PositioNZ-PP

A GPS Post-Processing Service for New Zealand

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Presentation to XXIV FIG International Congress 2010, Sydney, Australia, 13 April 2010

Project background

Australian Government — Geoscience Australia ← **AUSPOS** → Toitu te Land whenua Information New Zealand

Bernese

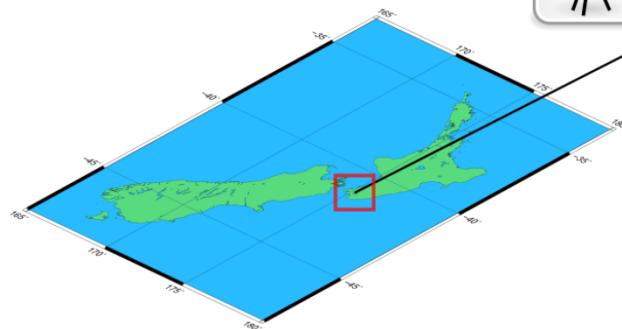positionz → New Zealand geodetic DATUM 2000

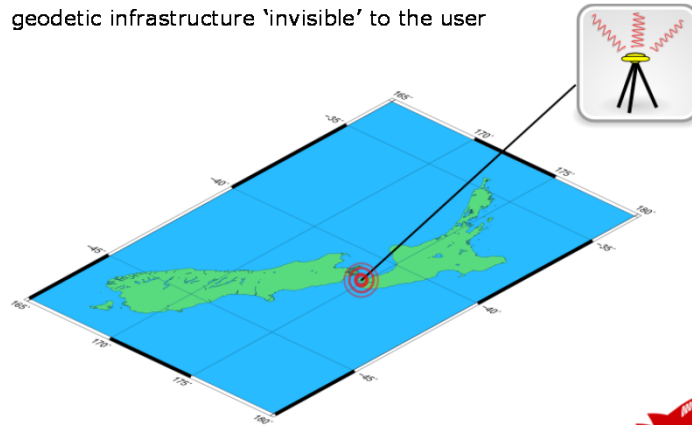
What the service is...

Traditional GPS survey approach

- Relative GPS positioning
  - cm level positioning with two or more receivers requires users to understand and extract existing geodetic infrastructure
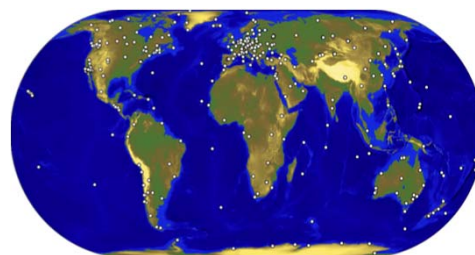
Online GPS Service Approach

- "Absolute" GPS positioning
  - cm level positioning with one or more receivers
  - geodetic infrastructure 'invisible' to the user

IGS Data

- Precise ephemeris data
- Reference station 30SEC RINEX data.
- Will also use ultra, rapid products for low latency processing

IGS station network
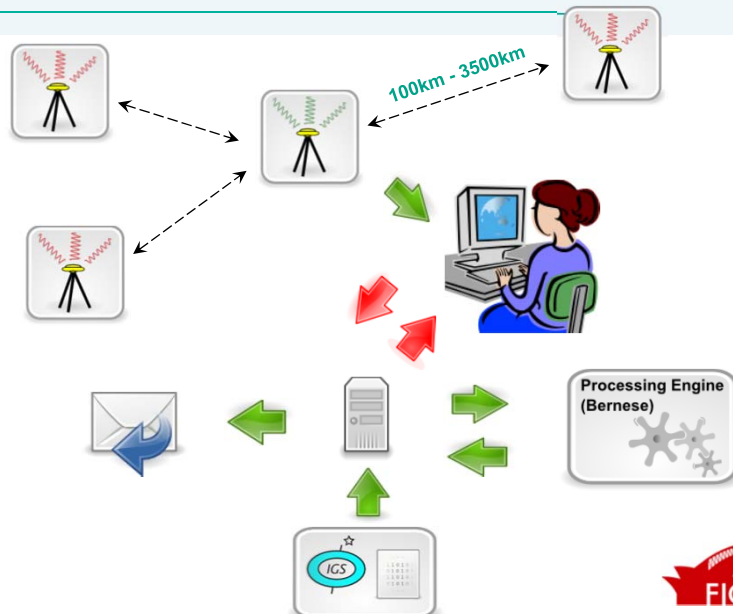
PositioNZ CORS Network

PositioNZ - 33 stations

Daily and hourly 30sec RINEX data

How will it work?

100km - 3500km

Processing Engine
(Bernese)

IGS
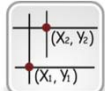
What will the user need?

@	Login Email Address
RINEX	Dual-frequency (L1/L2) Minimum 0.5 hour, recommended 6 GLONASS is not processed
(height diagram)	Height (Mark to ARP) Type
Advanced	UTC day/Datafile timeframe Reference station selection Report Output (PDF, TXT, XML)

Processing Output

(X₂, Y₂) (X₁, Y₁)	ITRF coordinates NZGD2000 coordinates NZTM2000 grid coordinates NZVD2009 heights
(report icon)	Quality of processing Reference metadata
SINEX	Solution data for integration with other packages

Bernese Processing Stages
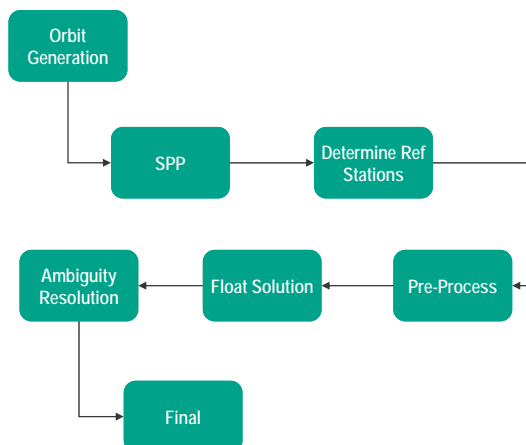
Reference Station Coordinates

Reference Stations from IGS

```
Reference Frame Co-ords
------------------------------------------------------------------
LOCAL GEODETIC DATUM: IGb00              EPOCH: 2005-09-04 00:00:00

NUM   STATION NAME         X (M)         Y (M)         Z (M)
      FLAG

  1   ALBH 40129M003    -2341332.9728  -3539049.5212   4745791.3152   I
  2   ALGO 40104M002      918129.3603  -4346071.2763   4561977.8499   I
  3   ALIC 50137M001    -4052052.1897   4212836.0828  -2545105.3946   I
  4   ALRT 40162M001      388042.6804   -740382.3914   6302001.8857   I
```

```
Reference Frame Co-ords
------------------------------------------------------------------
LOCAL GEODETIC DATUM: ITRF00

NUM   STATION NAME        VX (M/Y)      VY (M/Y)      VZ (M/Y)   FLAG
      PLATE

  1   ALBH 40129M003       -0.0100       -0.0005       -0.0069    I
  2   ALGO 40104M002       -0.0161       -0.0043        0.0029    I
  3   ALIC 50137M001       -0.0399       -0.0040        0.0520    I
  4   ALRT 40162M001       -0.0212       -0.0059        0.0083
```

Station Prediction Model

```
AUCK east
  1.5      first_time
  3098.5   last_time
  1.96425772 1    intercept
  0.00396584999 1    slope
 -0.0711306781 1    annual_cos
  0.0283077657 1    annual_sin
  0. 0     semi_annual_cos
  0. 0     semi_annual_sin
  0    slope_change: time, magnitude
  2    equipment_offset: time, magnitude
  667.  0.833302855 1
  2134.  1.09692883 1
  1    coseismic_offset: time, magnitude
  1819.  0.515103221 1
  0    decaying_exponential: time, duration, magnitude
  1    slow_slip: time, duration, magnitude
  1210.  0.0500000007  2.49033284 0
```
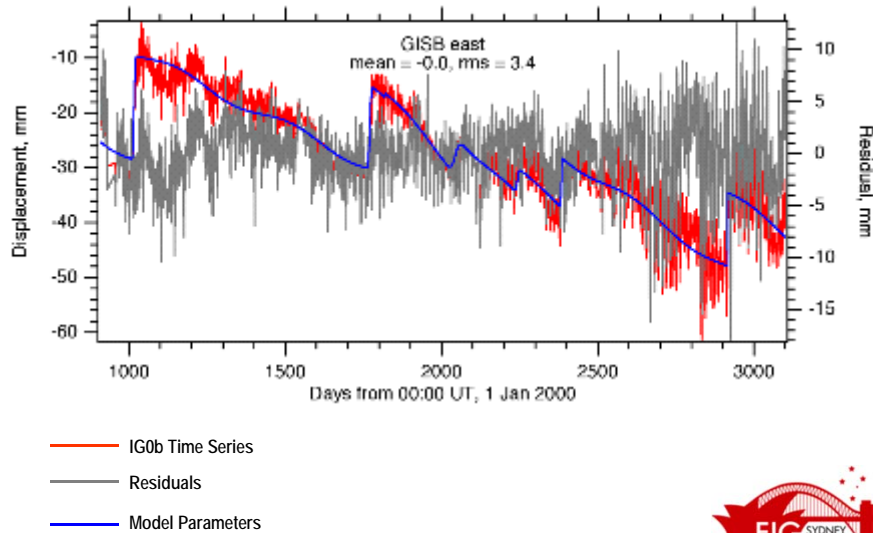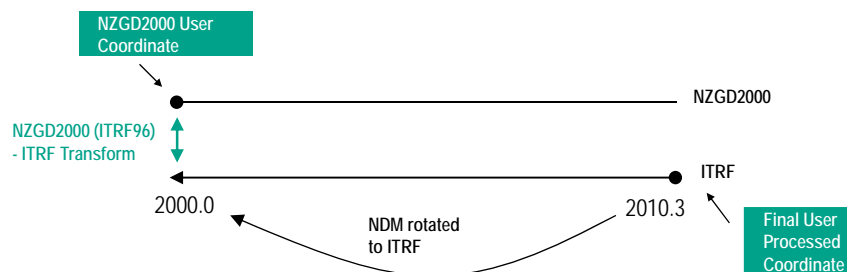
Expected Accuracy

Data amount	ITRF (RMS)	NZGD2000 (RMS) (processing epoch 2010.0)
2 Hours	20mm	32mm
4 Hours	9mm	27mm
24 Hours	6mm	18mm

Future…

- Awaiting deployment into LINZ IT environment
- Maybe late 2010??
- LINZ in conjunction with GNS is
  - Improve accuracy of NDM
  - Improve accuracy station model
- Rapid static processing

Acknowledgements

- Geosciences Australia
- GNS Science

Thanks!