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Towards a modernized geodetic datum for Nepal: Options for developing an accurate terrestrial reference frame following the April 25, 2015 Mw7.8 Gorkha earthquake

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FIG Working Week 2016

CHRISTCHURCH, NEW ZEALAND 2-6 MAY 2016

Recovery

from disaster

Organised by



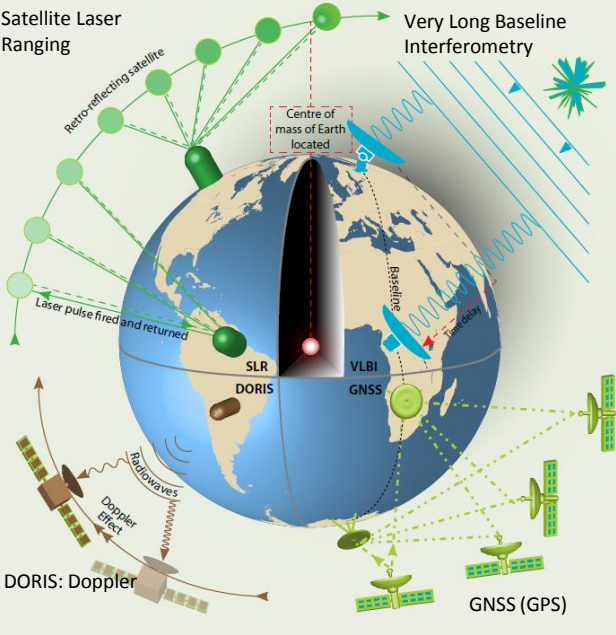
Platinum Partners



Diamond Partner

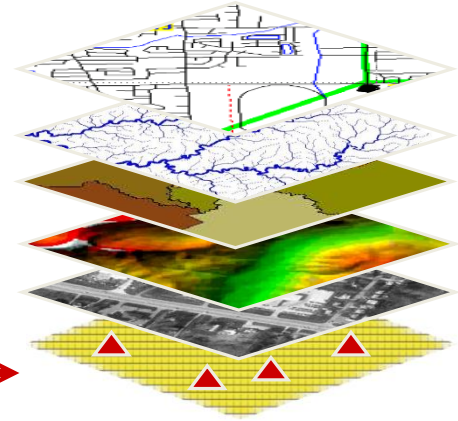


ITRF Measurement Techniques



ITRF2014

NDM



Required by GPS

No deformation model

Datums and epoch dates change frequently

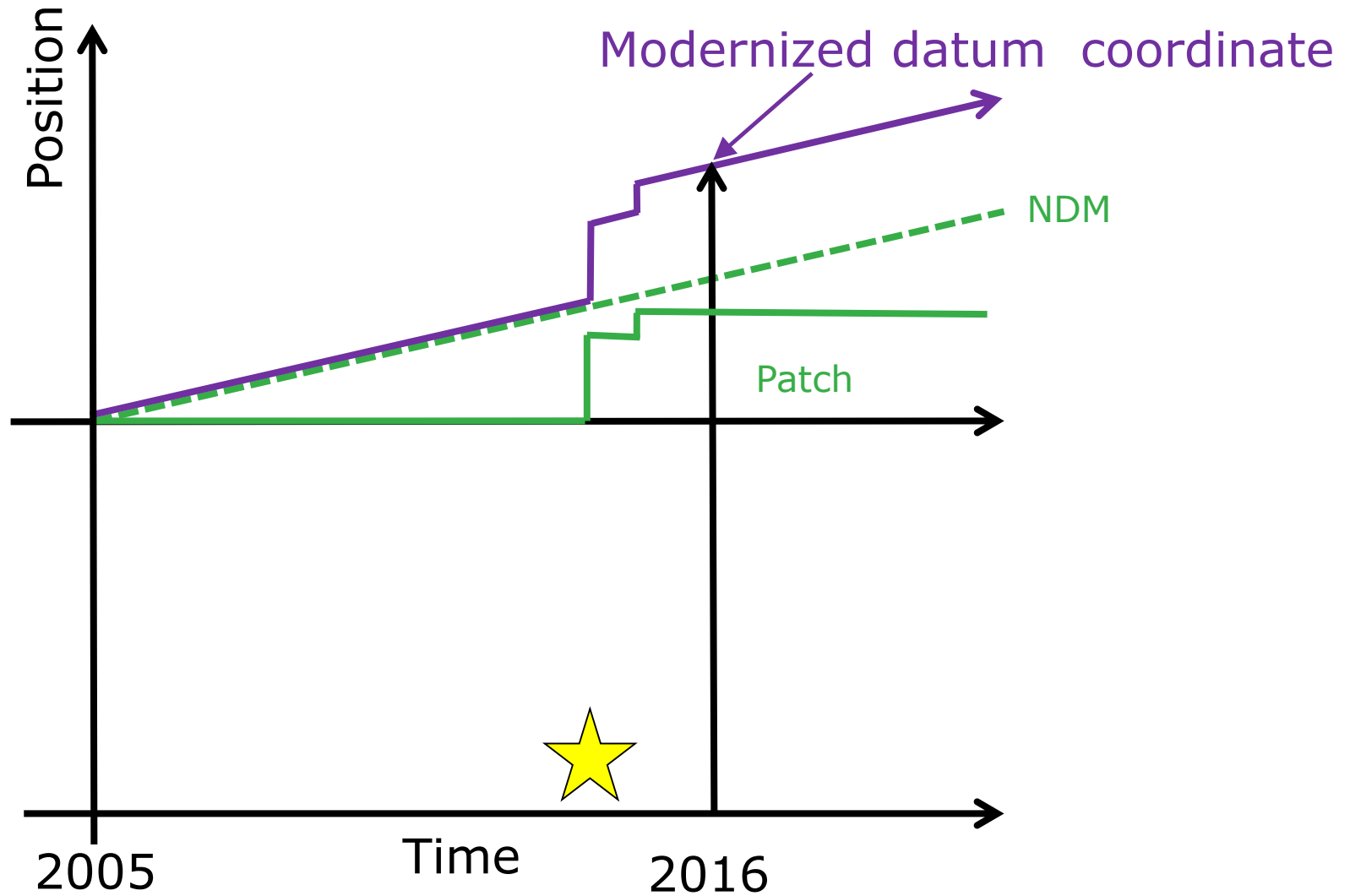
Modernized datum for Nepal

Stable coords

deformation model

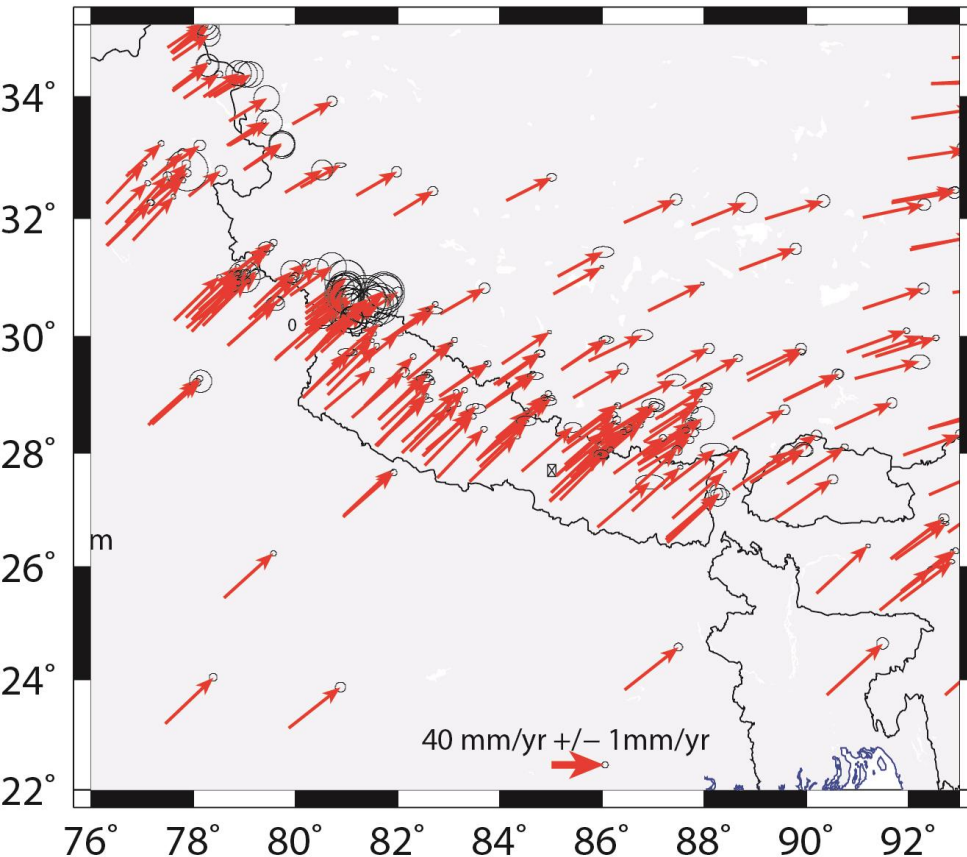
Modernized geodetic datum aligned with ITRF2014
 Coordinates transformed to 1 Jan 2016 using the a
 national deformation model

How the NDM works

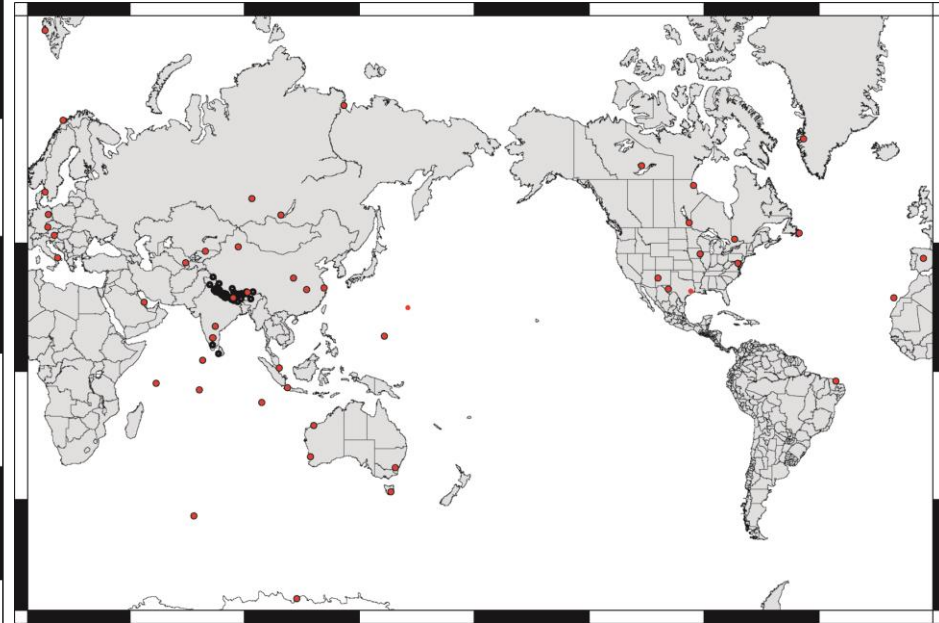


Secular velocity field

- Velocity from four recent studies were aligned with the ITRF2014 velocities
- The combined velocity field was used to produce a grid file with a density of 20 points/degree



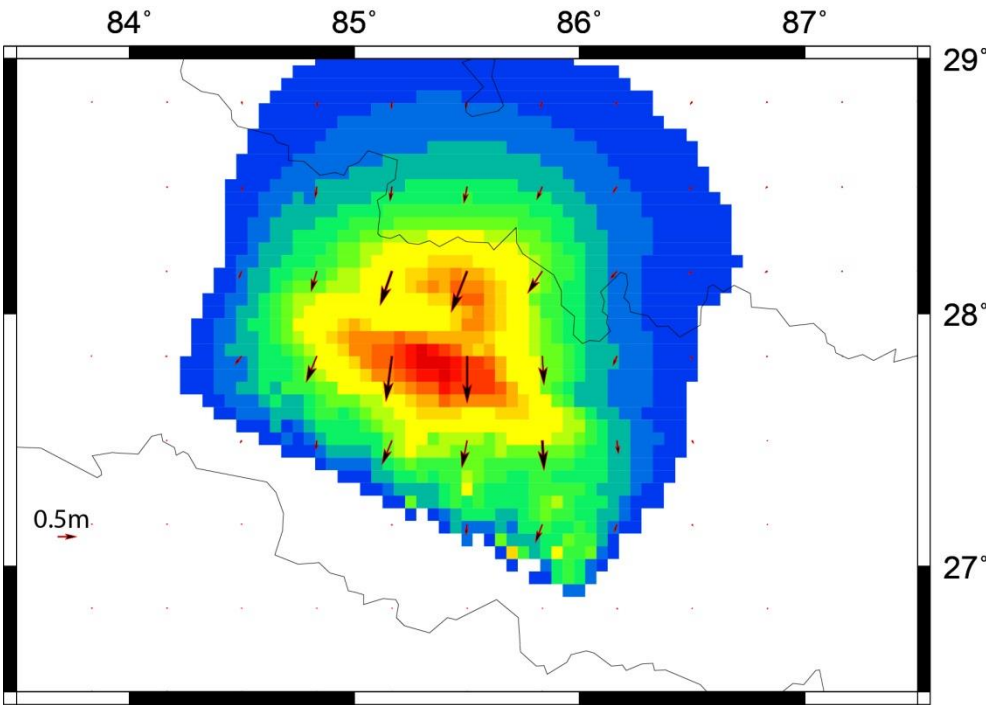
ITRF-2014 Banerjee 2008 Bettinelli 2006 Ader 2012 Jade 2014



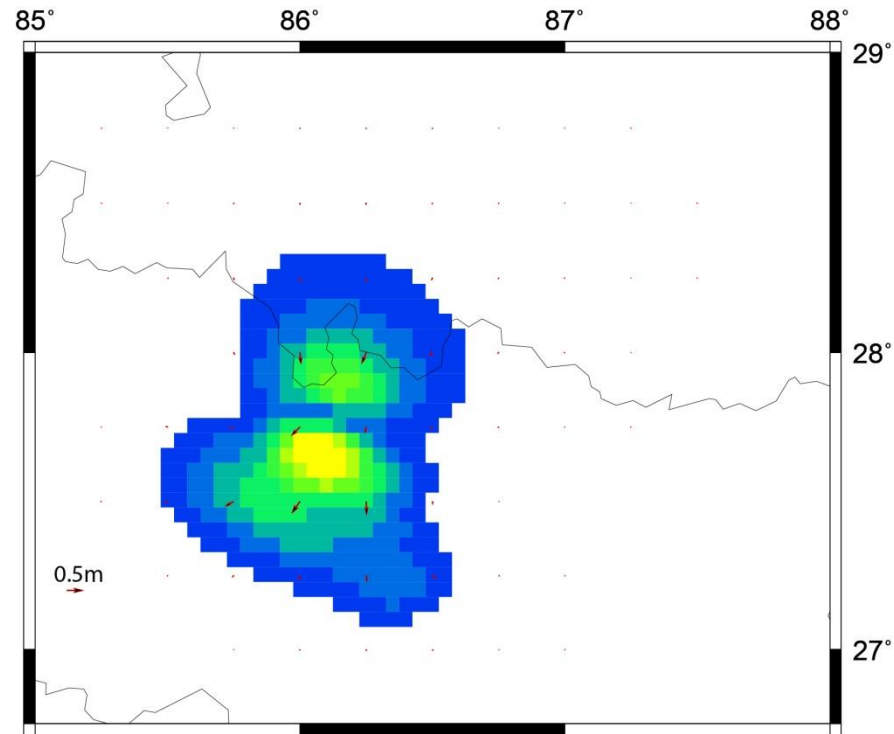
Earthquake Models

- Displacement grids developed from published dislocation models with a density of 20 points/degree

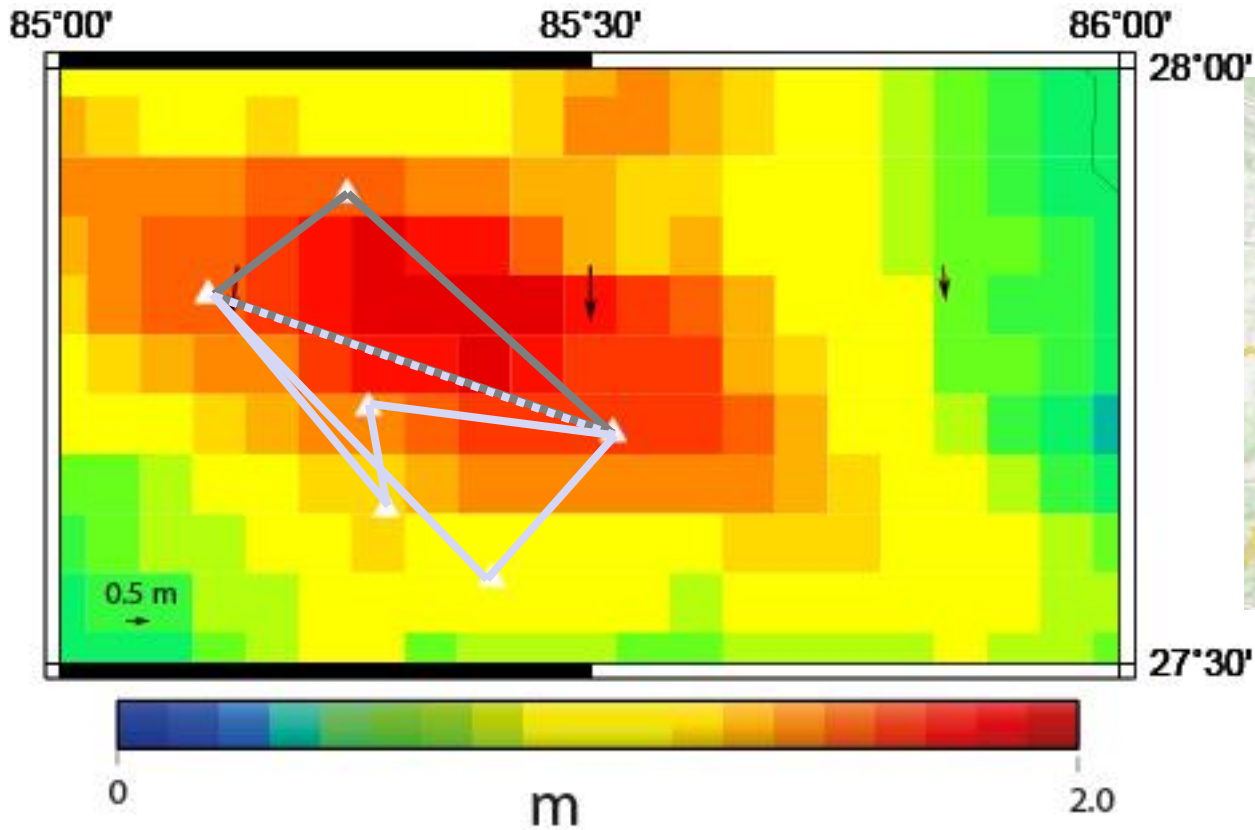
Mw 7.8 Gorkha Earthquake



Mw 7.3 12 May Aftershock

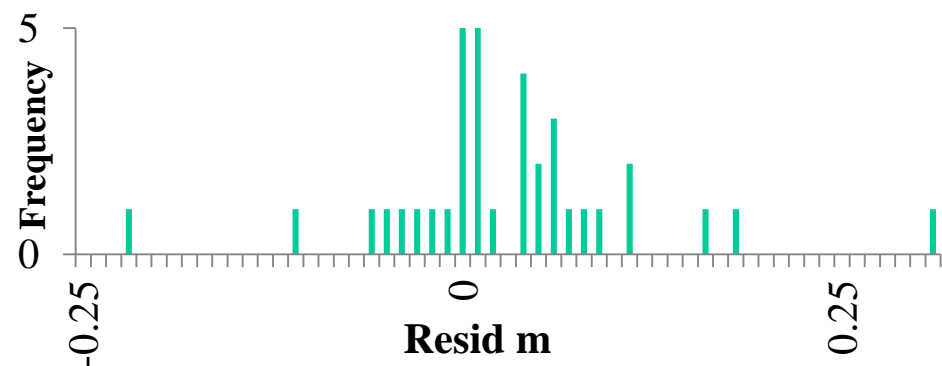
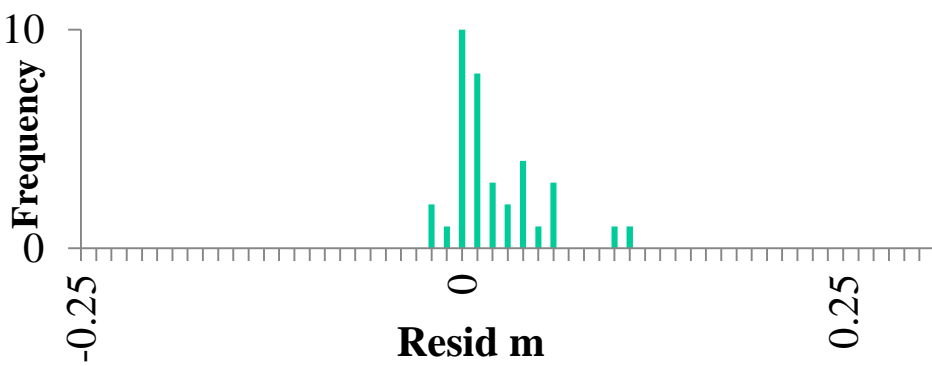


Adjustment of GPS before and after the Gorkha Earthquake



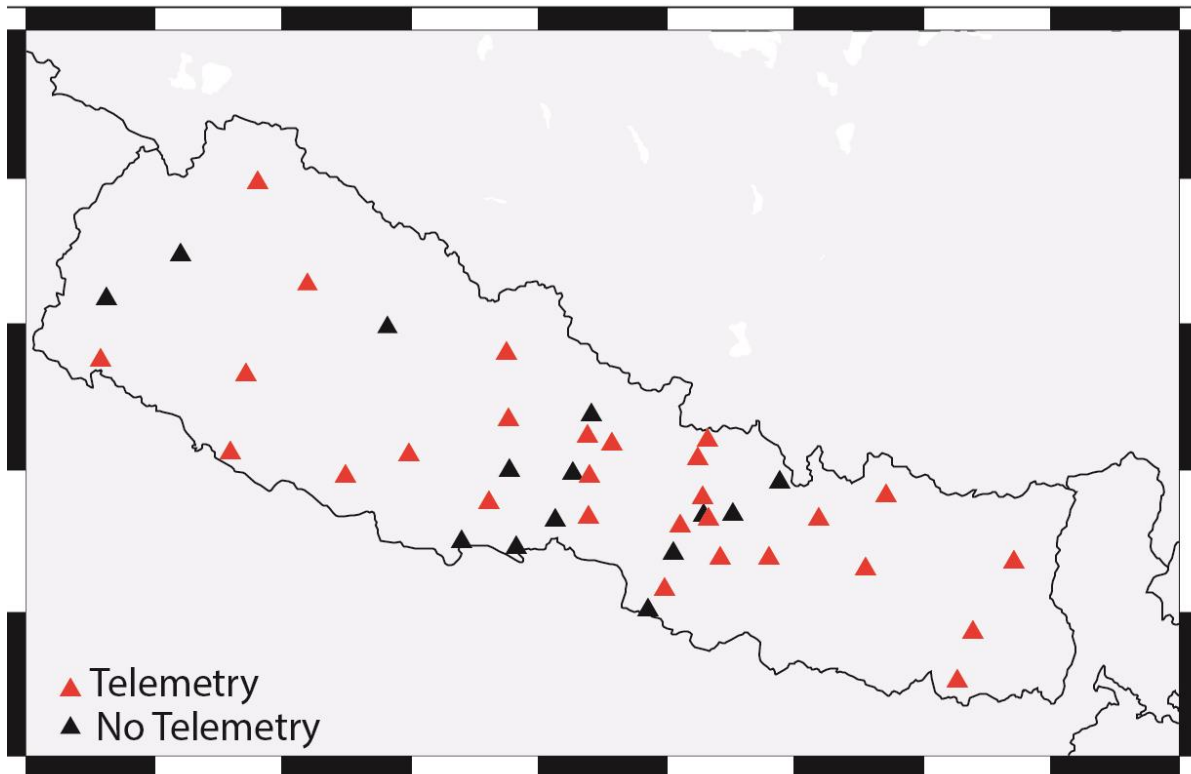
With NDM SEUW=1.0

Without NDM SEUW=3.2



Control

- The stations of the CALTECH network now operated by UNAVCO can be adopted as a 0 order network of CORS
- However the stations will have to be processed using specialist GNSS software to give coordinates precisely aligned to the ITRF
- Coordinates for lower order control will be determined by readjustments and new surveying.



Conclusions

- datum aligned to a realization of the ITRF
- common reference epoch after the recent sequence of earthquakes
- deformation model
 - Velocity model
 - Earthquake displacements
- Control
 - Top level control CORS network
 - Establish lower order control relative to the CORS
 - New marks surveyed with GPS
 - Readjust existing measurements
- correction grids to transform geodatabases from Nepal Everest into the new system.
- Support in commercial software