MODERNIZING FIJI'S GEODETIC DATUM

(UPDATE)

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Presentation Outline

- CORS Sites
- Software
- Connection to the Local Datum
- Field Survey Campaign
- Data Synchronisation
- Data Processing
- Administration
- Capacity Development
- Discussion and Conclusion

CORS Sites

- Labasa – Vaturekuka Govt. Station
- Nabouwalu - Nabouwalu Govt. Station
- Taveuni - Waiyevo Govt. Station
- Kadavu - Vunisea Govt. Station
- Koro Is. – Nasau Govt. Station
- Lakeba – Tubou Village
- Rotuma – Ahau Govt. Station
- Ono-i-lau Island – Matokana Village


HI-TARGET
TOYOTA

LABASA CORS

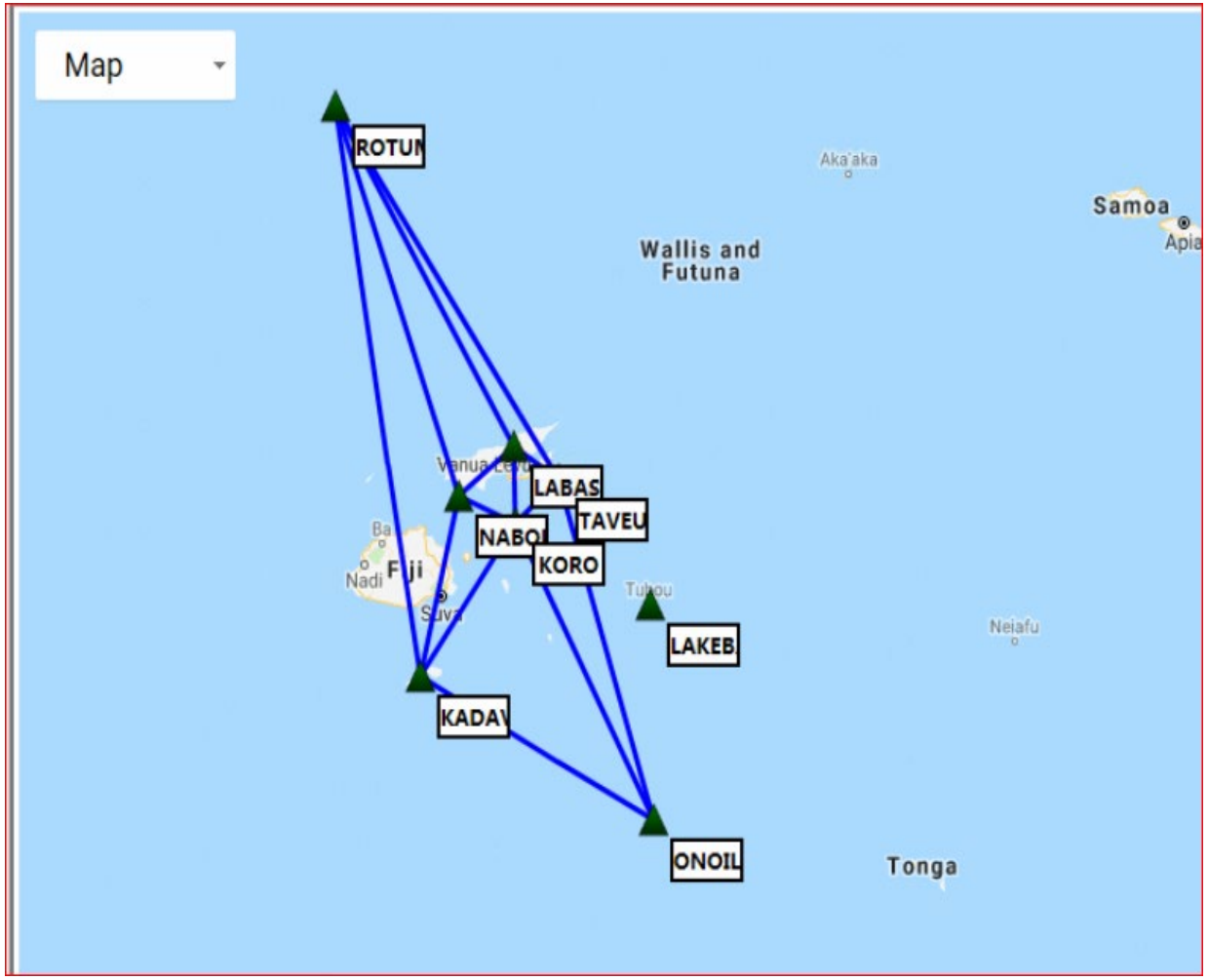
SOFTWARE

ZNetStream

-> Data Streaming and Data Splitting

Network Status

Number	Connection State	Station Name	Receiver Type	DataSources IP	Data Port	Network Protocol	Number Of Connectio
1	Connceted	LABASA	VNet-T	192.168.0.100	6000	TCP Server	2
2	Connceted	NABOUWALU	VNet-T	192.168.0.100	6001	TCP Server	2
3	Connceted	TAVEUNI	VNet-T	192.168.0.100	6002	TCP Server	2
4	Connceted	KORO	RTCM3.0	192.168.0.100	6004	TCP Server	2
5	Connceted	KADAVU	RTCM3.0	192.168.0.100	6003	TCP Server	2
6	Connceted	ROTUMA	RTCM3.0	192.168.0.100	6005	TCP Server	2
7	Connceted	ONOILAU	RTCM3.0	192.168.0.100	6006	TCP Server	2
8	Stopped	LAKEBA	RTCM3.0	192.168.0.100	6007	TCP Server	0



ZNetVRS

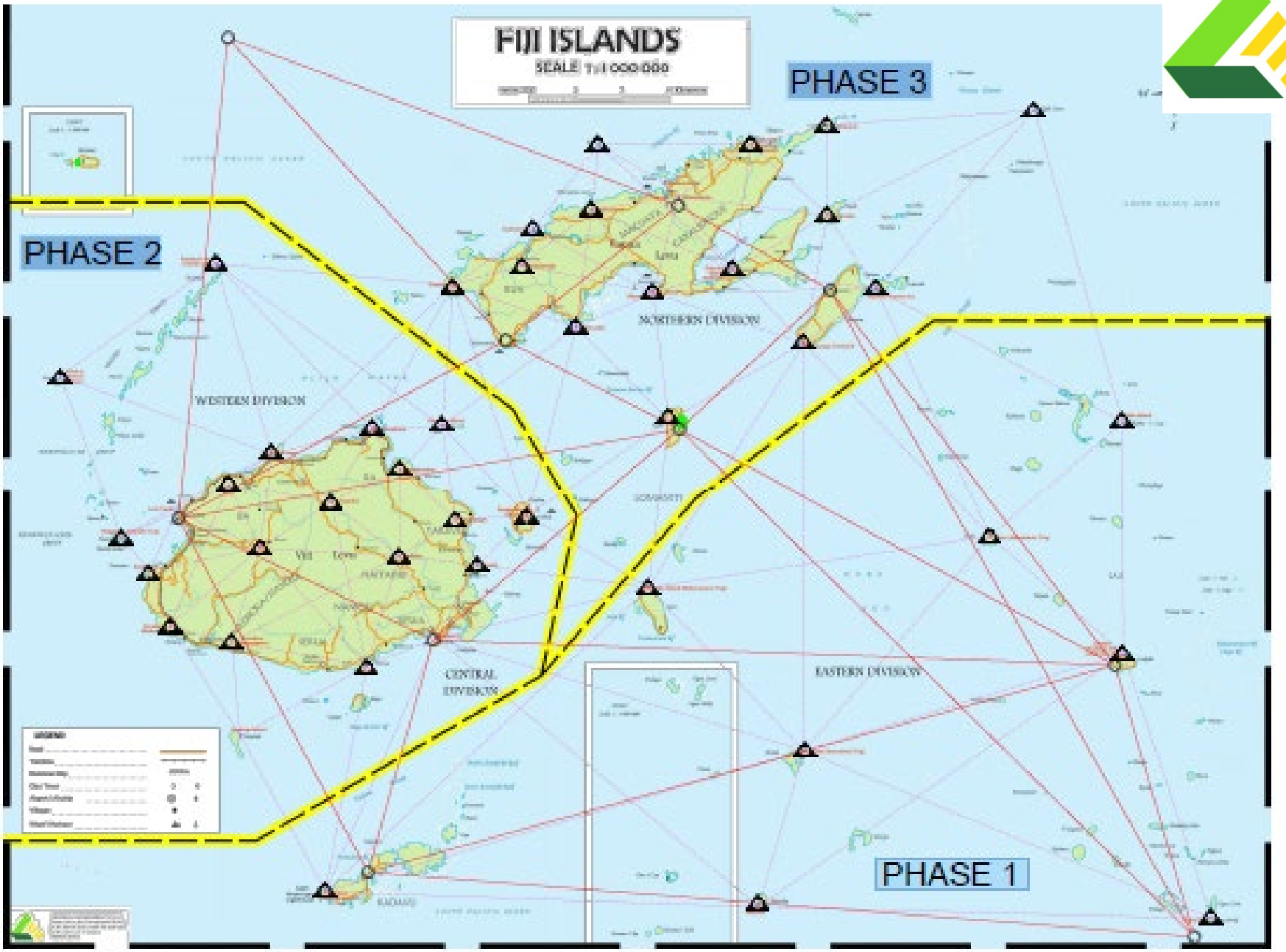
-> Multi-base system for Baseline solving & error modeling.
Also providing Ntrip Service.

Connection - Local Datum

- Viti Levu
- Vanua Levu
- Maritime Islands
- EEZ Boundary Delimitation Network
- Trig Reconnaissance Survey
- Reconnaissance Survey – Maritime Islands
- Reconnaissance Survey – 2nd Order and Standard Survey marks

Field Survey Campaign

- Survey Specifications
- Survey Implementation Plans – Fiji Navy, Pacific Community (SPC) and Ministry of Lands
- Logistics – Ships, Equipment, Stores
- Geoscience Australia – GA Lend GPS GNSS Geodetic Equipment
- Field Operators Training
- Field Survey Campaign in 3 Phases
- GNSS GPS Raw Data Backup


FIJI ISLANDS
SCALE 1:1 000 000
PHASE 3
PHASE 2
PHASE 1
NORTHERN DIVISION
WESTERN DIVISION
CENTRAL DIVISION
EASTERN DIVISION

Field Survey Campaign Specifications

TABLE OF CONTENTS

Phase 1 – Field Work

- Survey Staff - 58

- Fiji Navy 25, Control 26, SPC 5, GIM 2

- 3 Royal Fiji Navy Ships

- Kula, Kikau, Kacau: Southern Fiji, Ceva-i-ra

- Local Ferry – MV Lomaiviti Princess

- Kadavu and Gau

- Vehicles - 2

Phase 1 – Field Work Cont.

- Geodetic GPS GNSS Receivers

- Leica - 16

- Trimble - 7

- Stations Occupied

- 12 Primary Stations – 7 day observations

- 42 Secondary Stations – 6 hour observations

Phase 2 – Field Work

- Survey Staff - 60

- Fiji Navy 25, Control 26, SPC 2, DLOCE 7, DLMW

- 1 Royal Fiji Navy Ship

- Kacau: Vatulele, Mamanuca, Yasawa Islands

- Local Ferry

- Ovalau Island, Vatu-i-ra

- Vehicles – 6

Phase 2 – Field Work Cont.

- Geodetic GPS GNSS Receivers

- Leica: 16

- Trimble: 7

- Stations Occupied

- 22 Primary Stations – 7 day observations

- 23 Secondary Stations – 6 hour observations

Phase 3 – Field Work

- Survey Staff - 63

- Fiji Navy 20, Control 27, SPC 2, DLOCE 7, DLMN 7

- 1 Royal Fiji Navy Ship

- Kacau: Udu Pt, Qelelevu, Cikobia

- Local Ferry

- Vanua Levu, Taveuni, Qamea, Rabi, Kia, Rotuma

- Vehicles - 5

Phase 3 – Field Work Cont.

- Geodetic GPS GNSS Receivers

- Leica: 14

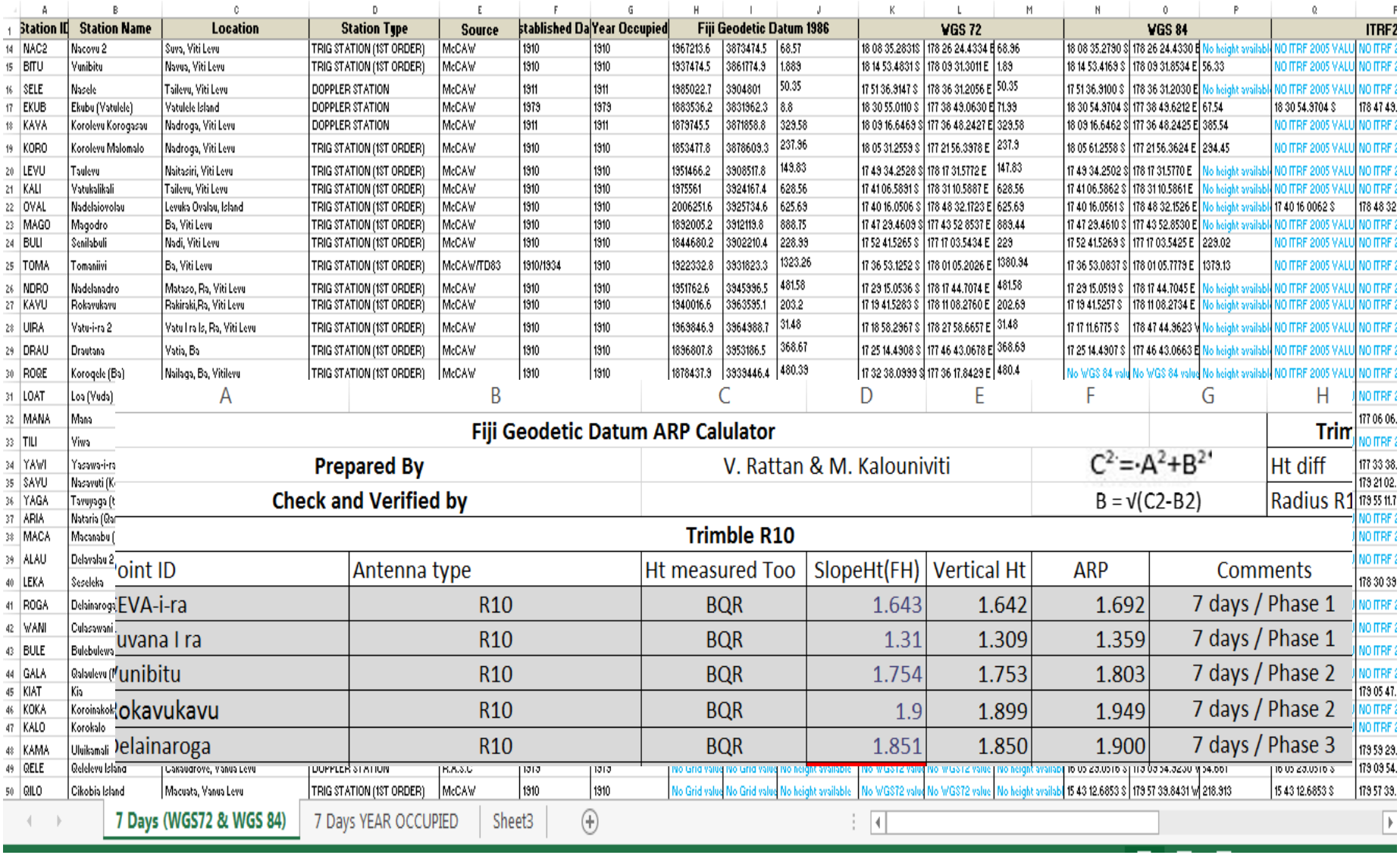
- Trimble: 5

- Stations occupied

- 18 Primary Stations – 7 day observations

- 23 Secondary Stations – 6 hour observations

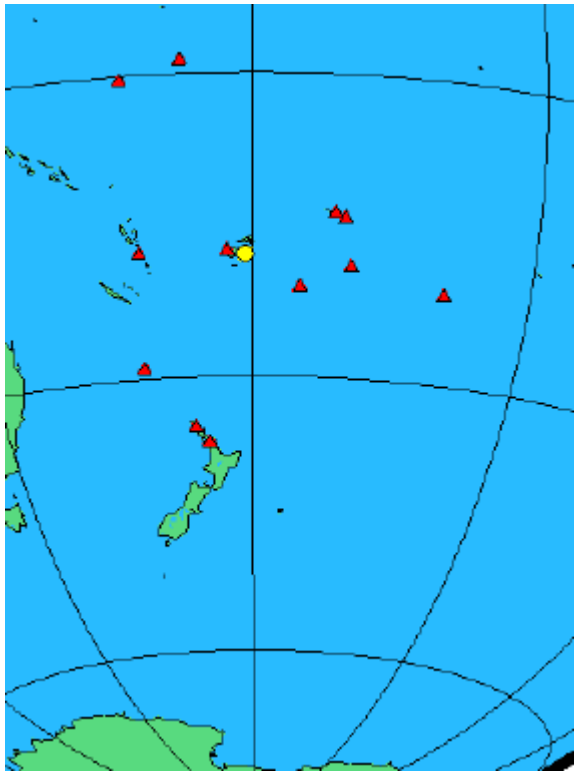
Data Synchronisation



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Station ID	Station Name	Location	Station Type	Source	stablished Da	Year Occupied	Fiji Geodetic Datum 1986			WGS 72			WGS 84			ITRF2	
14	NAC2	Nacovu 2	Suva, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1967213.6	3873474.5	68.57	18 08 35.2831S	178 26 24.4334 E	68.96	18 08 35.2790 S	178 26 24.4330 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
15	BITU	Vunibitu	Navua, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1937474.5	3861774.3	1.889	18 14 53.4831 S	178 09 31.3011 E	1.89	18 14 53.4169 S	178 09 31.8534 E	56.33	NO ITRF 2005 VALU	NO ITRF 2
16	SELE	Nasele	Tailevu, Viti Levu	DOPPLER STATION	McCAW	1911	1911	1985022.7	3904801	50.35	17 51 36.3147 S	178 36 31.2056 E	50.35	17 51 36.3100 S	178 36 31.2030 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
17	EKUB	Ekubu (Vatulele)	Vatulele Island	DOPPLER STATION	McCAW	1979	1979	1883536.2	3831962.3	8.8	18 30 55.0110 S	177 38 43.0630 E	71.99	18 30 54.9704 S	177 38 43.6212 E	67.54	18 30 54.9704 S	178 47 49.
18	KAVA	Korolevu Korogasau	Nadroga, Viti Levu	DOPPLER STATION	McCAW	1911	1911	1879745.5	3871858.8	329.58	18 09 16.6469 S	177 36 48.2427 E	329.58	18 09 16.6462 S	177 36 48.2425 E	385.54	NO ITRF 2005 VALU	NO ITRF 2
19	KORO	Korolevu Malomalo	Nadroga, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1853477.8	3878609.3	237.96	18 05 31.2559 S	177 21 56.3978 E	237.3	18 05 61.2558 S	177 21 56.3624 E	294.45	NO ITRF 2005 VALU	NO ITRF 2
20	LEVU	Taulevu	Naitasiri, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1951466.2	3908517.8	143.83	17 43 34.2528 S	178 17 31.5772 E	147.83	17 43 34.2502 S	178 17 31.5770 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
21	KALI	Vatukalikali	Tailevu, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1975561	3924167.4	628.56	17 41 06.5831 S	178 31 10.5887 E	628.56	17 41 06.5862 S	178 31 10.5861 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
22	OVAL	Nadelaiovolau	Levuka Ovalau, Island	TRIG STATION (1ST ORDER)	McCAW	1910	1910	2006251.6	3925734.6	625.69	17 40 16.0506 S	178 48 32.1723 E	625.69	17 40 16.0561 S	178 48 32.1526 E	No height available	17 40 16 0062 S	178 48 32
23	MAGO	Magodro	Ba, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1892005.2	3912113.8	888.75	17 47 29.4603 S	177 43 52.8537 E	889.44	17 47 29.4610 S	177 43 52.8530 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
24	BULI	Senilabuli	Nadi, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1844680.2	3902210.4	228.99	17 52 41.5265 S	177 17 03.5434 E	229	17 52 41.5263 S	177 17 03.5425 E	229.02	NO ITRF 2005 VALU	NO ITRF 2
25	TOMA	Tomaniivi	Ba, Viti Levu	TRIG STATION (1ST ORDER)	McCAW/TD83	1910/1934	1910	1922332.8	3931823.3	1323.26	17 36 53.1252 S	178 01 05.2026 E	1380.94	17 36 53.0837 S	178 01 05.7779 E	1379.13	NO ITRF 2005 VALU	NO ITRF 2
26	NDRO	Nadelanadro	Mataso, Ra, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1951762.6	3945936.5	481.58	17 29 15.0536 S	178 17 44.7074 E	481.58	17 29 15.0513 S	178 17 44.7045 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
27	KAVU	Rokavukavu	Rakiraki,Ra, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1940016.6	3963595.1	203.2	17 19 41.5283 S	178 11 08.2760 E	202.69	17 19 41.5257 S	178 11 08.2734 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
28	UIRA	Vatu-i-ra 2	Vatu I ra Is, Ra, Viti Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1963846.9	3964388.7	31.48	17 18 58.2367 S	178 27 58.6657 E	31.48	17 17 11.6775 S	178 47 44.3623 W	No height available	NO ITRF 2005 VALU	NO ITRF 2
29	DRAU	Drautana	Vatia, Ba	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1896807.8	3953186.5	368.67	17 25 14.4308 S	177 46 43.0678 E	368.63	17 25 14.4301 S	177 46 43.0663 E	No height available	NO ITRF 2005 VALU	NO ITRF 2
30	ROQE	Koroqele (Ba)	Nailaga, Ba, Vitilevu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	1878437.3	3939446.4	480.39	17 32 38.0999 S	177 36 17.8429 E	480.4	No WGS 84 valu	No WGS 84 value	No height available	NO ITRF 2005 VALU	NO ITRF 2
31	LOAT	Loa (Yuda)	A	B	C	D	E	F	G	H								NO ITRF 2
32	MANA	Mana	**Fiji Geodetic Datum ARP Calulator**							**Trim**								177 06 06.
33	TILI	Viwa																NO ITRF 2
34	YAWI	Yacawa-i-ra	**Prepared By**		V. Rattan & M. Kalouniviti			$C^2 = A^2 + B^2$		Ht diff								177 33 38.
35	SAVU	Nacavuti (K																179 21 02.
36	YAGA	Tavuyaga (t	**Check and Verified by**					B = √(C2-B2)		Radius R1								179 55 11.7
37	ARIA	Nataria (Ba																NO ITRF 2
38	MACA	Macanabu (	**Trimble R10**															NO ITRF 2
39	ALAU	Delavalu 2	oint ID	Antenna type	Ht measured Too	SlopeHt(FH)	Vertical Ht	ARP	Comments									NO ITRF 2
40	LEKA	Seseleka	EVA-i-ra	R10	BQR	1.643	1.642	1.692	7 days / Phase 1									178 30 39
41	ROGA	Delainaroga	uvana I ra	R10	BQR	1.31	1.309	1.359	7 days / Phase 1									NO ITRF 2
42	WANI	Cutacawani	unibitu	R10	BQR	1.754	1.753	1.803	7 days / Phase 2									NO ITRF 2
43	BULE	Bulebulewa	okavukavu	R10	BQR	1.9	1.899	1.949	7 days / Phase 2									NO ITRF 2
44	GALA	Galaulevu (N	elainaroga	R10	BQR	1.851	1.850	1.900	7 days / Phase 3									179 05 47.
45	KIAT	Kia																NO ITRF 2
46	KOKA	Koroinakok																NO ITRF 2
47	KALO	Korokalo																NO ITRF 2
48	KAMA	Uluikamali																179 53 29.
49	QELE	Qeleleva Island	Cakaudrove, Vanua Levu	DOPPLER STATION	R.K.S.C	1913	1913	No Grid value	No Grid value	No height available	No WGS72 value	No WGS72 value	No height available	16 05 23.0516 S	179 03 54.3230 W	54.661	16 05 23.0516 S	179 03 54.
50	QILO	Cikobia Island	Macuata, Vanua Levu	TRIG STATION (1ST ORDER)	McCAW	1910	1910	No Grid value	No Grid value	No height available	No WGS72 value	No WGS72 value	No height available	15 43 12.6853 S	179 57 39.8431 W	218.913	15 43 12.6853 S	179 57 39.

7 Days (WGS72 & WGS 84) | 7 Days YEAR OCCUPIED | Sheet3

Data Processing



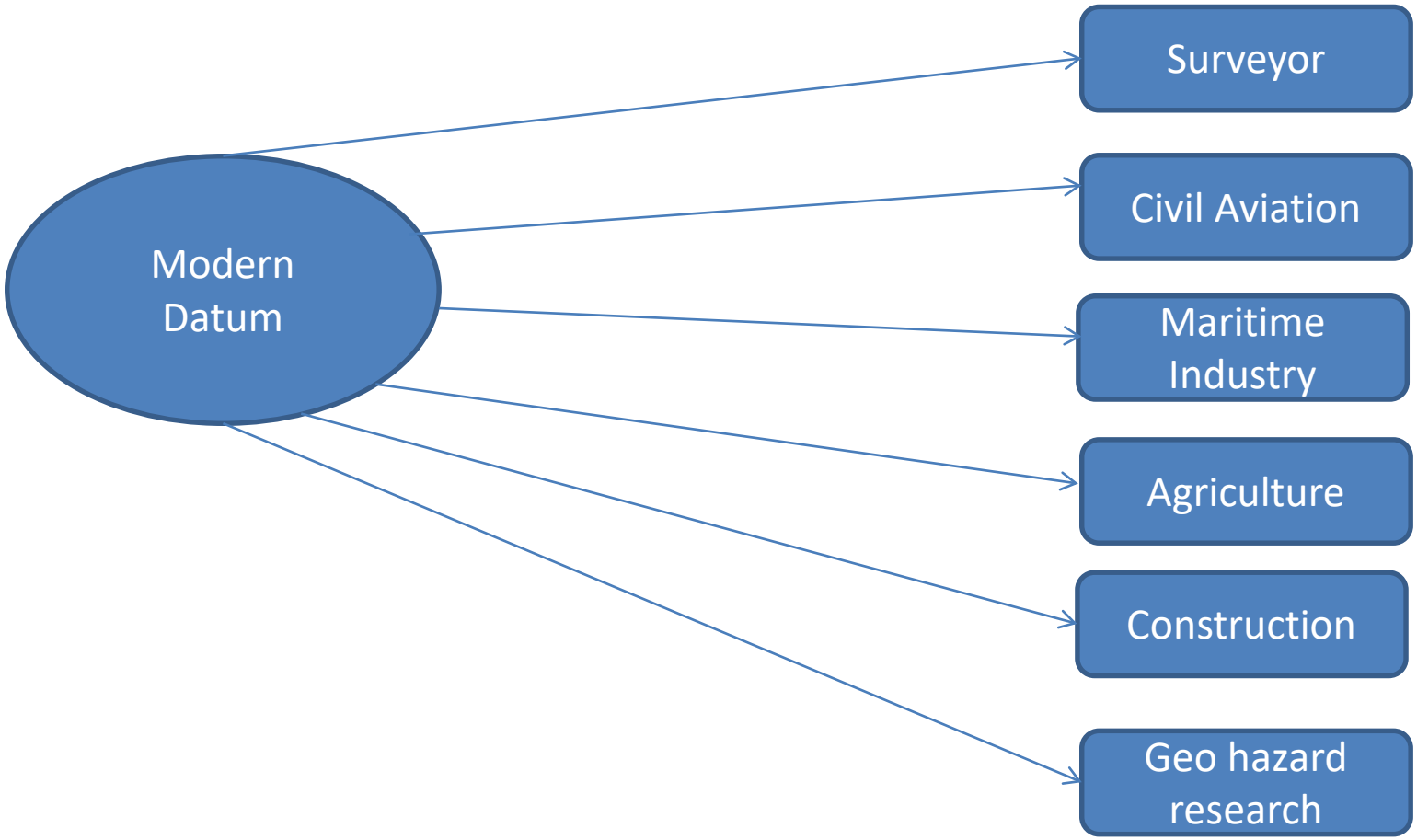
3.1 Cartesian, ITRF2014

Station	X (m)	Y (m)	Z (m)	ITRF2014 @
NAKO	-6069393.356	74300.547	-1952865.357	11/11/2019
ASPA	-6100260.164	-996502.631	-1567977.229	11/11/2019
AUCK	-5105681.536	461563.989	-3782181.015	11/11/2019
CKIS	-5583182.653	-2054142.744	-2292166.216	11/11/2019
KIRI	-6327822.319	785605.163	149769.550	11/11/2019
KTIA	-5190163.556	612173.575	-3644201.273	11/11/2019
LAUT	-6075194.668	270923.748	-1917189.053	11/11/2019
NAUR	-6212554.888	1442787.651	-61006.321	11/11/2019
NIUM	-5937160.914	-1054675.184	-2071385.997	11/11/2019
NIUT	-5937831.776	-1055480.626	-2068907.654	11/11/2019
NORF	-5457454.402	1166108.445	-3078178.999	11/11/2019
PTVL	-5950573.211	1230677.660	-1932016.925	11/11/2019
SAMO	-6129702.397	-890028.533	-1516806.783	11/11/2019
TONG	-5930303.509	-500148.744	-2286366.274	11/11/2019

Administration

- Geodetic Survey Office/Agency Established
- Procurement of relevant software
- Training on the software
- Capacity Building
- Formulate Policies
- Licensed End Users
- GNSS Data Management
- Maintenance of CORS Infrastructure

Capacity Development Need



Discussion and Conclusion

- Geodetic Adjustments
- FGD 2020 and Launching
- Conversion of Existing Survey Plans - 41,178
- Precise Levelling to all CORS
- Extend the CORS network

Vinaka