



Pacific
Community
Communauté
du Pacifique

Pacific Islands Regional Maritime Boundaries Project

Presented By Filimoni Yaya

(Andrick Lal, Sachindra Singh, Emily Artack)

Geoscience Division

Pacific Community (SPC Geoscience Division, GSD)

STAR Sessions, 26th – 29th June 2017 Nadi, Tanoa International Hotel

Regional Maritime Boundaries

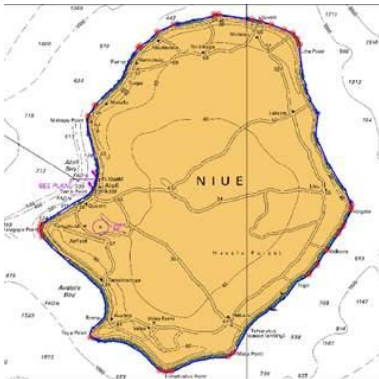
Project background

- Started in the late 1990s under the fisheries programme at Forum Fisheries Agency (FFA) based in Honiara, Solomon Islands
- Governing Council agreed to transfer the Project to the *South Pacific Applied Geoscience Commission (SOPAC)* in 2000
- Project was funded by the Government of Australia
- Project staff:
 - 1 Technical officer (Full time) + 1 Senior Surveyor (Part-time) + 1 GIS Assistant (Full time) + 1 IT Specialist (Part-time)
 - Project Manager & Programme Administrator

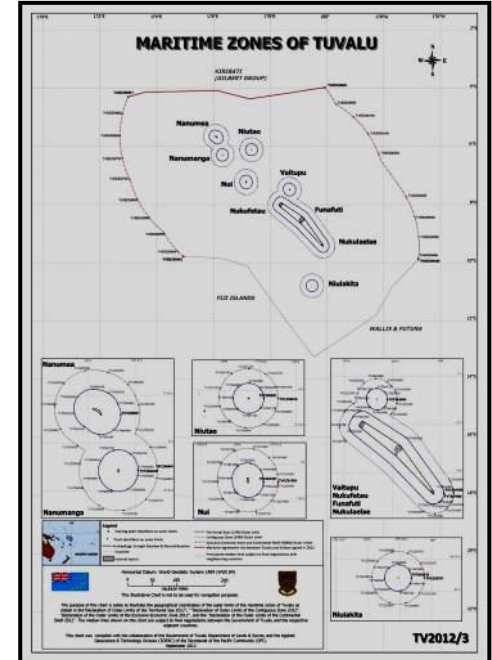
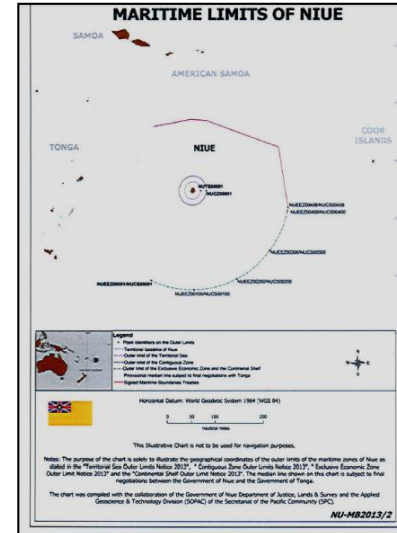
SPC's Geoscience Division: Regional Maritime Boundaries Unit Activities (2002 to date)



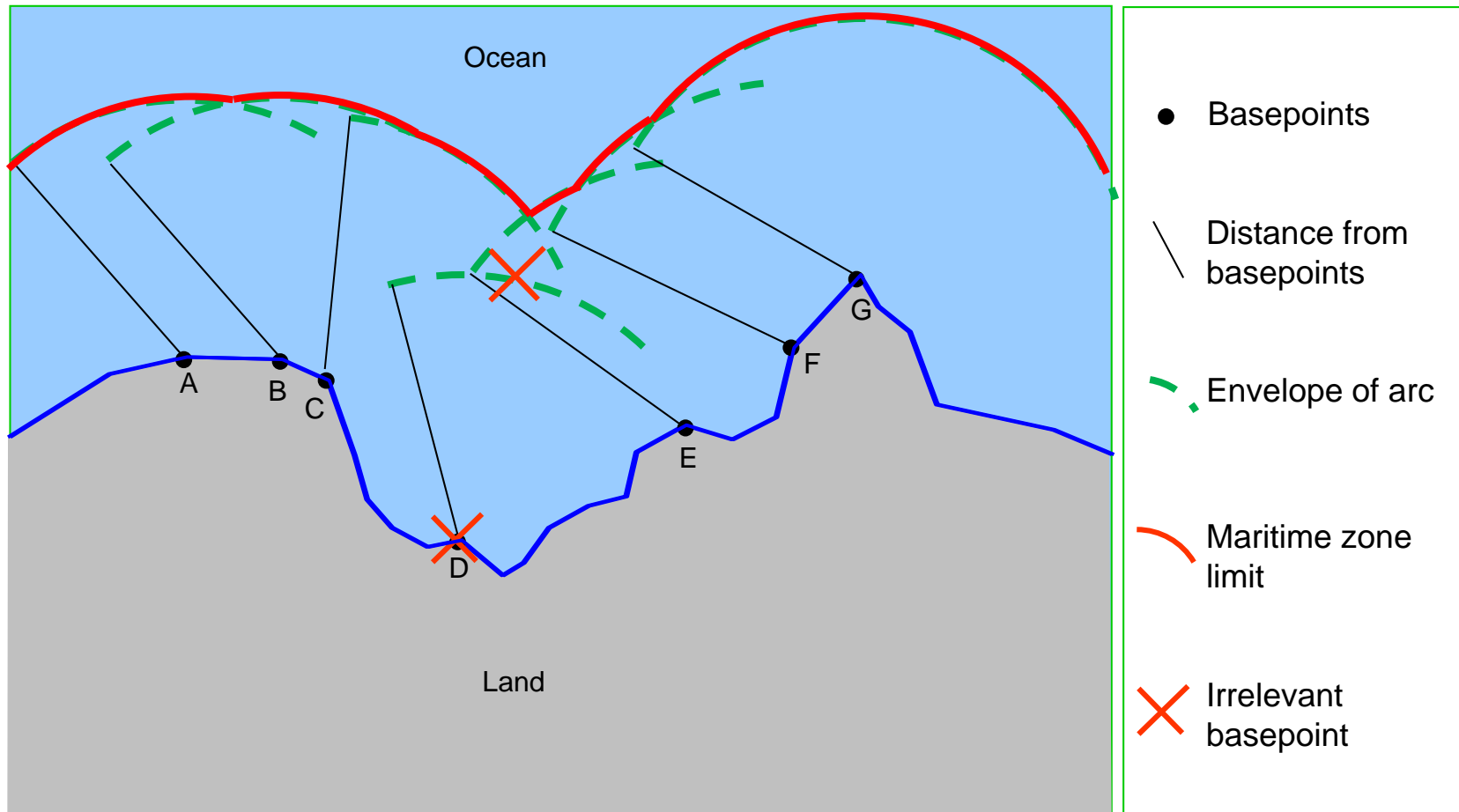
(1) Development of baseline and critical base points



(2) Maritime zones development



Maritime Limits: The Envelope of Arcs



Baselines versus Basepoints:

Not all of the baseline contributes to defining the limits of maritime jurisdiction

Maritime Boundary Computation



MarZone

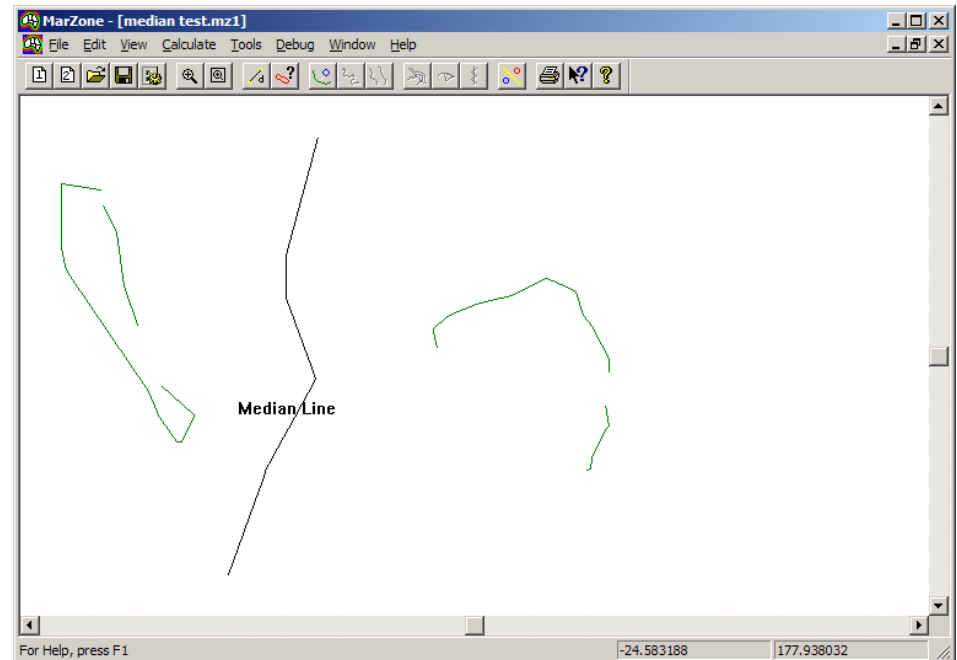
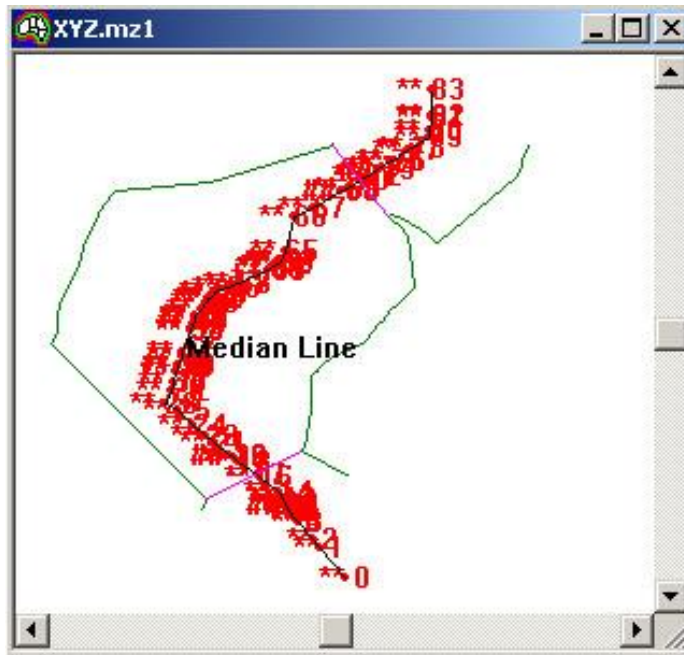
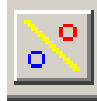
- PC application, computes maritime boundaries in accordance with the various provisions of UNCLOS
- Developed by University of Melbourne, under contract to Geoscience Australia
- Translators have been developed to make it compatible with MapInfo (previously preferred GIS platform of the Pacific region) QGIS is compatible with MarZone

Maritime Boundary Computation



MarZone

- Calculates the median line between two countries – based on *equi-distance ratio*



MarZone Part 1; Median Line Results



- Median Line output in log file

```
XYZ.log - Notepad
File Edit Format Help

-- Median Boundary (insertion order, no additional sort) --

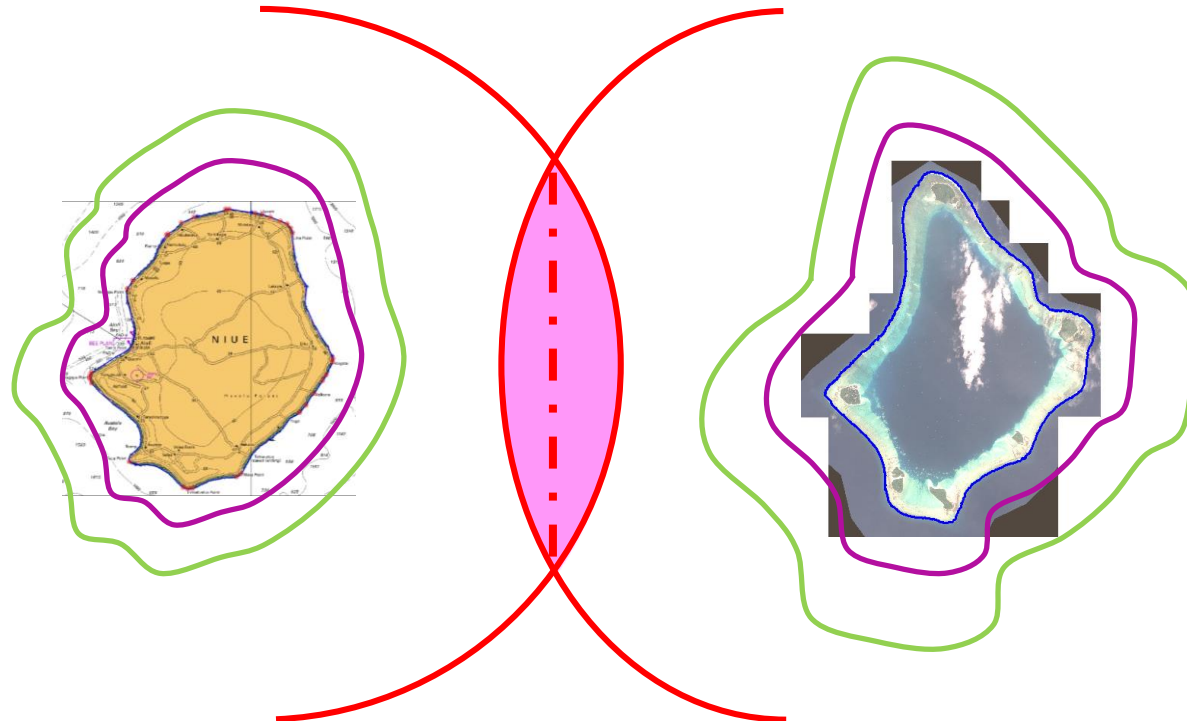
Point #      : 0
Point type   : 4 (tri-point)
Coordinates  : -59.907917326, 168.922739959
Coast points :
-55.117749307, 158.688701043 (ISL, NBL, AUS, AUS_1, 0 (0), ?)
-52.622220000, 169.126660000 (ISL, NBL, NZ, NZ_1, 4 (66), ?)
-55.117685913, 158.688812639 (ISL, NBL, AUS, AUS_1, 1 (1), ?)
Distances (m): 811331.132, 811331.132, 811331.132

Point #      : 1
Point type   : 4 (tri-point)
Coordinates  : -57.836414340, 167.024221746
Coast points :
-55.117685913, 158.688812639 (ISL, NBL, AUS, AUS_1, 1 (1), ?)
-52.622220000, 169.126660000 (ISL, NBL, NZ, NZ_1, 4 (66), ?)
-55.117590681, 158.688924482 (ISL, NBL, AUS, AUS_1, 2 (2), ?)
Distances (m): 595622.125, 595622.125, 595622.125
```

Median Line is also saved as a line output from MarZone

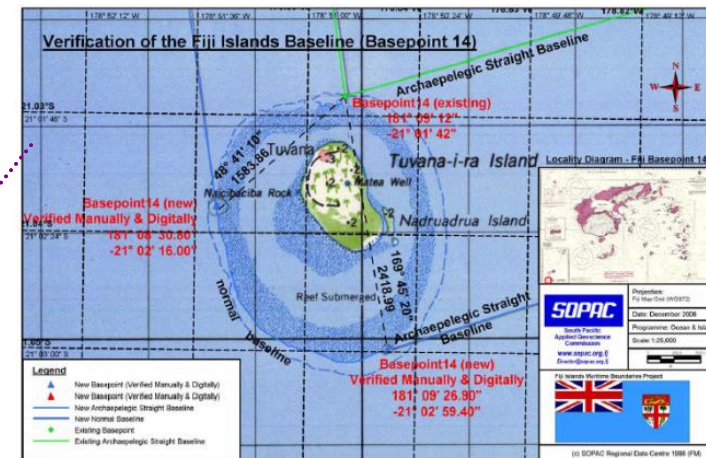
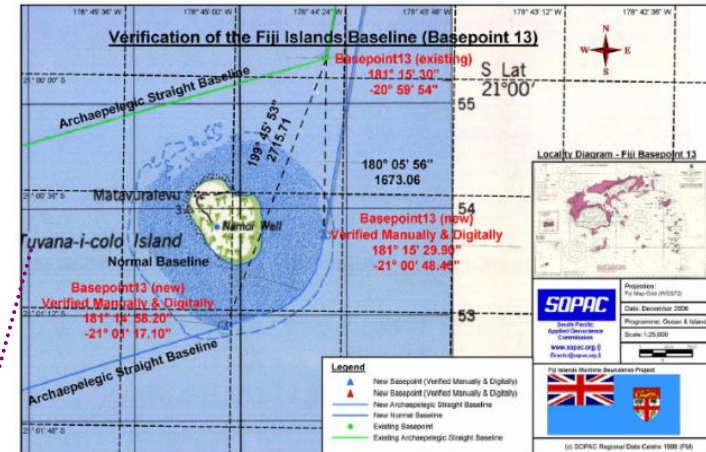
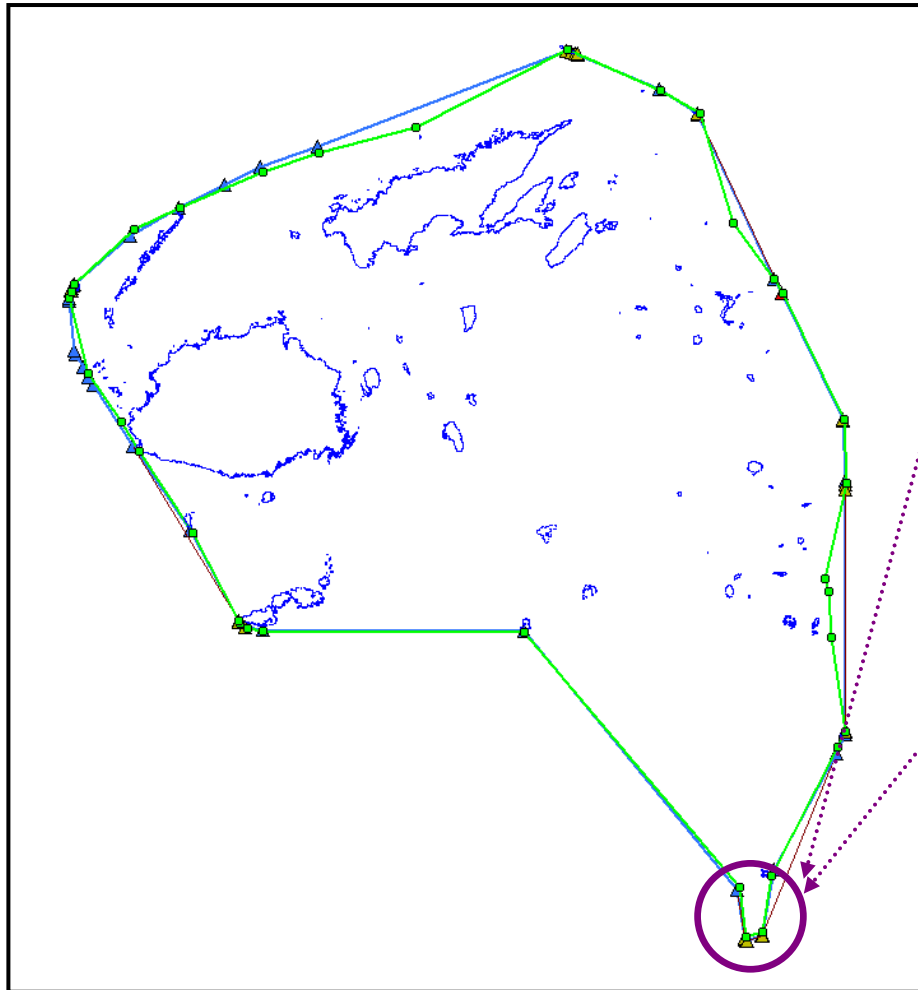
Regional Maritime Boundaries Unit

(3) Technical solutions prepared with PICs for shared/overlapping EEZs

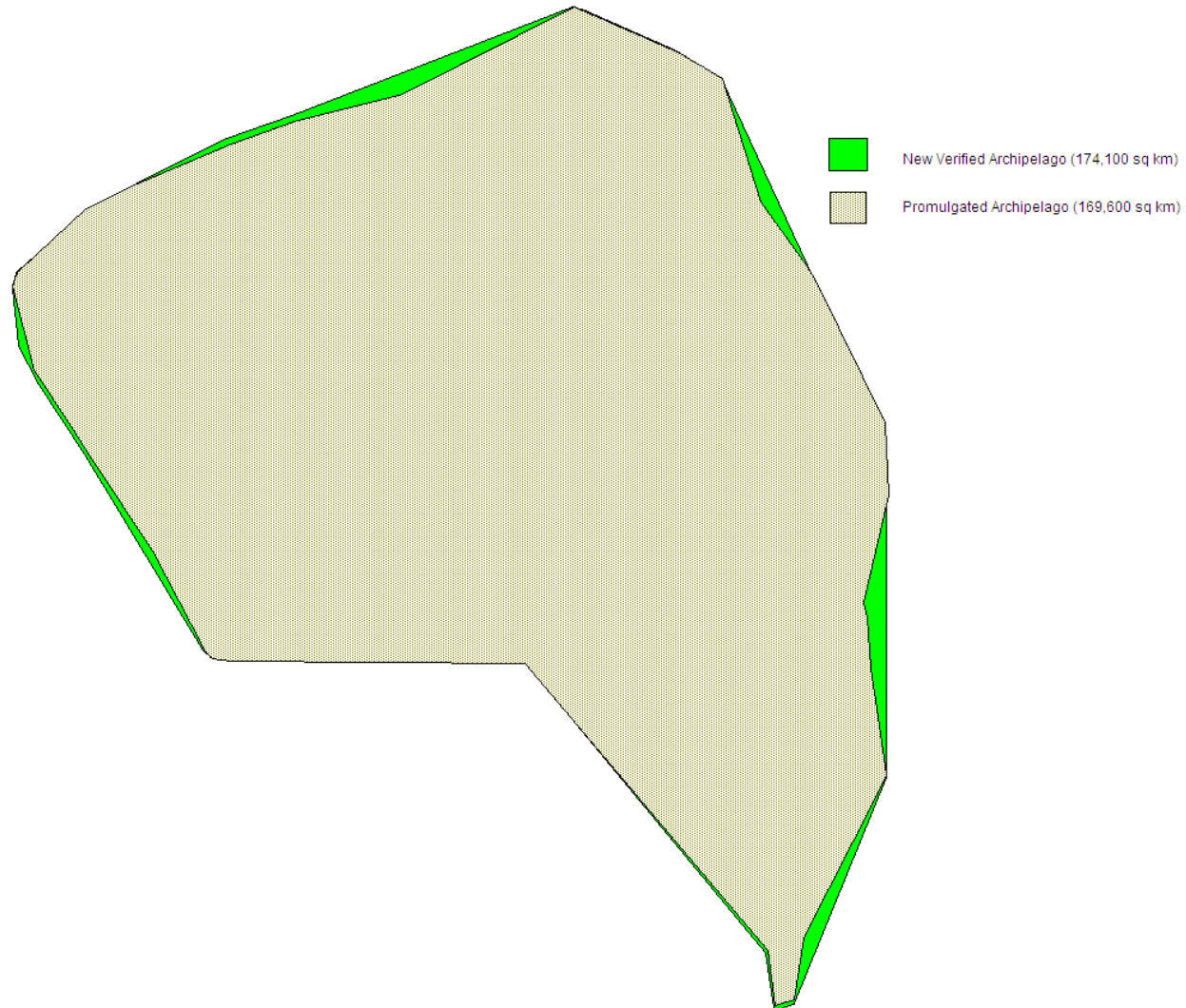


* Not drawn to scale

Review & Verification – Fiji Islands Archipelago



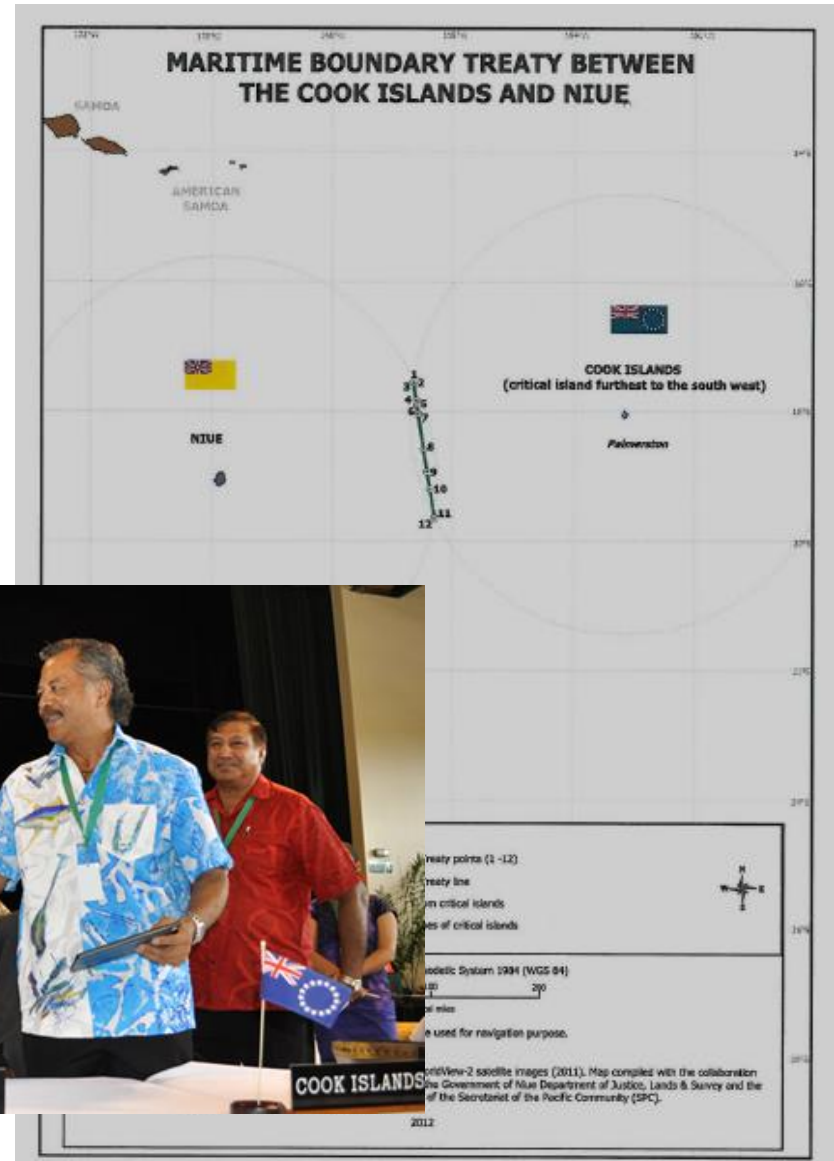
Verification of Main Archipelago



Treaty development



AGREEMENT
BETWEEN
THE GOVERNMENT OF THE COOK ISLANDS AND
THE GOVERNMENT OF NIUE
CONCERNING THE DELIMITATION OF THE MARITIME
BETWEEN
THE COOK ISLANDS
AND
NIUE



Treaty Development (2012)



Marshall Islands, Kiribati and Nauru meeting



Australian Government
Attorney-General's Department



An excellent example of a successful partnerships between regional organisations and testament to the excellent relationships between Pacific Island neighbours.

Milestone: Signing of the 7 Bilateral Maritime Boundaries, 2012 Forum Meeting



USA – FSM Maritime Boundary negotiations (2014)



Technical and legal meeting hosted by the US in Hawaii in April 2014 (FSM team officials travel costs were supported by the Forum Fisheries Agency)



SPC Maritime Boundaries Project

Regional Maritime Boundaries Unit within the Geoscience Division has operated since 2001, and is widely recognised as driving a successful international collaborative effort to fulfil one of the region's key strategic priorities embedded in the **Pacific Oceanscape Framework (endorsed by the Pacific Island Leaders in 2010)** which is to formalise maritime boundaries and securing rights over ocean resources as the first regional priority.

In the Pacific region, there are 50 shared and overlapping Exclusive Economic Zones (EEZs), so there is a need for PICs to negotiate and delimit their own EEZs where it overlaps with its neighbouring countries zones as well.

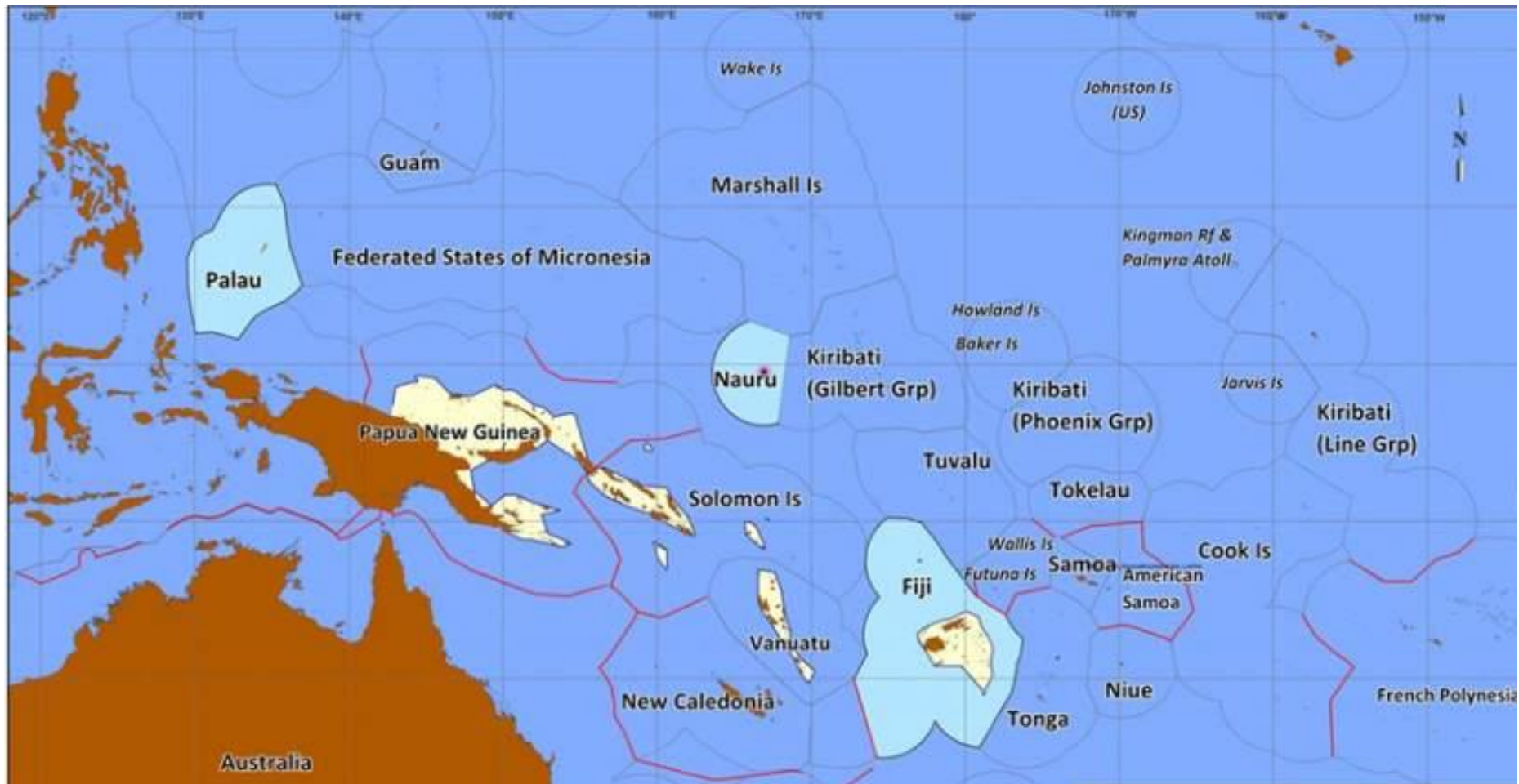
Core Functions of the Project

- **Provide maritime boundaries delimitation data and information** for the member countries to assist in preparation of claims for delimitation of their Exclusive Economic Zones;
- **Develop comprehensive data-sets** which facilitate definition of the legal and administrative offshore limits for member countries, in accordance with the provisions of UNCLOS;
- **Build national capacity** within member countries to undertake these assessments;
- **Provide advice and assistance** to member countries on relevant provisions of UNCLOS;
- **Act as an information and data repository.**

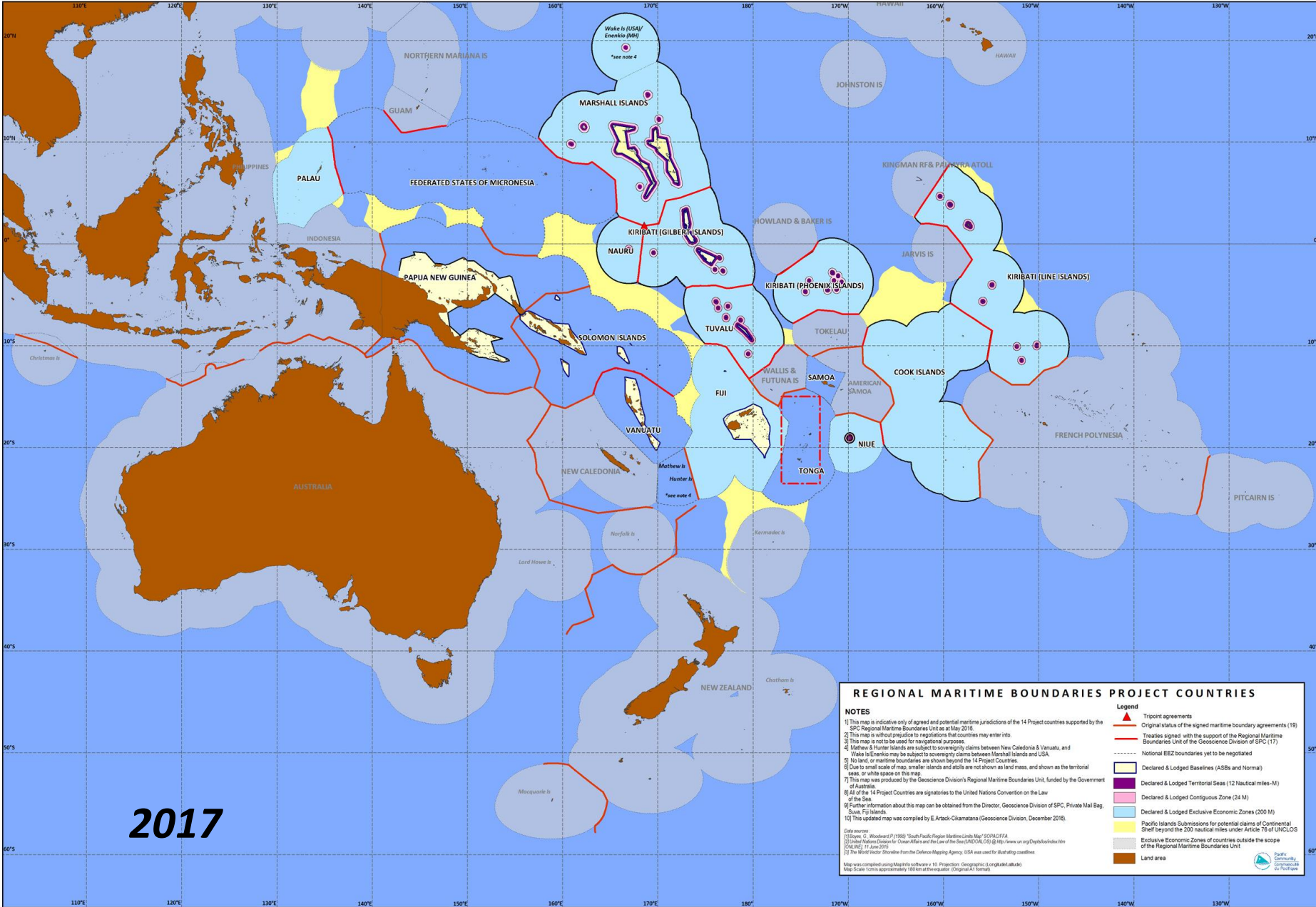
Overall Regional progress in implementing UNCLOS and the PICs maritime boundaries



2002



Overall Progress Now



Status of efforts at regional scale as compared to efforts at the national scale

	Tasks	CK	FJ	FM	KI	MH	NR	NU	PW	PG	SB	TV	TO	VU	WS
SPC Geoscience Division Responsibility															
	Territorial Seas (Normal) Baseline developed	Yes	Yes	Work in progress	Yes	Yes	Yes	Yes	Work in progress	Work in progress (Torres Strait)	Yes updated	Yes	Yes	Yes updated	Yes
	Archipelagic Status defined and developed	NA	Yes updated	Work in progress	Yes	Yes	NA	NA	Work in progress	Yes	Yes updated	Yes	Yes	Yes updated	NA
	Maritime Boundaries computed & developed	Yes	Review in progress	Work in progress	Yes	Yes	Yes	Yes	Work in progress	Yes	Work in progress	Yes	Work in progress	Work in progress	Yes -12, 24 only
	CS beyond 200 nautical miles submissions complete	Yes	Yes	Yes	Yes	NA	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes	NA
Country Responsibility															
	Territorial Seas (Normal) Baseline Gazetted	No	Yes updated	No work in progress	Yes	Yes	Yes being reviewed	Yes	No work in progress	Yes being updated	Yes being updated	Yes	No	Yes updated	Yes
	Archipelagic Baseline Gazetted	NA	Yes updated	No work in progress	Yes	Yes	NA	NA	No work in progress	Yes – being updated	Yes – being updated	Yes	No	Yes updated	NA
	Maritime Boundaries / Zones Gazetted	Yes -EEZ	Yes -EEZ	No work in progress	Yes	Yes	Yes being reviewed	Yes	No work in progress	No work in progress	No work in progress	Yes	No	No	Yes -12, 24 only
	Territorial Seas (Normal)/Archipelagic Baselines deposited with UNCLOS	No	Yes updated	No	Yes	Yes	Yes being reviewed	Yes	Yes – provisional only, being reviewed	Yes – being updated	Yes – being updated	Yes	No	Yes updated	Yes
	Maritime Boundaries deposited with UNCLOS	Yes -EEZ	Yes – being reviewed	No	Yes	Yes	Yes being reviewed	Yes	Yes – provisional only, being reviewed	No	No	Yes	No	No	Yes -12, 24 only
	CS beyond 200 nautical miles submitted to the Commission on the Limits of the Continental Shelf (CLCS)	Yes: 16 April 2009	Yes: 20 April 2009 *Remaining preliminary submissions for North Fiji Basin, Charlotte Bank region	Y: (1) Ontong Java Plateau 5 May 2009 (2) Eauripik Rise 30 Aug 2013	Yes: 24 Dec 2012	NA	NA	NA	Yes: 8 May 2009	Y: Ontong Java Plateau 5 May 2009	Y: Ontong Java Plateau 5 May 2009 *Remaining preliminary submissions for North Fiji Basin, Charlotte Bank region	Yes: 7 Dec 2012	Yes: (1) 11 May 2009 (2) western part of the Lau-Colville Ridge 23 April 2014	Yes: preliminary submission 10 Aug 2009 *Remaining preliminary submissions for North Fiji Basin.	NA

Service Level Agreement with FFA



The 2016 SLA underlined the need for the maritime zones lines in the **Pacific Islands Forum Fisheries Agency (FFA)** Vessel Monitoring System (VMS) to be updated with publicly available and legislated boundaries for the purpose of fisheries monitoring, control, surveillance and enforcement and management.



FFA

- Data delivered will be based on IHO S-121 Maritime Limits and Boundaries Exchange format and will be disseminated via OGC web services in PacGeo portal
- Full documentation, tools and processes on maritime boundaries i.e. updates and revisions with incorporation of new datasets
- Features delivered to FFA will be in points, lines and polygons
- Global dataset(VLIZ) will be used where there is no treaty or data available

Vessel Monitoring System



Pacific
Community
Communauté
du Pacifique



Member Countries Consent Letters for Release of MB Data to FFA



Have	Have Not
Nauru - (12, 24, 200) and Treaties	Palau - (Provisional EEZ and Treaties)
Kiribati - (PHX-200,24,12) (GIL-200,24,12) (LIN-12,24,200) and Treaties	
Tuvalu - (12, 24, 200) and Treaties	Marshall Islands –(12, 24, 200) and Treaties
FSM - (Treaties)	Solomon Islands – (Treaties)
Vanuatu - (Archipelagic baseline)	Tonga - (Restricted)
Cook Islands - (EEZ- 200, Treaties)	Fiji (Archipelagic baseline and Treaties)
Samoa - (Restricted)	
Tokelau - (Not a Project Member Country) - Treaties	SPC's Maritime Boundary Unit will not release any data to be used in the Vessel Monitoring System (VMS) unless permission is given to SPC to release the data in a legally signed document.
PNG - (Treaties)	
Niue - (12, 24, 200) and Treaties	

Official Release Letters to FFA



Pacific
Community
Communauté
du Pacifique



GOVERNMENT OF KIRIBATI

MINISTRY OF FISHERIES AND MARINE RESOURCES DEVELOPMENT

P.O.Box 64, Bairiki, Tarawa, Republic of Kiribati

Tel: (686) 21099 Fax: (686) 21120

Email: info@mfmrd.gov.ki

Our ref: 17/52

Date: 26th August 2015

Prof Michael Petterson
Director
SPC-Geoscience Division
Suva
Fiji

Attention: Ms Emily Artack

Dear Professor Petterson,

Clearance for release of Kiribati Maritime Boundaries GIS data

At the outset, allow me to convey the Ministry's gratitude for the past and ongoing assistance provided by your good office through the Ocean and Islands Section (Maritime Boundary Team) which has successfully assisted us in the completion of delimiting and depositing our Maritime Boundaries with the United Nations (DOALAS office).

This year the Ministry with assistance from the GD Maritime boundary team have completed and domesticated all of their Maritime Boundary Regulations namely

- a. Archipelagic Baseline
- b. Territorial Seas Baseline
- c. Territorial Seas Outer Limits
- d. Contiguous Zone



GOVERNMENT OF TUVALU MINISTRY OF FOREIGN AFFAIRS, TRADES, TOURISM, ENVIRONMENT AND LABOUR

GPO Vaiaku, Funafuti, TUVALU Phone: (688) 20117, Email: dfa@gov.tv

7 July 2015

Dr. Colin Tukuitonga
Director-General
Secretariat of the Pacific Community (SPC)

Sir,

AUTHORISATION FOR SPC TO RELEASE NEW MARITIME BOUNDARIES DATA TO FFA

With reference to the agreement achieved on the ninety-third Officials Forum Fisheries Committee meeting held in Tuvalu (FFC93) and also the letter from the Director-General of FFA addressed to your good office of 17th June 2015 (with copies to FFA member countries), the Government of Tuvalu strongly support the immediate need for SPC to release Tuvalu's updated boundary data to FFA.

This new maritime boundary data will clearly show our new internal waters, thus allow FFA to updates its current lines in the FFA Vessel Monitoring System (VMS) which will then enable them to facilitate new legal enforcement and fisheries management on these zones. In return, it would also allow us to impose new enforcement initiatives and a careful monitoring system on these new jurisdictions to avoid foreign fishing vessels from fishing in these zones illegally.

Therefore, the Ministry would appreciate the SPC's (Geoscience Division) cooperation in urgently releasing these new Archipelagic Water coordinates of Tuvalu to FFA.

Should you need further information and clarifications on the above matter please do not hesitate to contact this Ministry at the above contacts.

Sincerely,

Falata Kilisi (Mr)
for Permanent Secretary for Foreign Affairs, Trades, Tourism, Environment & Labour

Pacific Islands Regional Maritime Boundary Information System (PIRMBIS)



- The **goal** of the project is to **increase economic development opportunities** and **sustainable resource development** in Pacific coastal States (PcS) through defining maritime and extended continental shelf boundaries to assert sovereignty and declare sovereign rights and secure access to known and potential economic marine resources
- Written by **Andrick Lal** with **Emily Artack** (technical manual)
- **GA Mr Colin French** (maritime boundaries adviser) with financial help from **Gov. Australia**
- Support from member countries :**Cook Islands, Federated States of Micronesia, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu**
- The **design** and **development** of the Pacific Islands Regional Maritime Boundaries Information System (**PIRMBIS**) in the project led to the establishment of a **sound management** of the **maritime boundaries related data and information**. The source data and output data from PIRMBIS is always **quality assured** and **verified**.

Schematic Diagram of PIRMBIS



Pacific
Community
Communauté
du Pacifique

PACIFIC ISLANDS REGIONAL MARITIME BOUNDARIES INFORMATION SYSTEM [PIRMBIS]

SOURCE TABLE

PIRMBIS [chain]

country_name
feature
feature_id
accuracy
low_tide_elevation_position [lte_link_flag]
straight baseline table [sb_table]
straight baseline number [sb_number]
coast
line_type
category
feature_type
Object_id

PIRMBIS [points]

country_name
feature
feature_id
accuracy
low_tide_elevation_position [lte_link_flag]
name
group name
category
feature_type
object_id

Treaty

feature
feature_id
accuracy
title
status
status date
boundary
line_type

QUALITY TABLE

quality information [accuracy]
feature reliability [feat_rel]
attribute reliability [att_rel]
operator
planimetric accuracy [plan_acc]
capture accuracy [capture_acc]
title
map_number
edition
scale
height
datum
authority
media
collection
control
residual
capture
comments

MARITIME TABLE

Maritime Zone [chain]

feature
feature_id
Object_id
category
feature_type
Cp_index
** other optional fields
** Segment_type

Maritime Zone [poly]

feature
feature_id
accuracy

Basepoints

Feature
Feature_id
Country_name
Maritime_istance [Mar_dist]
category
feature type
Accuracy
cps_index

Figure 1: Schematic diagram of the Pacific Islands Regional Maritime Boundaries Information System

Why S-121?

Concurrent with the advent of electronic navigation, Geographical Information Systems (GIS) and the **online delivery and exchange of information**; the need arose for a **high precision data format** for the exchange of officially recognised maritime limits and boundaries.

Such a digital format would enable States to exchange, lodge and distribute their maritime boundaries in a form that would be **portable across a number of applications and platforms**. The specification's primary function is for States to **exchange maritime boundary information** in a **recognised format**, both between States and as the preferred format for lodgement to the United Nations.

Furthermore, the format would encourage the development of digital **marine spatial data infrastructures** to improve all aspects of ocean management. The format will be appropriate for MSDI, **GIS and online utilisation**.



What does S-121 define?

3 Profiles – Baselines, Limits and Boundaries:

Data Specification and Application Schema

Data Product Identification (UUID)

Feature and Attribute Types

Geographic Feature Types

Attribute Values and Validations

Mandatory and Optional Values and Validations

Coordinate Reference Systems (CRS)

Horizontal Geodetic Datum

Data Quality, Reliability and Accuracy of Data

Geometry: *points, curves and surfaces*

Encoding

INTERNATIONAL HYDROGRAPHIC ORGANIZATION



Maritime Limits and Boundaries Product
Specification

IHO S-121

Version 1.0 – April 2014

Only Canada and Australia have started to adopt S-121 so far.

S-121 Profiles

Key difference between profiles are categories:

A. Baselines

- 1 : Normal baseline
- 2 : Straight baseline
- 3 : Archipelagic baseline
- 4 : River closing line
- 5 : Bay closing line
- 6 : Reef closing line

B. Zone or Limits

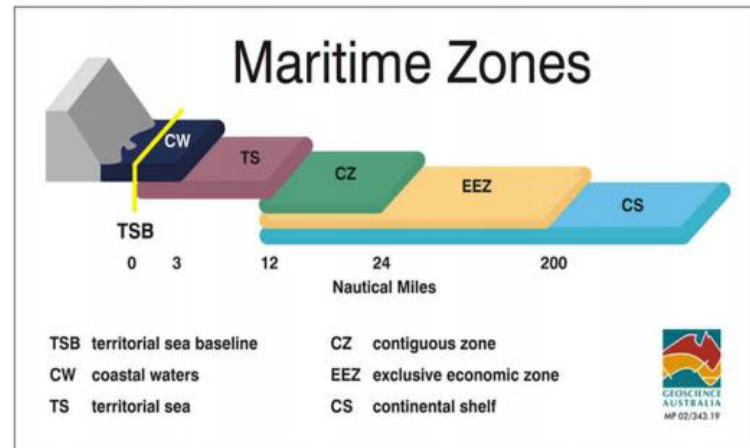
- 1 : Internal Waters
- 2 : Archipelagic Waters
- 3 : Coastal Water
- 4 : Territorial Sea
- 5 : Contiguous Zone
- 6 : Exclusive Economic Zone
- 7 : Continental Shelf

C. Boundaries

- 1 : Delimitation

Vertical Jurisdiction

- 1 : Air Space, Water Column, Seabed, Subsoil
- 2 : Water Column
- 3 : Seabed and Sub-soil



Output Format: Geo-JSON

Due to attribute field name size and validation required, current desktop GIS formats were not suitable:

E.g.: Shapefile

- Has a 11 character limit for attribute names
- Multi-feature geometry is not supported
- Schema-less, validations can not be built in
- File structure verbosity (multiple files for a single geometry type – shp, shx, dbf, prj, cpg, qpj)
- Binary and closed

S-121 specification documents *recommends* GML (a XML-based, verbose standard)

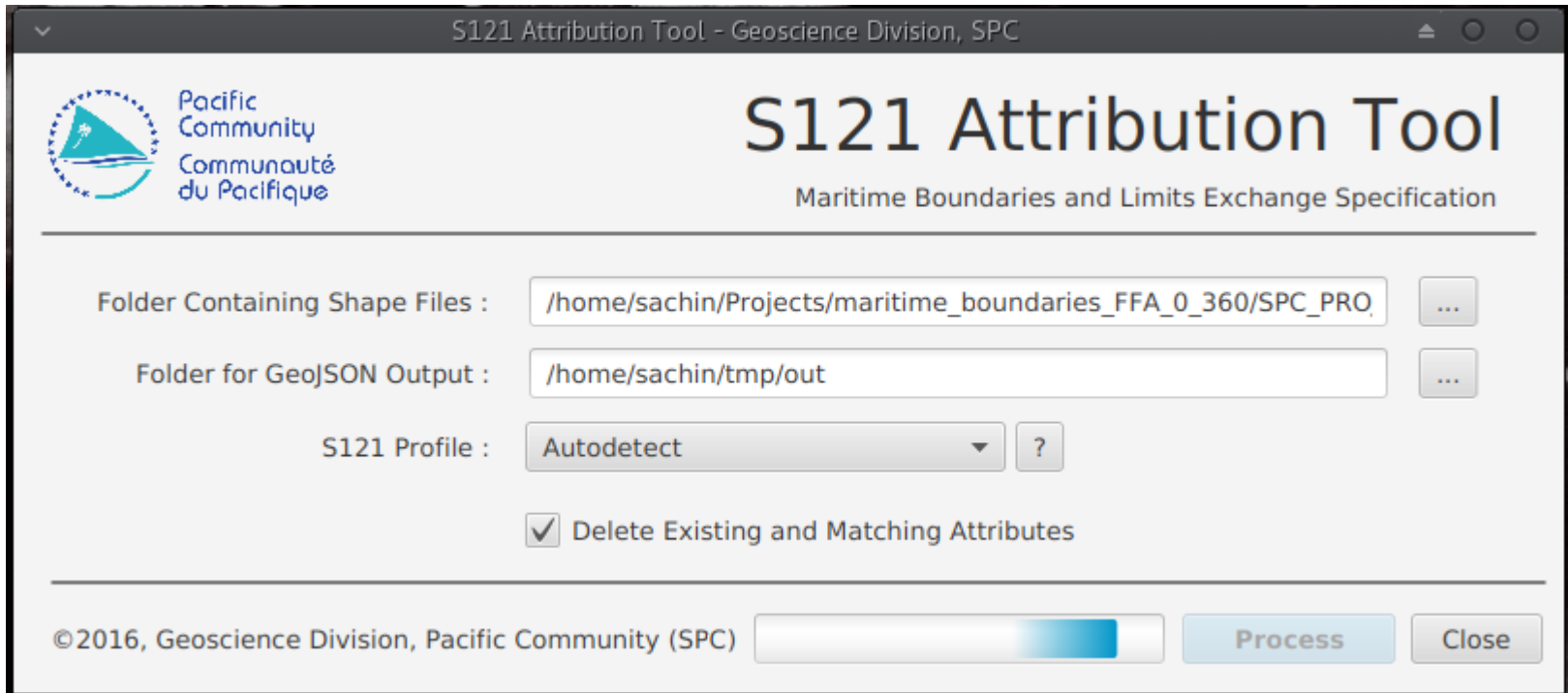
Geo-JSON was adopted for the Pacific S121 Tool because:

- Single file supports multi-feature type (multi-points, multi-lines and multi-polygons - curves)
- Human and machine readable
- Schema defined
- No limitations in attribute name/value length
- Internet-bandwidth friendly and open in nature
- <http://geojson.org/>

**GeoJSON**

S-121 Data Attribution Tool

Post-processes a folder of Shape-files and auto appends S121-specific attributes across the three S121 Profiles - Baseline, Maritime Limits and Maritime Boundaries.

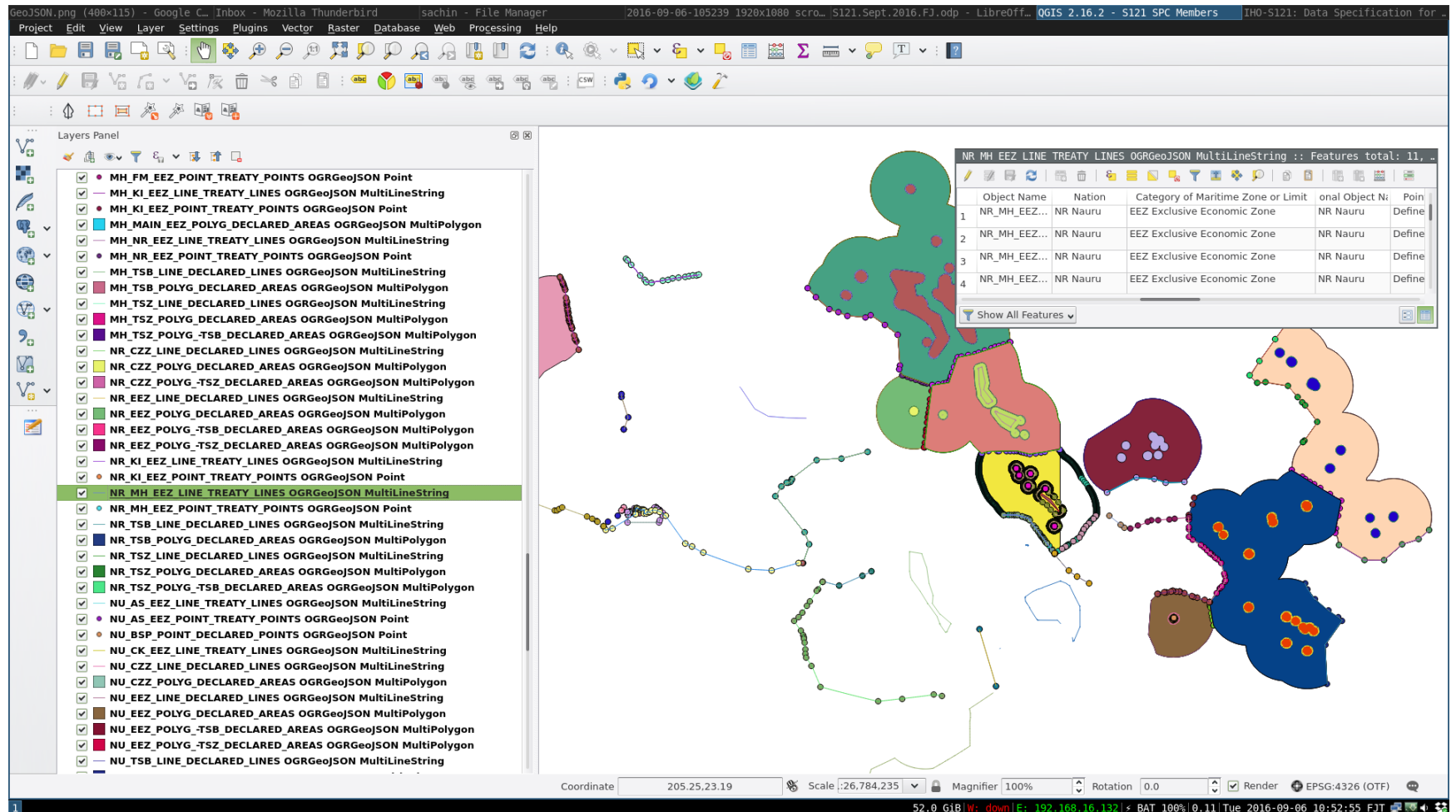


The screenshot shows the S121 Attribution Tool window. The title bar reads "S121 Attribution Tool - Geoscience Division, SPC". The interface includes the Pacific Community logo and name in both English and French. The main title is "S121 Attribution Tool" with the subtitle "Maritime Boundaries and Limits Exchange Specification". There are three input fields: "Folder Containing Shape Files" with the path "/home/sachin/Projects/maritime_boundaries_FFA_0_360/SPC_PRO", "Folder for GeoJSON Output" with the path "/home/sachin/tmp/out", and "S121 Profile" set to "Autodetect". A checkbox labeled "Delete Existing and Matching Attributes" is checked. At the bottom, there is a copyright notice "©2016, Geoscience Division, Pacific Community (SPC)", a progress bar, and "Process" and "Close" buttons.

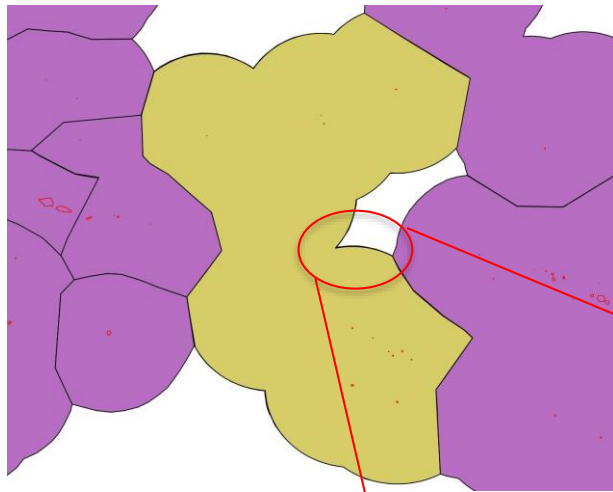
Open Source and Cross Platform
<http://services.gsd.spc.int/s121>

S-121 Attributed Geo-JSON Output

ESRI Shapefiles : 23.1 Mb, 826 Individual Files (~206 layers)
S-121 Geo-JSON : 1.8 Mb, Single File



Cook Islands



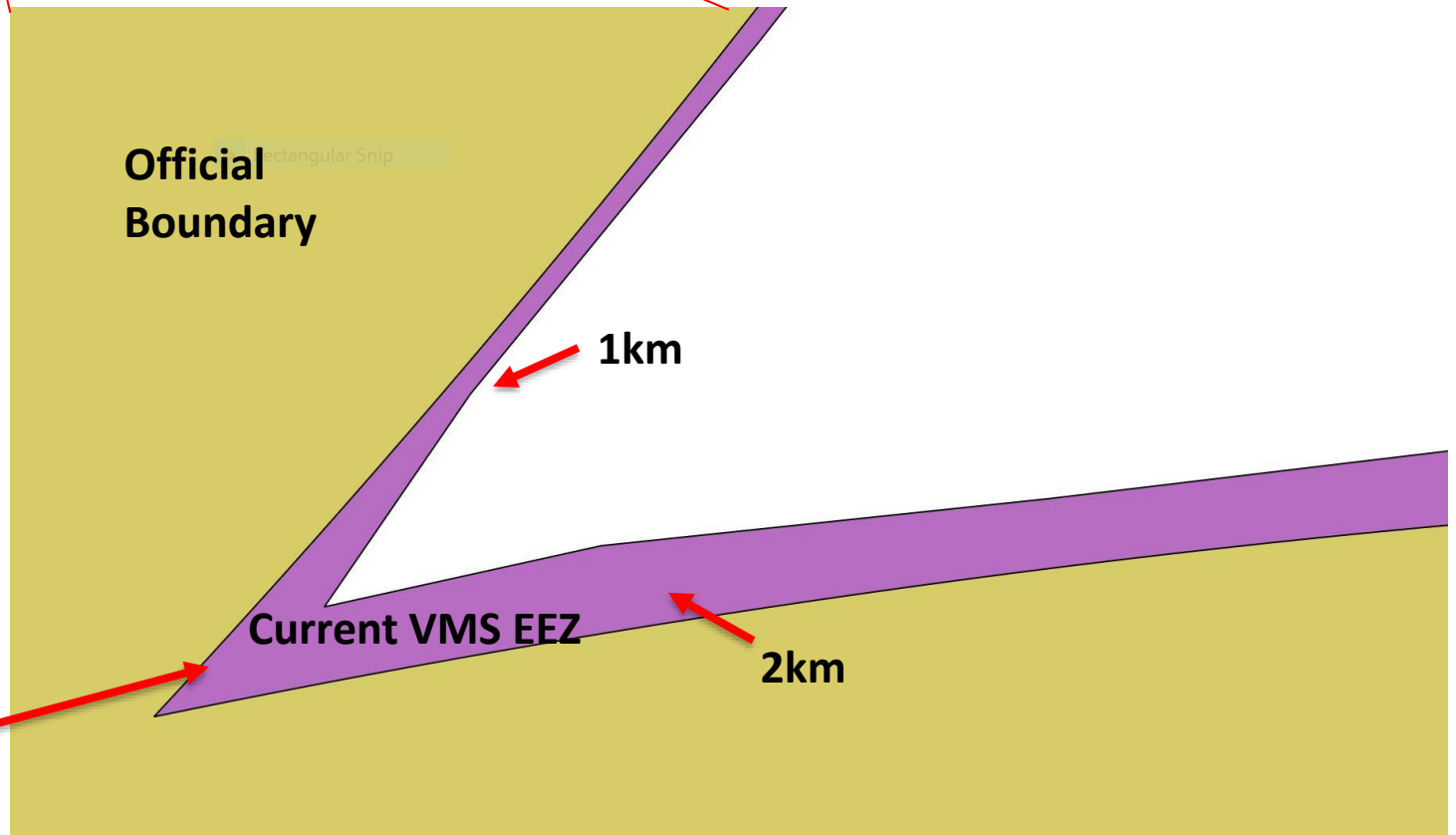
**Official
Boundary**

1km

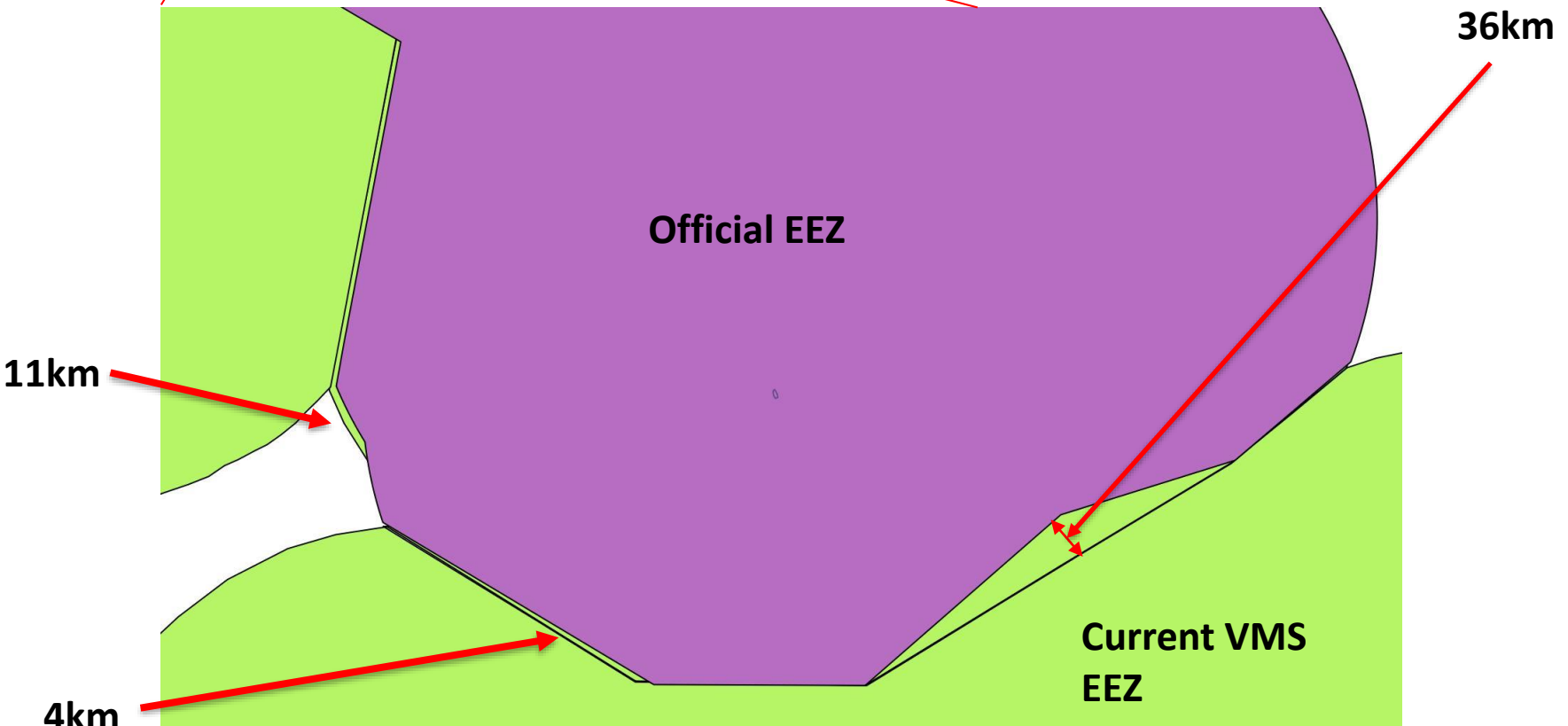
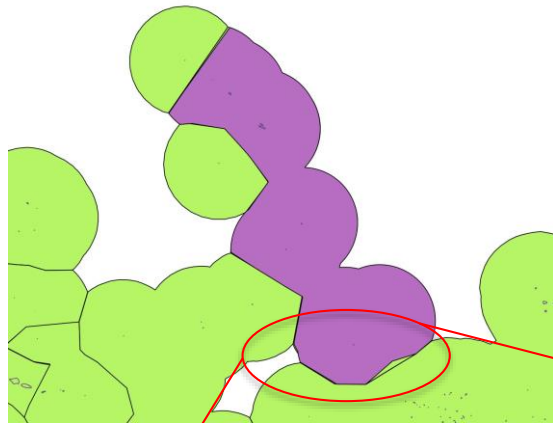
Current VMS EEZ

2km

6km



Kiribati (Line Island Group)



Why is it important?

The clear definition of the limits of the maritime jurisdiction is important as it provides the legal framework for the governance of maritime space and the management of the valuable marine resources within the country's national jurisdiction areas:

- **Fisheries management**
- **Deep sea minerals development**
- **Security**
- **Biodiversity**
- **Conservation**
- **Research**
- **Transport**
- **Vessel monitoring**

Fisheries management



Home News **Radio** Series & Podcasts Topics

National Concert International Programmes Pre

PACIFIC

Vanuatu challenge French Navy arrest of Chinese boat

10:33 am on 24 December 2013

Share this



Vanuatu's Director for Foreign Affairs says Kanak Leaders in New Caledonia have offered to approach French authorities on behalf of Vanuatu over the illegal arrest of the Chinese fishing boat Hu Yu 911 by the French Navy on October 20 this year.

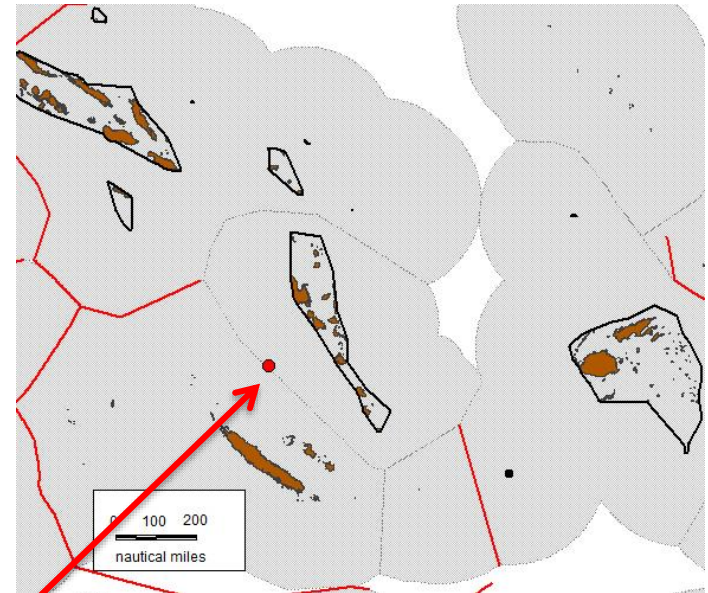
The Captain of the fishing boat was prosecuted in Noumea and found guilty of trespassing and fishing illegally in French maritime waters and fined 5.5 million US dollars, and his catch and fishing boat confiscated by the French.

However Yvon Basil says his Office is going to ask the Kanak Leaders to speak to the French authorities over the issue.

The Vanuatu Government insists that the Chinese fishing boat was fishing in Vanuatu waters when it was illegally arrested by the French Navy.

The Maritime Boundary Coordinator Tony Tevi says the French Navy acted on a new French boundary line which the French authorities drew without the courtesy of discussing it with Vanuatu.

Share this



UN Report: Pacific Increasingly Used By Transnational Criminals As Drug Transit Point

Submitted by PIR Editor on Thu, 09/22/2016 - 14:04



'Spillover' of illicit drugs moving between Asia and Australia, NZ is troubling

By Matilda Simmons

SUVA, Fiji (Fiji Times, Sept. 23, 2016) – A UN report says the Pacific is increasingly used as a transit point for drug trafficking as well as being vulnerable to exploitation by transnational organised crime.

Inshik Sim, the United Nations Office on Drugs and Crime analyst, said methamphetamine and precursor chemicals from Asia, and cocaine from the Americas, were trafficked to and through Pacific Island countries en route to Australia and New Zealand, and other destinations.

"There is also evidence of 'spillover' of illicit drugs into Pacific Island countries. They (Pacific Islands) do not have the infrastructure or programs to deal with illicit drug use," the report said.

The findings were revealed after a first ever UN report titled "Transnational Organised Crime (TOC) in the Pacific: A Threat Assessment", was launched yesterday to examine major illicit trafficking flows and issues in the region.

The report also identified some factors that facilitated illicit transnational activities affecting the region.

"The Pacific is increasingly integrated and connected with other regions, especially Asia, but also the Americas," said Jeremy Douglas, UNODC Regional Representative for Southeast Asia and the Pacific.

"Connecting with the rest of the world can be positive from a development perspective, but it also means that the region is more susceptible to accompanying crime and security challenges."

Future threats to regional peace & security

Issues

- Requires the political will and support of National Governments (ground work has taken the past 10 years of this project)
- There are certain technical and legal capacity constraints within the project teams (trained staff get promoted internally)
- Sovereign issue but it is heavily dependent on regional support and assistance (cost of field surveys to collect data, purchase of satellite imagery, etc.)
- National Maritime Laws and Legislation needs to be reviewed and updated to reflect the technical datasets being used to develop the baselines and maritime zones
- The 10 project countries who have submitted their claims for Extended Continental Shelf (under Article 76 of UNCLOS) are facing capacity constraints in the process of the defence of the these claims to the UN.

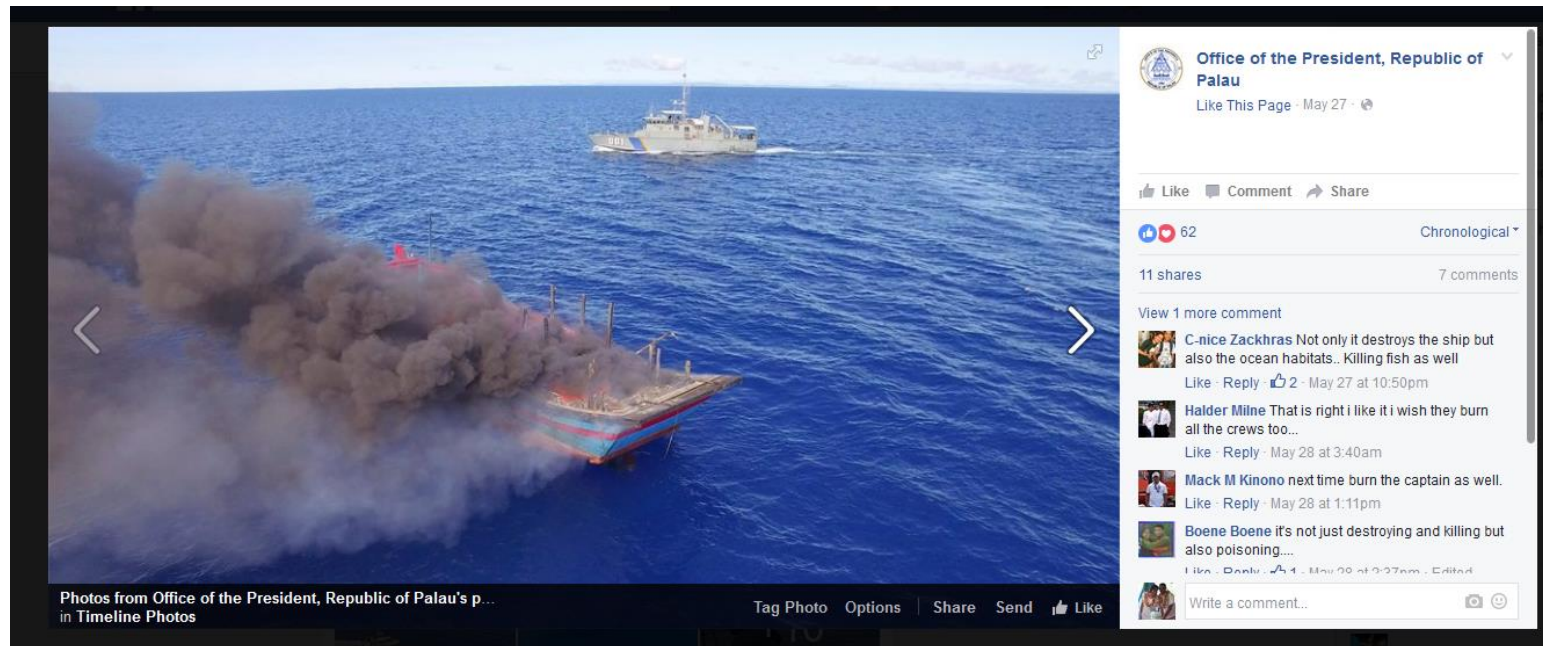
Future Challenges



Pacific
Community
Communauté
du Pacifique

- **Increasing reports of IUU fishing activities in the region**

Leaders need to formally establish their maritime boundaries (including signed treaties for overlapping EEZs) in a legal manner and deposit this information with the UN.

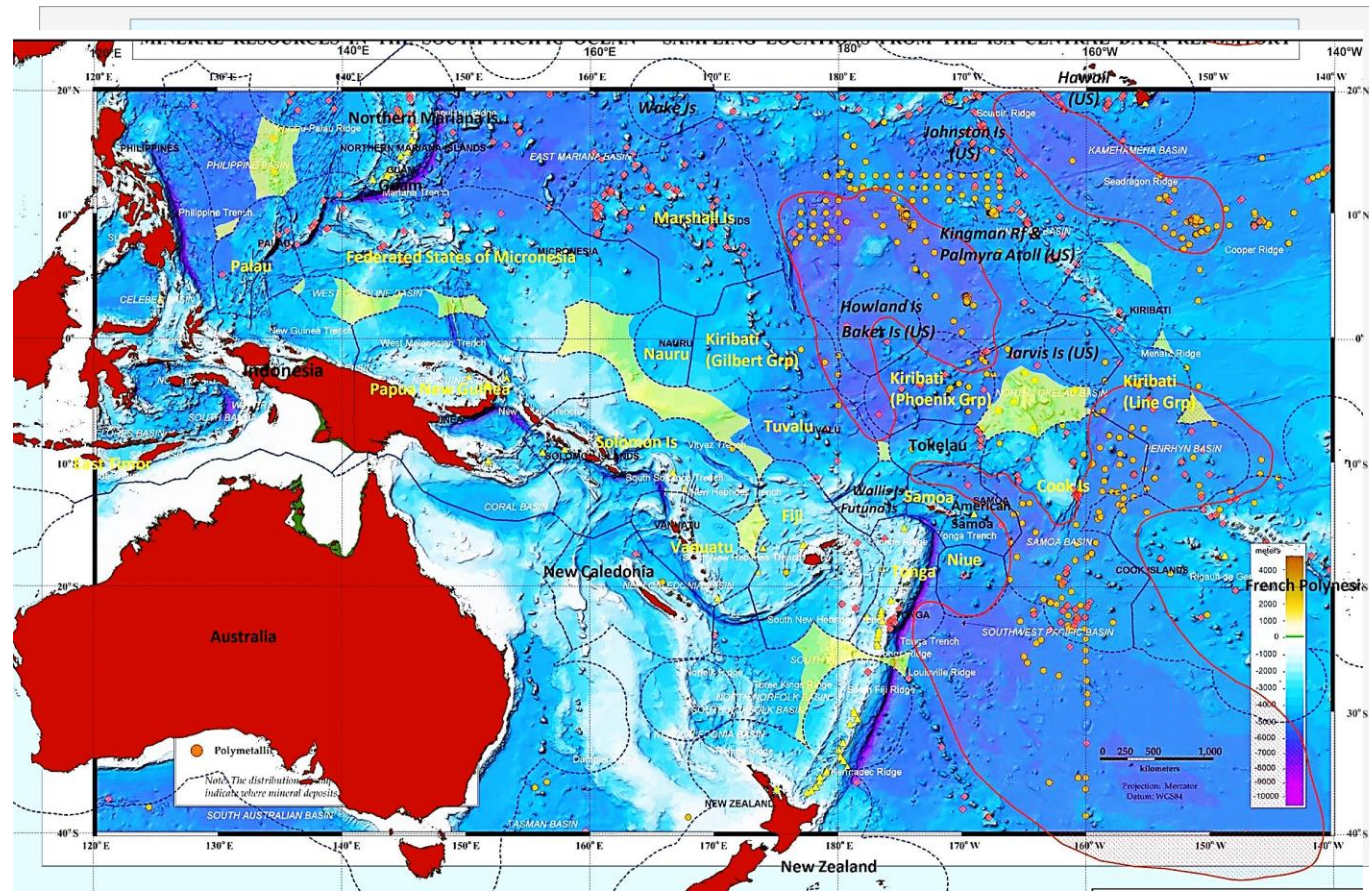


Future Challenges



- **Deep Sea Mining Implications**

Application and approval of mining leases for seabed exploration and exploitation within a country's EEZ and also in “the Area”



Regional support for remaining Negotiations (13 shared EEZs yet to be finalised)



- SPC, GA, Australia AG Dept. & Advisor visited Palau in March 2015 for a national consultation workshop.
- Outcome was to develop a strategy paper for the national taskforce to consider in upcoming negotiations.



- SPC & FFA provided technical & legal assistance to the delegation from Palau during the fourth (4th) round of negotiations between Palau and Indonesia in July 2015.

Countries and Project Partners



The University of Sydney



Australian Government
Attorney-General's Department

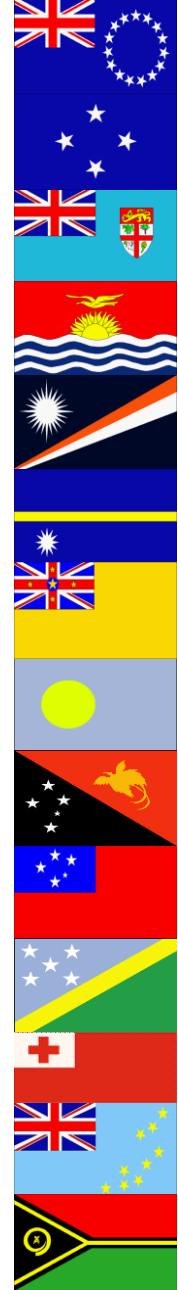


Australian Government
Geoscience Australia



A Centre Collaborating with UNEP





Thank You

www.pacgeo.org

www.gsd.spc.int

www.spc.int



Australian Government
Attorney-General's Department



Australian Government
Geoscience Australia