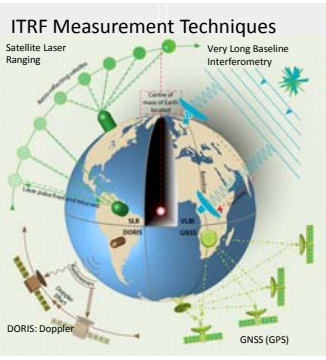




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NEW ZEALAND


The development of modern geodetic datums in New Zealand and Nepal, implications for datum modernization in tectonically active areas

Chris Pearson

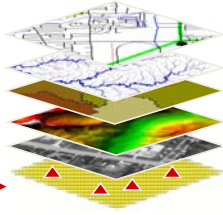


ITRF Measurement Techniques

Satellite Laser Ranging, Very Long Baseline Interferometry, GNSS (GPS), DORIS: Doppler



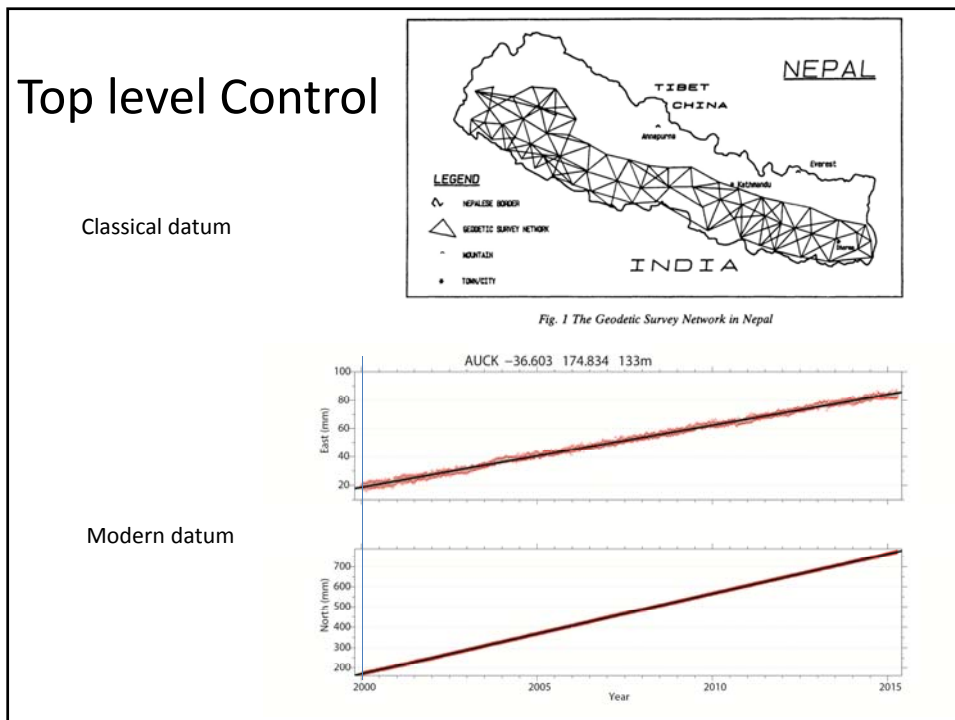
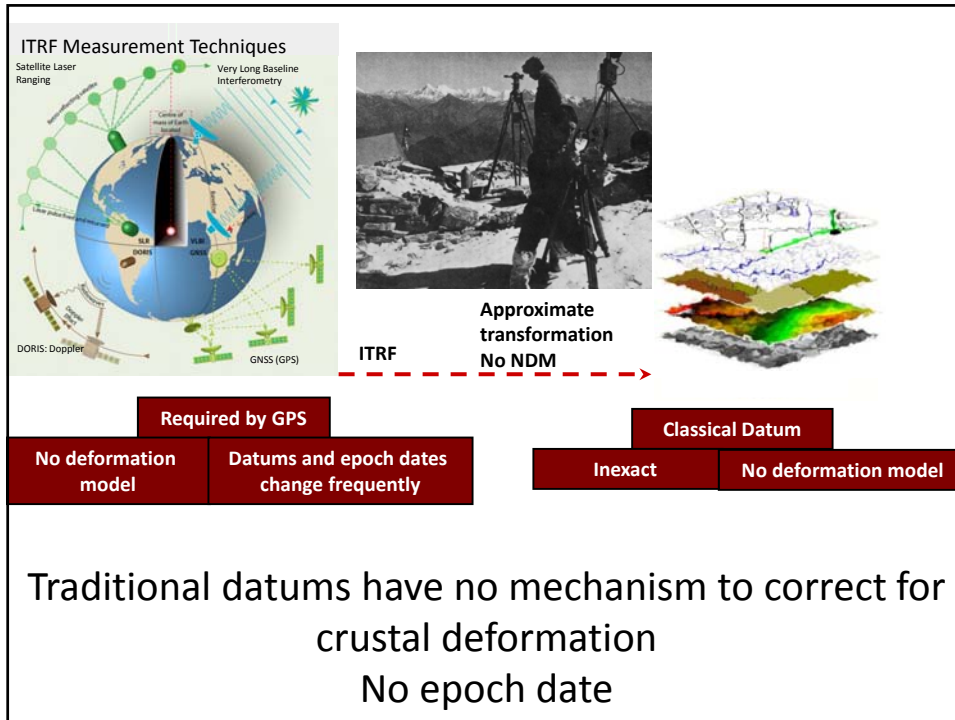
ITRF2014 Nepal
ITRF97 New Zealand

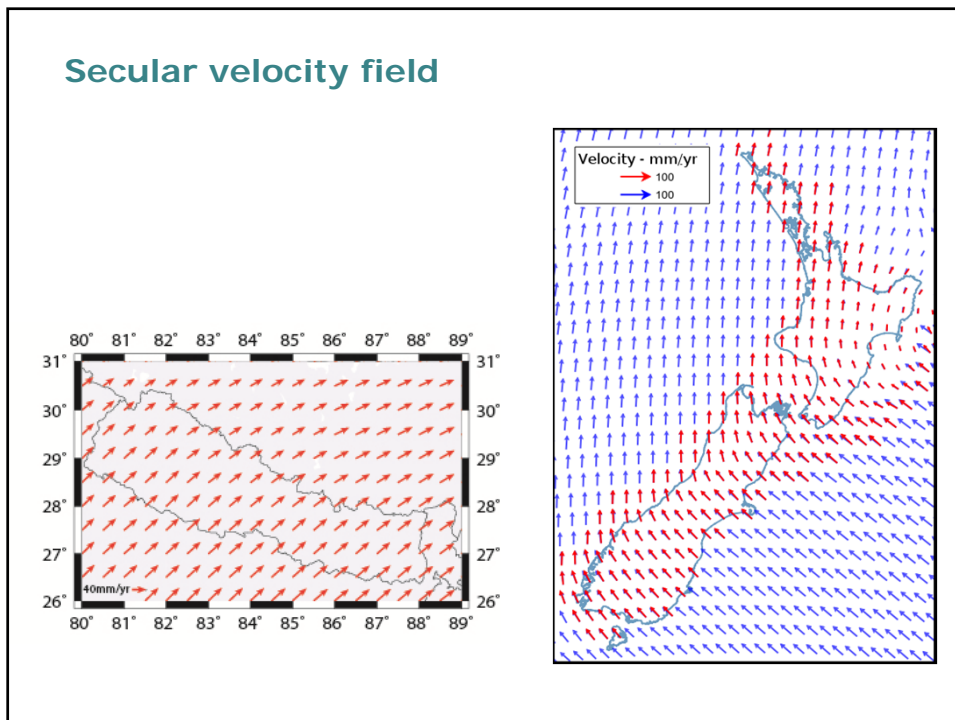
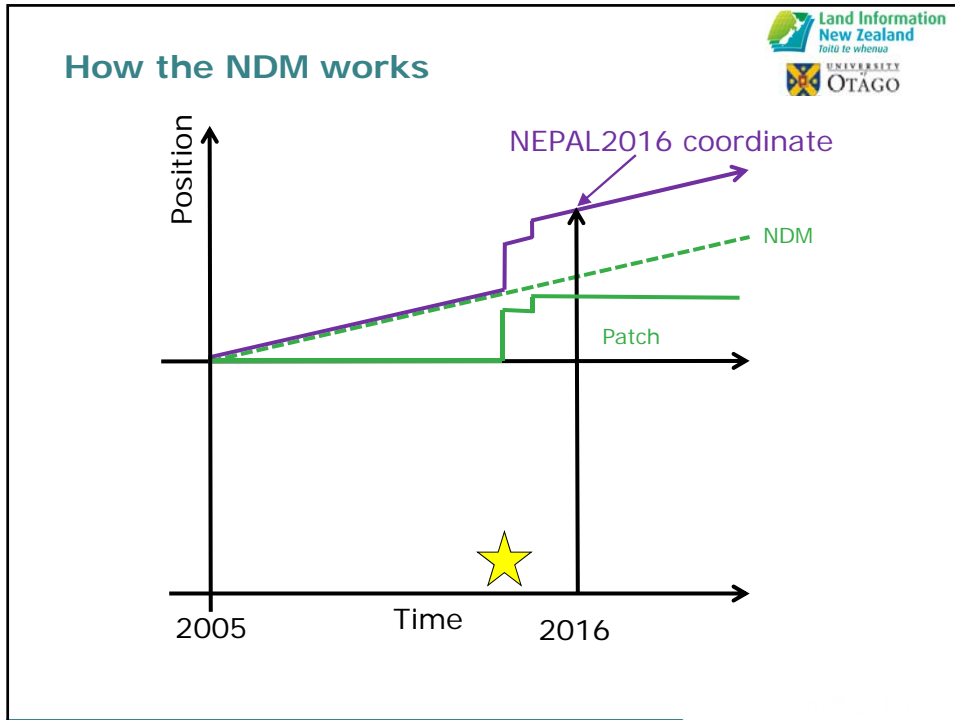


NDM

Required by GPS		Modern datums	
No deformation model	Datums and epoch dates change frequently	Stable coords	deformation model

Modern datums aligned with ITRF
Coordinates transformed reference epoch using the
National deformation model

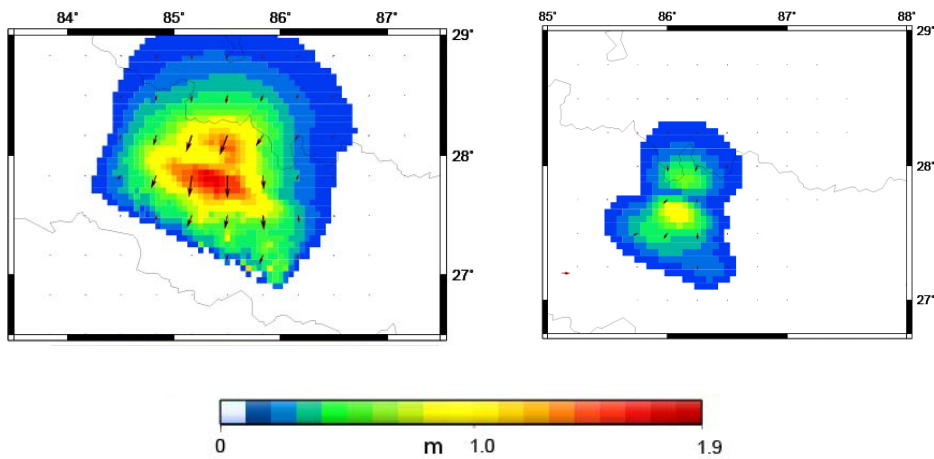




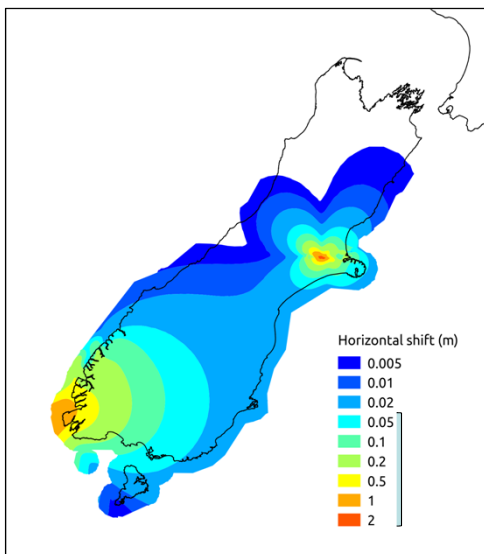
Patches for Nepal Models

Mw 7.8 Gorkha Earthquake

Mw 7.3 12 May Aftershock



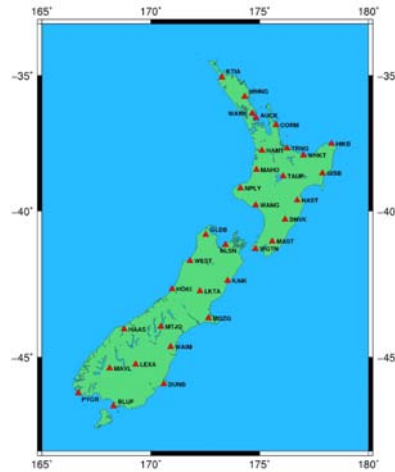
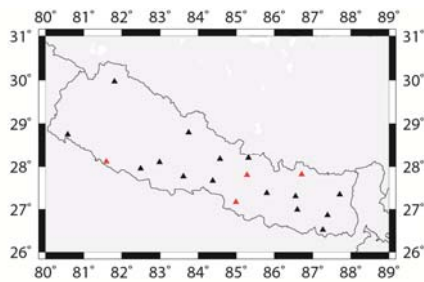
Patches for New Zealand earthquakes



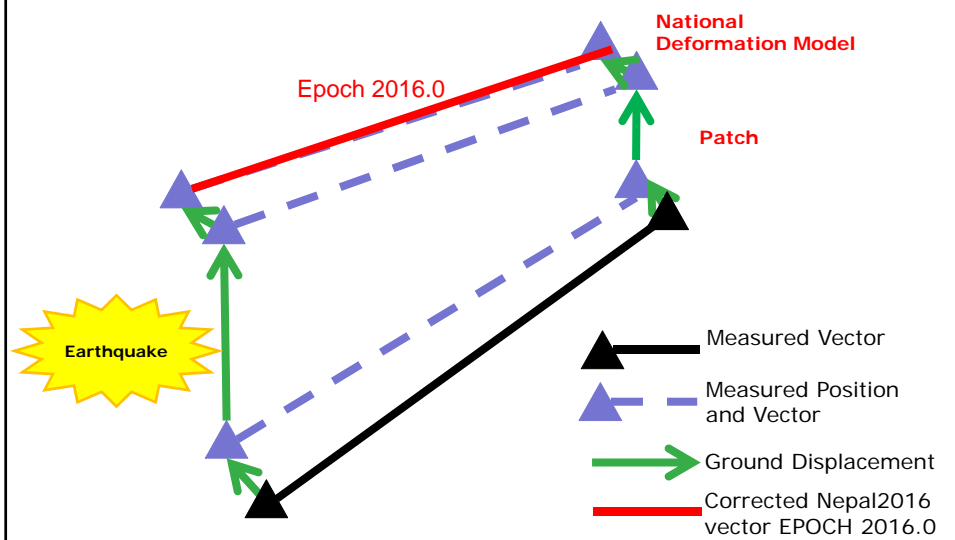
Patching coordinates in New Zealand because there have been 10 earthquakes since 2002.

Control

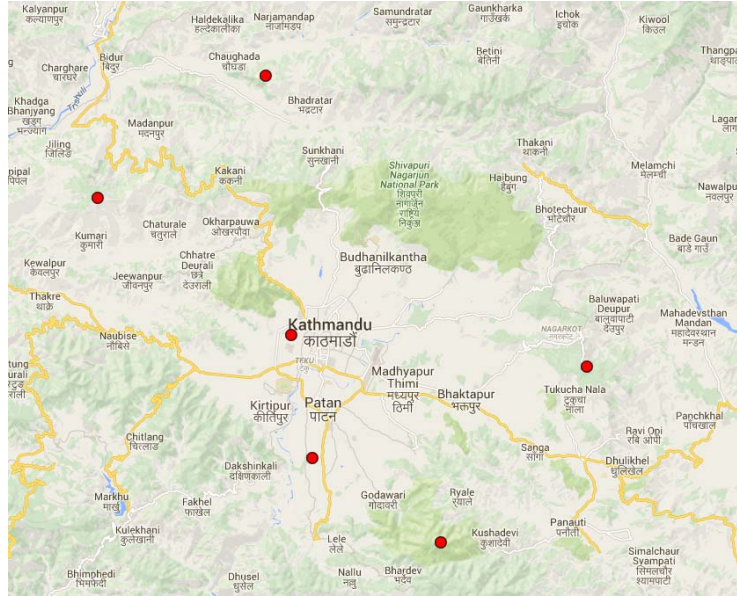
- Top level control for all modern datums is a network of cGNSS stations
- These maintain the alignment of the national datum and the ITRF
- Help GPS users to connect to the datum



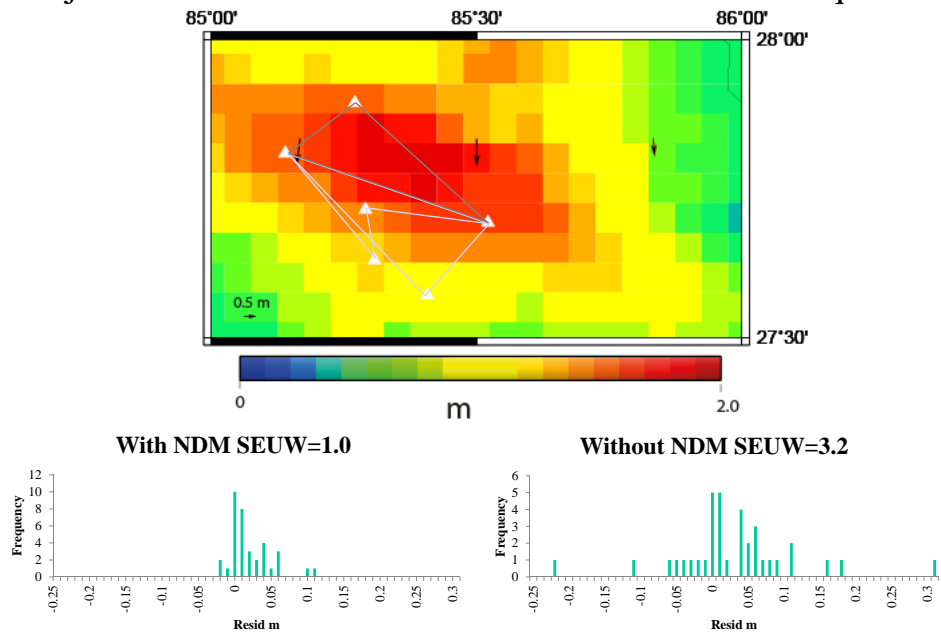
Deformation models in survey adjustments Example: Patch for an Earthquake



Test points



Adjustment of GPS before and after the Gorkha Earthquake



Conclusions

- Development of a modern datum requires
 - Adoption of a realization of the ITRF and reference epoch
 - Development of a National Deformation Model which will need to contain a model of the secular velocity field plus any recent earthquakes
 - Software to perform datum transformations and least square adjustment of survey data

- Implementation of a new datum will require
 - Establish a National cGNSS network to act as top level control
 - Develop ITRF coordinates and velocities for cGNSS stations
 - Determine new coordinates of lower order control by a combination of readjustment and surveying,
 - Develop correction grids to transform geodatabases from the old into the new system.



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

Technical Seminar on Reference Frames in Practice: Reference Frames, Datum Unification and Kinematics

- Two-day seminar immediately before the Working Week (Sunday 1 May and Monday 2 May 2016) aimed at surveyors and spatial professionals involved in developing or utilising geodetic datums
- Datum unification and kinematics theme chosen as being of particular interest to the Pacific region
- Delivered by FIG, IAG, UN-GGIM, ICG and NZIS so able to access international expertise
- <http://www.fig.net/fig2016/commission5.htm>

