



International Federation of Surveyors
Fédération Internationale des Géomètres
International Vereinigung der Vermessungsingenieure

The Contribution of FIG to Reference Frames

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Outline

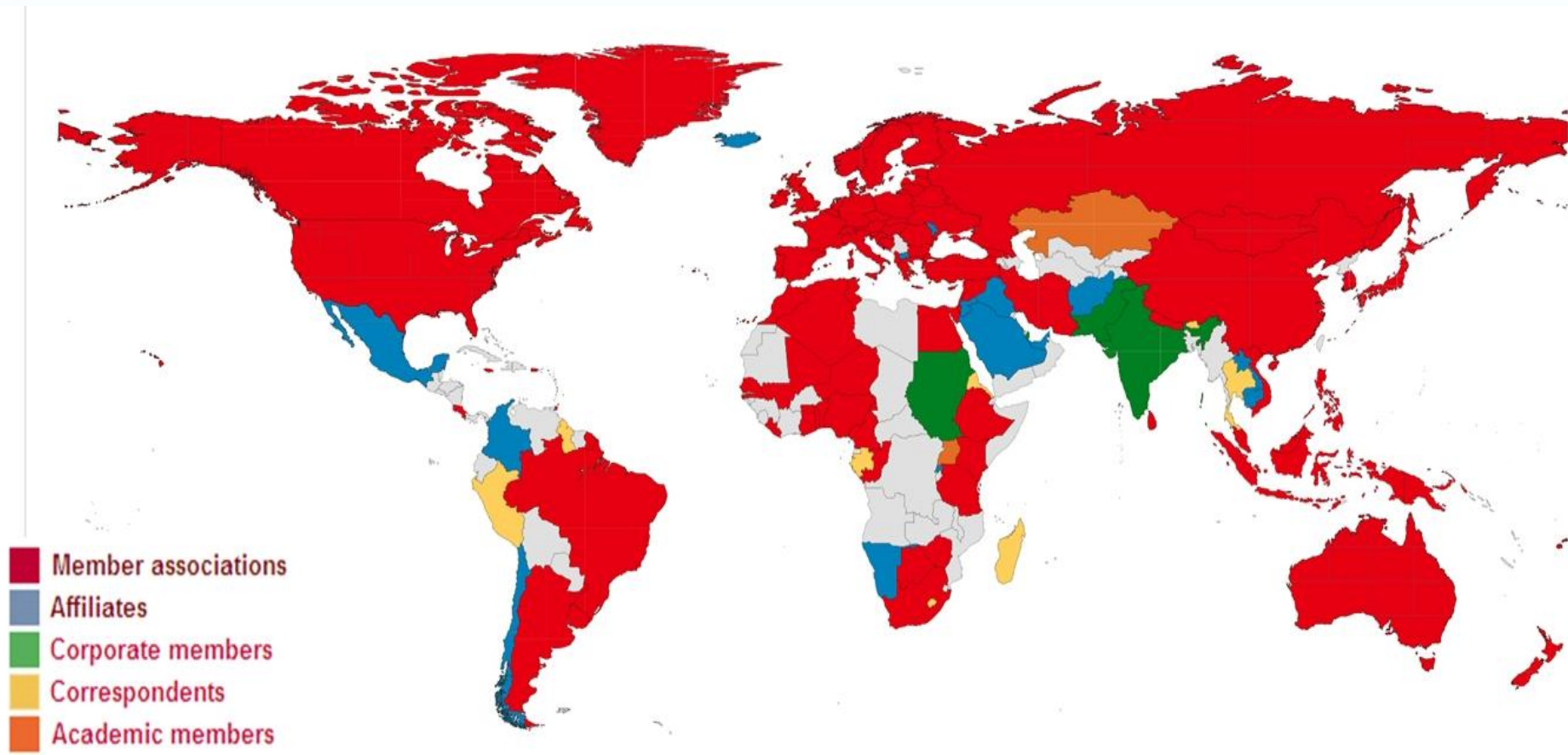
- FIG – A Brief Introduction
- FIG Commission 5: 2015-18
- Technical Seminars on Reference Frames
- Kinematic Datum



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Members

- **121 countries represented in 2015 – more than 300,000 individuals**





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Members

Membership categories:

- 101 member associations from 88 countries
- 45 affiliate members from 43 countries
- 92 academic members from 58 countries
- 25 corporate members

- 1 correspondents
- 6 honorary presidents
- 32 honorary members



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FIG Council



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Rudolf Staiger
DVW (Germany)
Vice President



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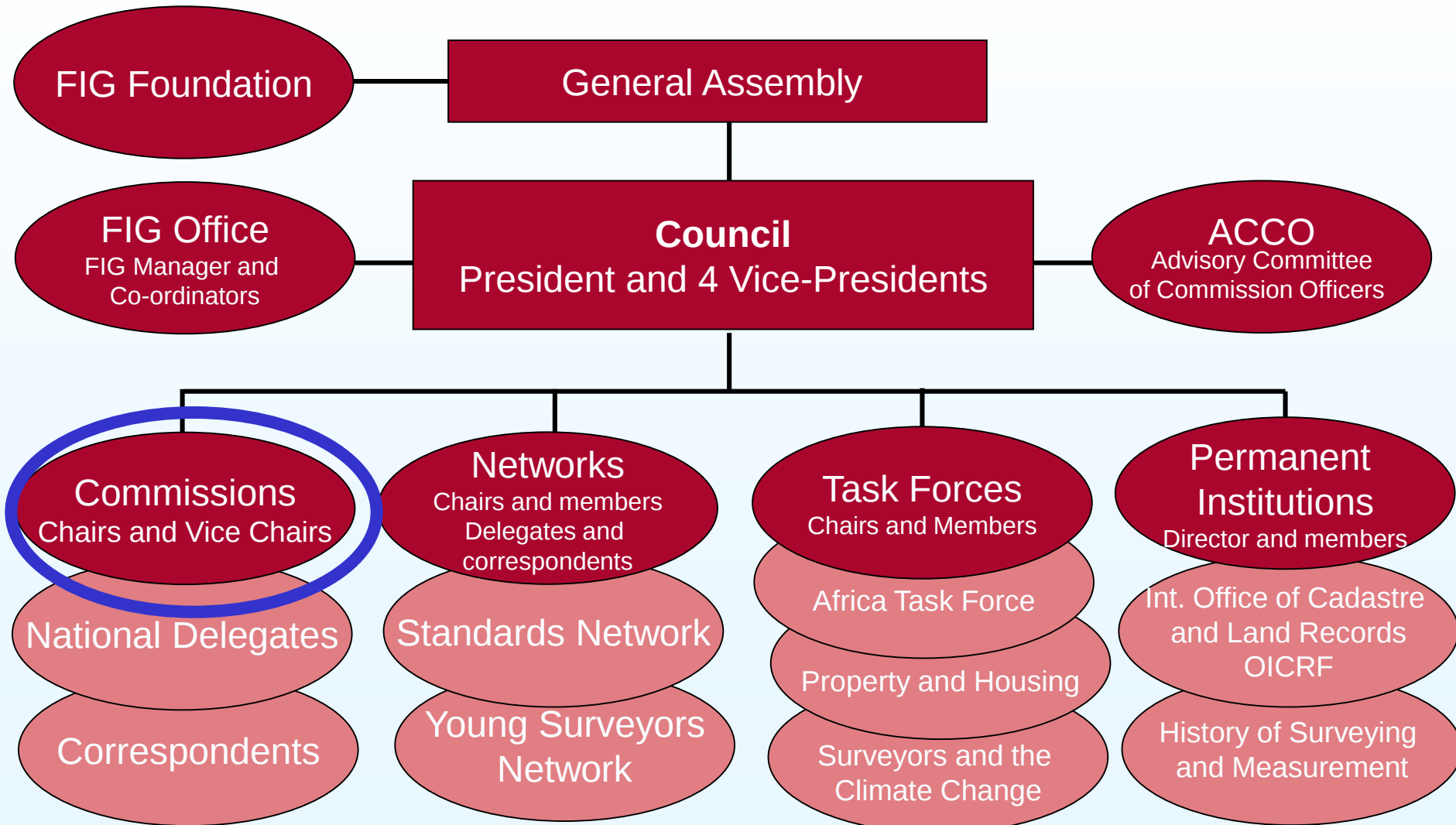
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FIG Commissions

- Com 1: Professional Standards and Practice
- Com 2: Professional Education
- Com 3: Spatial Information Management
- Com 4: Hydrography
- **Com 5: Positioning and Measurement**
- Com 6: Engineering Surveys
- Com 7: Cadastre and Land Management
- Com 8: Spatial Planning and Development
- Com 9: Valuation and the Management of Real Estate
- Com 10: Construction Economics and Management

[illegible]



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FIG Commission 5: Working Group Structure

Chair: ***Volker Schwieger***, Germany

Vice-Chair of Administration: ***Li Zhang***, Germany



WG 5.1: Standards, Quality Assurance and Calibration
(David Martin, France)

WG 5.2: 3D Reference Frames (Nic Donnelly, New Zealand)

WG 5.3: Vertical Reference Frames (Kevin Kelly, USA / Dan Roman, USA)

WG 5.4: GNSS (Neil D Weston, USA / Suelynn Choy, Australia)

WG 5.5: Multi-Sensor-Systems (Allison Kealy, Australia /
Guenther Retscher, Austria / Joint with IAG)

WG 5.6: Cost Effective Positioning (Leonid A. Lipatnikov, Russia)



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WG 5.2: 3D-Reference Frames

- Focus on geometric reference frames
- Practical focus on implementation and use of reference frames, particularly as it applies for surveyors
- Close links with IAG Commission 1 – Reference Frames
- Reference Frames in Practice Workshops (see later)
- Publication on Reference Frame Case Studies
 - Global (eg ITRF, WGS84), Regional (eg EUREF, APREF), Local/National (NAD83, GDA94)
- Geodesy “education” via Wikipedia, Navipedia etc



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WG 5.3: Vertical Reference Frames

- Practical implementation of VRF, VRF in Practise Monograph
- National height system inventory
- Review paper on VRF and height systems
- Practical focus on implementation of new geopotential datum, accessing VRF using geoid height models and geometric datum
- Ties between height systems and local and global mean sea level
- Reference Frames in Practice Workshops (see later)



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WG 5.4: GNSS

- Review of web-based automated positioning services as well as positioning techniques using GNSS
- Explore research and applications using real time networks, GNSS products and services
- Collaborate with the International Committee on Global Navigation Satellite Systems (ICG) and IAG WG4.5.2 Precise Point Positioning and Network-RTK
- FIG publications on Precise Point Positioning and GNSS Advancements





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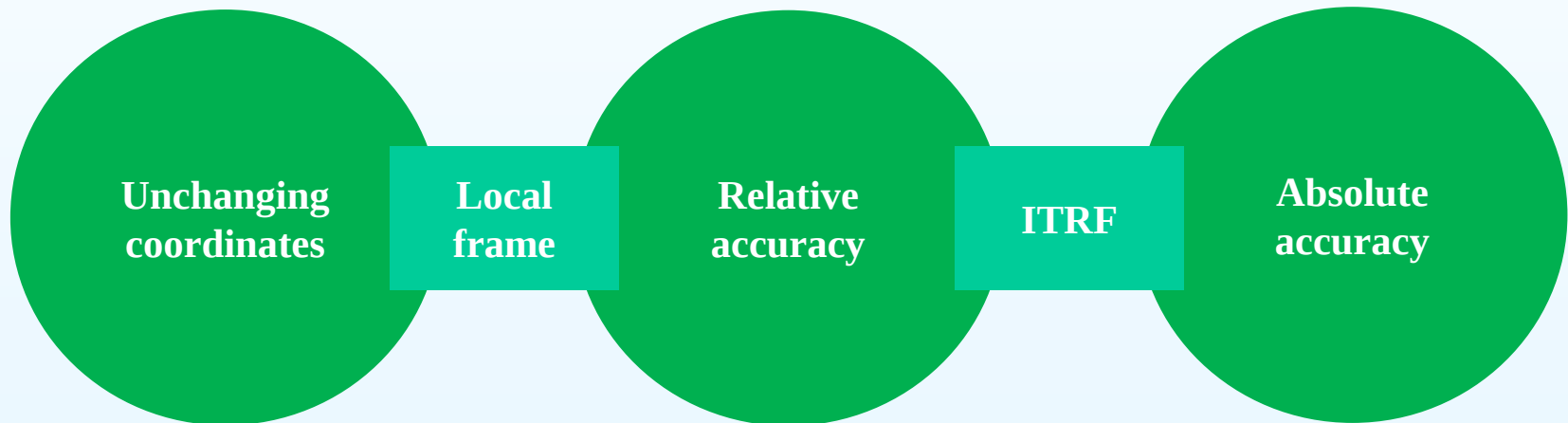
Technical Seminars: Reference Frames in Practise

IAG / FIG Commission 5 / ICG

- 04/05 May 2012; Rome, Italy
- 21/22 June 2013; Manila, Philippines
- 27/28 July 2015; Singapore;
[focus on vertical reference frames](#)
- May 2016; Christchurch, New Zealand;
focus on kinematic reference frames and deformation

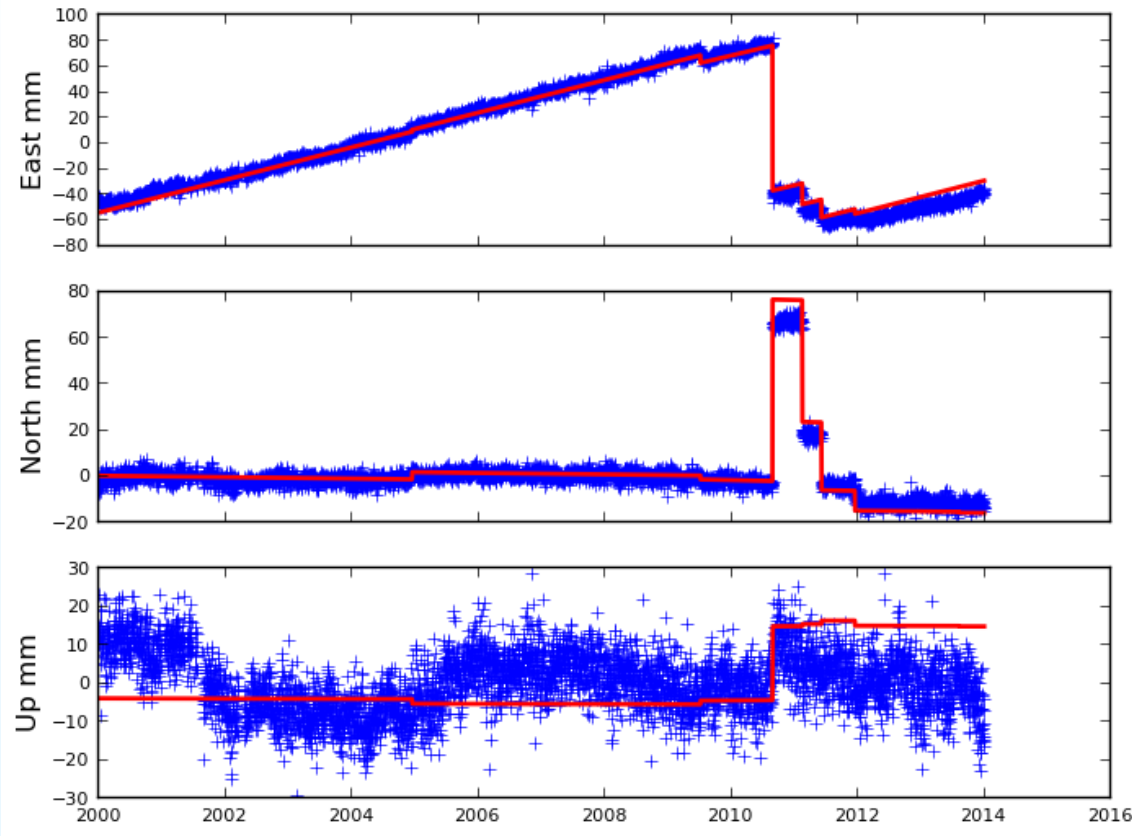
Kinematic Datum

User Requirements of a National Reference Frame



Source: Nic Donnelly, Chris Crook, Richard Stanaway, Craig Roberts, Joel Haasdyk, Chris Rizos (2014): A Two-Frame Spatial Referencing System Accounting for Geodynamics

Coordinate movements caused by earthquakes



Source: *N. Donnelly et al. (2014)*

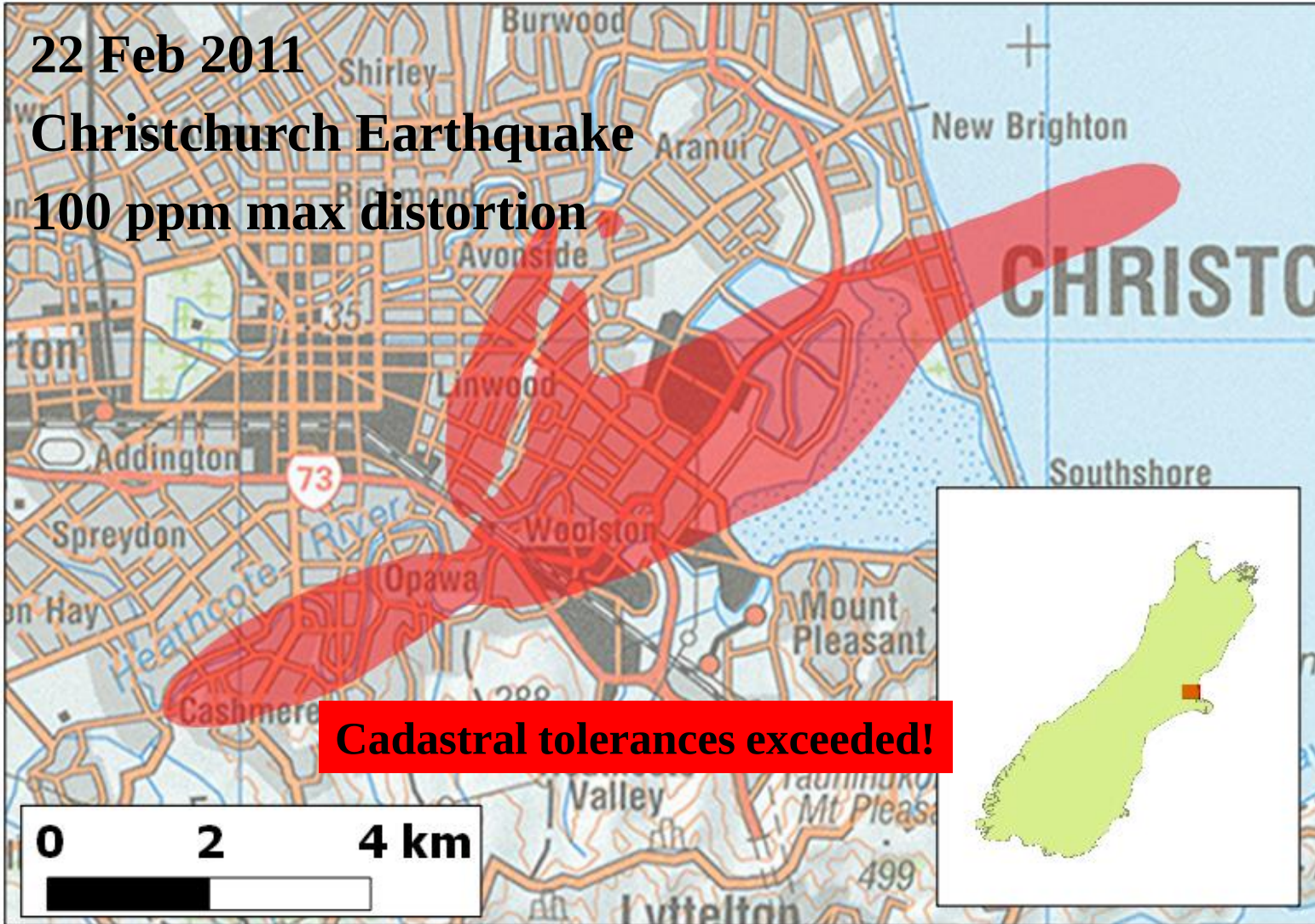


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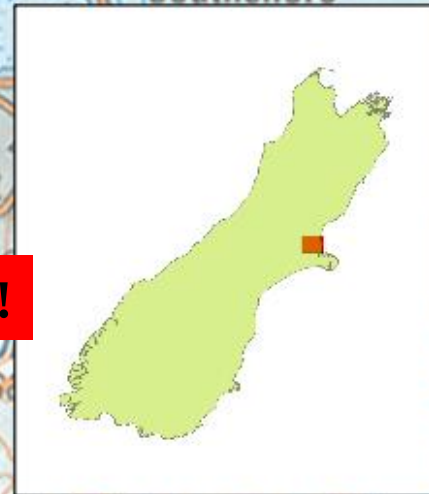
22 Feb 2011

Christchurch Earthquake

100 ppm max distortion



Cadastral tolerances exceeded!

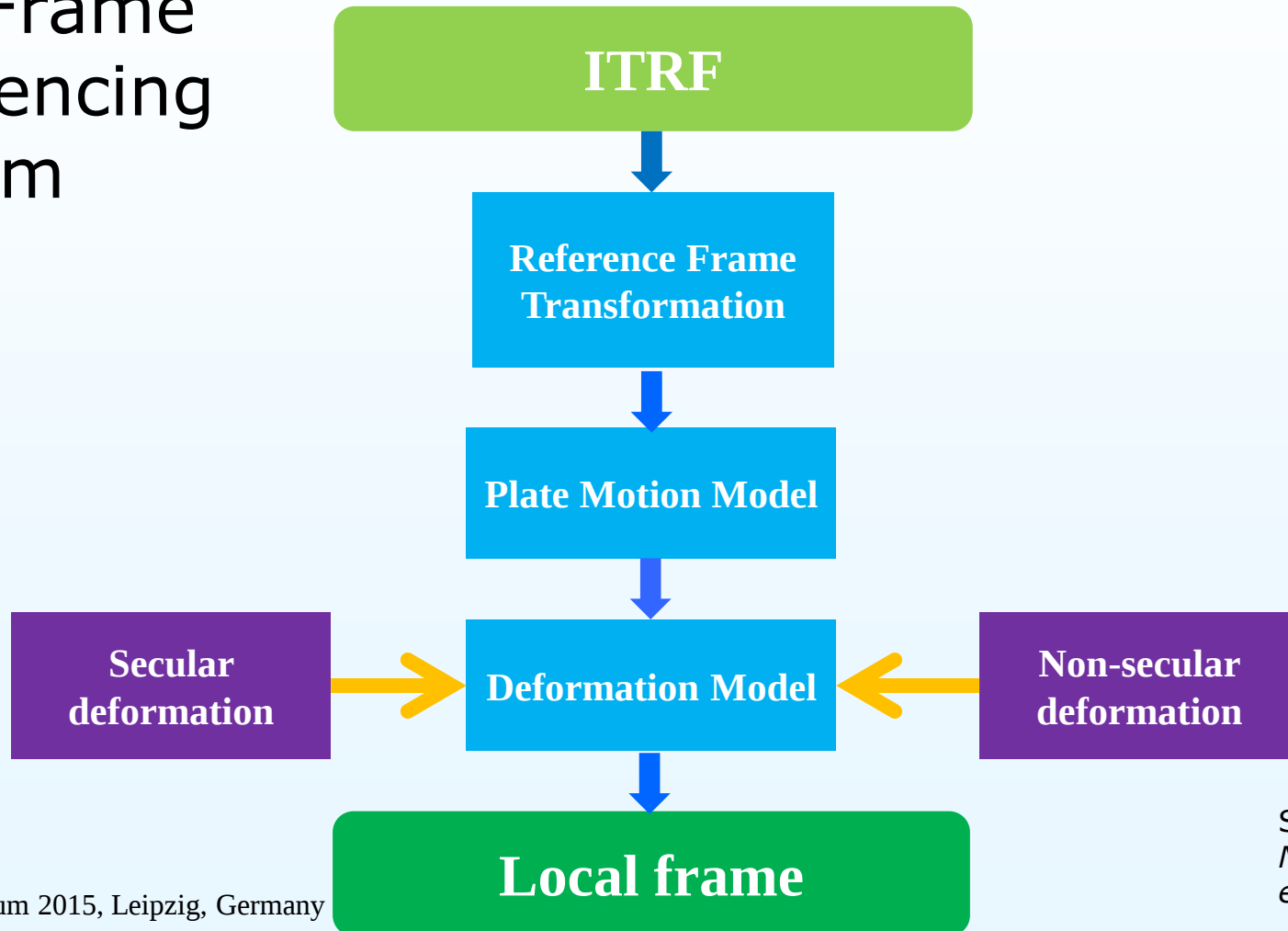


Source:
*N. Donnelly
et al. (2014)*

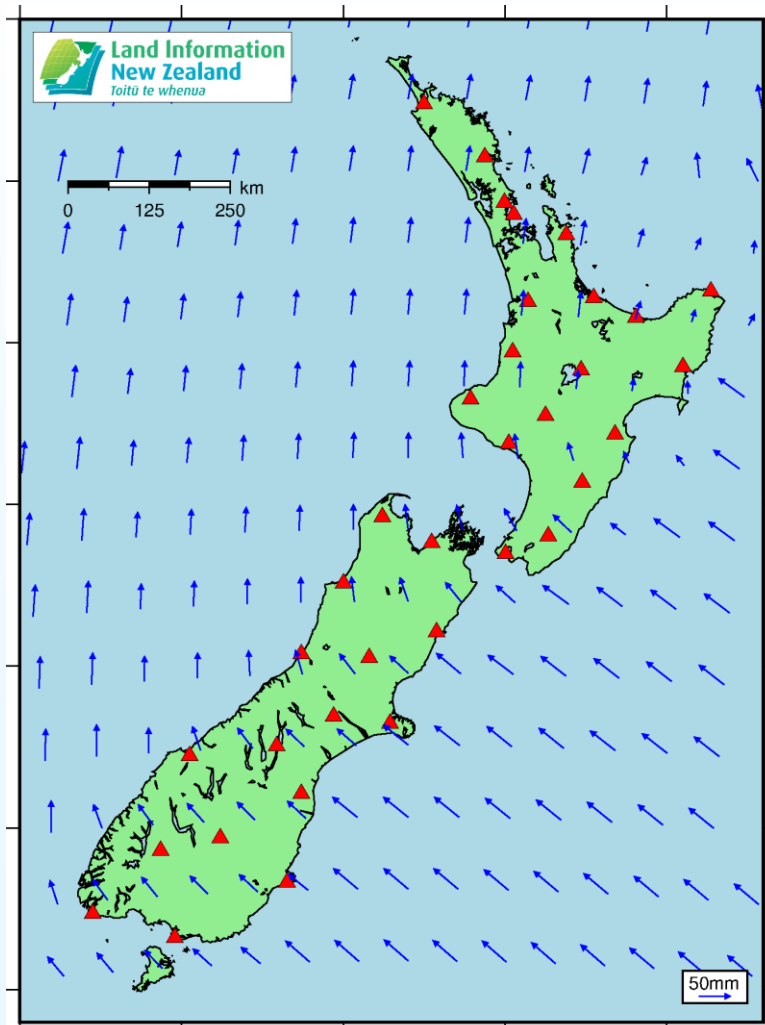


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Two-Frame Referencing System



Source:
*N. Donnelly
et al. (2014)*



National Deformation Model

Secular Deformation

~10km
Grid

Linear
Velocity

Kinematic national and local datum changes !

Christchurch (20111223) Rev Patch

Coseismic Deformation

~13km Grid

~3km Grid

~0.8km Grid

~0.2km Grid

Step
Function

Source:
N. Donnelly
et al. (2014)



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Summary

- FIG (Commission 5) is ready for cooperation; focus on practical aspects
- 27/28 July 2015; Singapore:
Technical Seminar on Vertical Reference Frames
- Kinematic Datum is an alternative for the future

Thank you very much for your attention!