datum, vertical datum, and user services and access.
- The horizontal deformation model was developed using GPS observation that consist secular deformation and cosesimic deformation.
- More detail characteristics of the local deformation in Indonesian region is necessary for updating the velocity model of IGRS 2013.
- By the new definition of ITRF2014, the update of IGRS2014 will be initiated
- Geoid as a vertical datum in Indonesia is under development.
- User services and system access still need to be improve

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## Thank you

