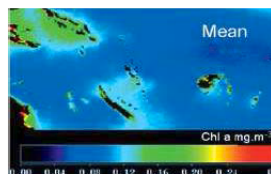
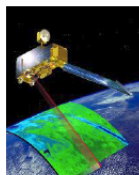


Pacific GIS-RS conference 16-20 Novembre 2015



Satellite ocean color of the coastal zones around Pacific Islands

Cécile DUPOUY

Madeleine Goutx, Marc Tedetti, Chloe Martias (PHD)

Jérôme Lefèvre IRD

Guillaume Wattlez, Touraivane UNC

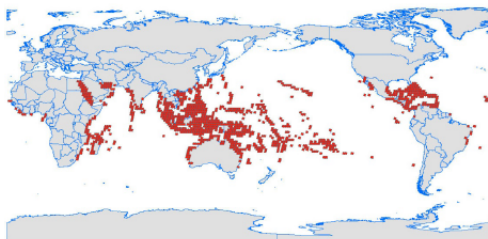
Hélène Jacot des Combes, Awnesh Singh, Antoine N'Yeurt

(Suva) PaCE-SD (Fiji)

Rémi Andreoli, Didier Lille (Bluecham)



Rationale of ocean colour surveys



- All Pacific countries are vulnerable to climate change, which could modify equilibrium in the biogeochemistry of coastal waters
- Health of the coastal waters is a crucial challenge for PICS economies (coral reef sustainability, fisheries)



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Ocean colour from space

Backscattering

Lumière bleue rétrodiffusée efficacement

Absorption

Phytoplancton absorbe la lumière bleue
Eau absorbe la lumière rouge

Phytoplankton, Dissolved organics, Suspended particulates concentrations

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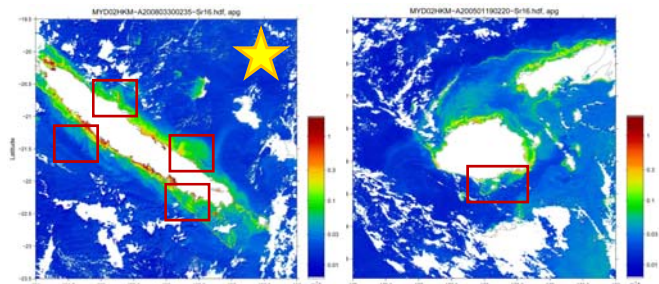
4

MODIS true color image of New Caledonia after a tropical rain in 2011

MODIS 27 décembre 2011
Aqua/Terra
Depression Ex-Fina
Nasa 2011

Données

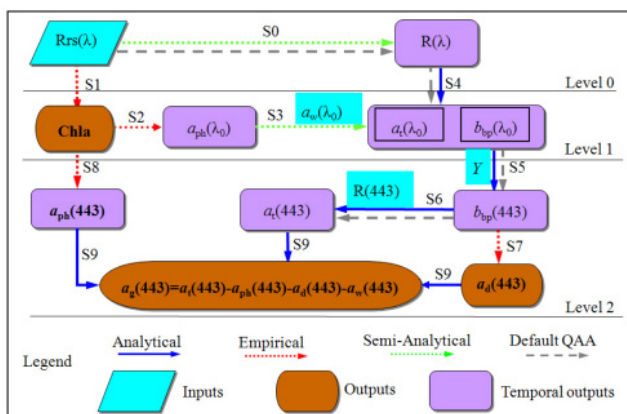
DROPS objectives



➤ *in red study zones of PHD Chloe Martias 2015-2017

- Evaluate space-time variability of CDOM in 2 lagoon areas, New Caledonia and Fiji
- Improve ocean colour estimates by in situ measurements
- ➔ provide inputs for decision makers

Satellite retrieval of CDOM



- Calculation of Phytoplankton, dissolved organic matters and turbidity from reflectance
- Multiscale : from global to regional scale
- As soon as a data is made available

VALHYSAT: Satellite data basis MODIS-DB

Identification of MODIS image

Métadonnées

Position lat/lon of 4 corners of the scene
NC, Fiji, Vanuatu....

- Identification temporal and spatila of MODIS (Aqua ou Terra)
- Integration of regional or local algorithms

MODIS BD : AQUA / TERRA metadata "GRANULE_L1_META"

Some statistics :
 Over Fiji, 500 scenes MODIS cloud-free 2002-2013
 Jérôme Lefèvre, 2015. Evolution of the MODIS-DB at <http://www.ird.fr/informatique-scientifique/projets/valhysat/>

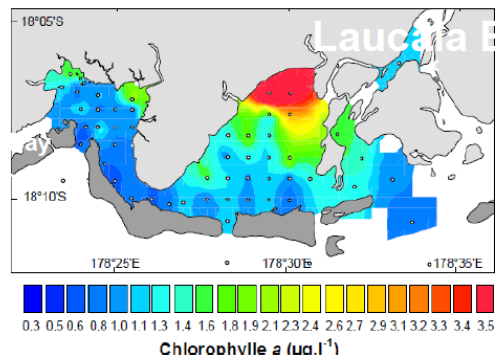
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Satellite data validation DROPS, New Caledonia

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Satellite data validation DROPS, PACE-SD

Validate ocean colour maps by in situ measurements of phytoplankton, turbidity, dissolved organic matter
Describe seasonal variability (surveys) 1st "DROPS " cruises in June and in Nov 2015

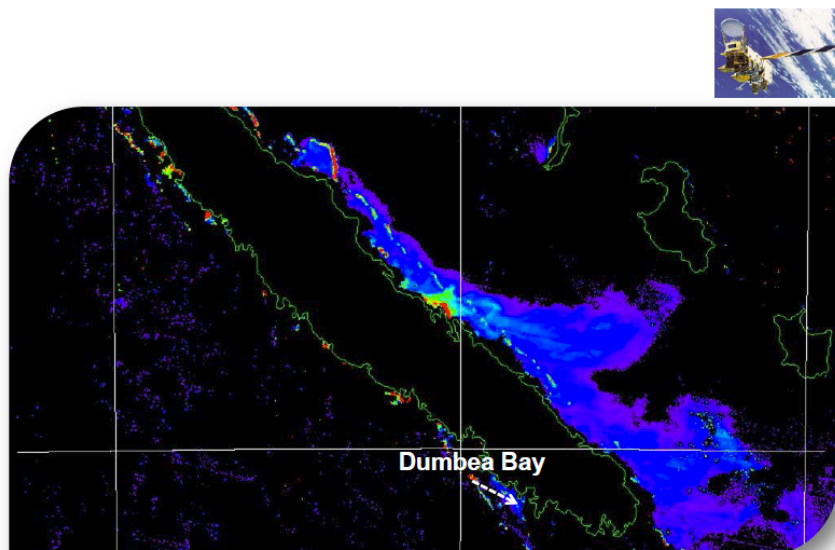


Martias, Marine GIS, Tuesday 17th November

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•Turbidity map (mg.m^{-3})

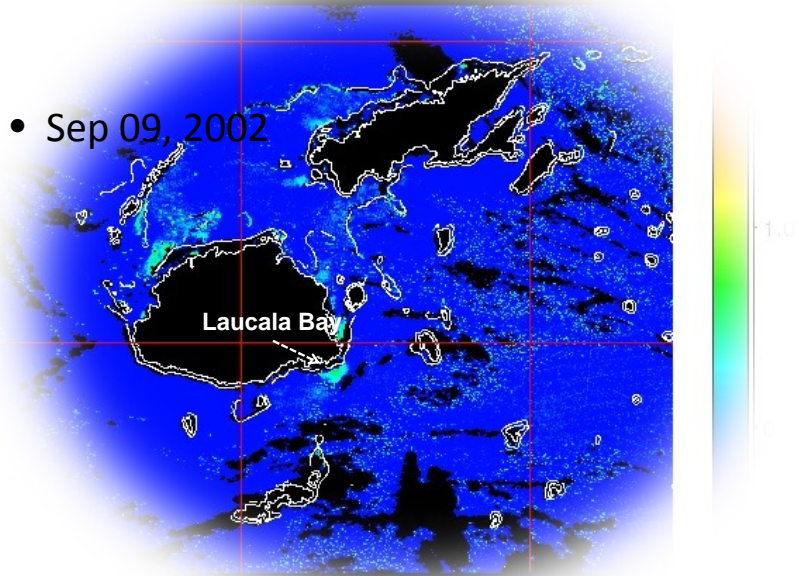


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•Turbidity : large particulates (g.m⁻³)

• Sep 09, 2002

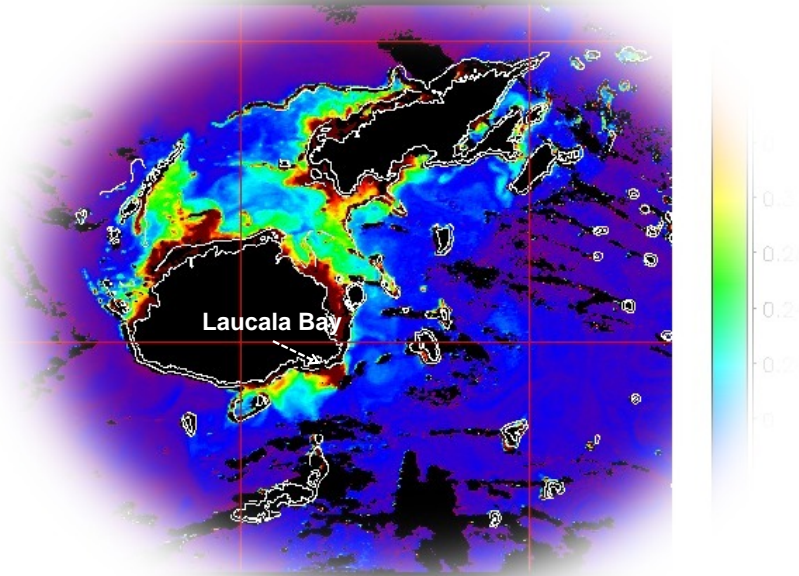


<http://www.ird.nc/UR65/Lefevre/oc.modis.fiji/> GIS-RS November 2015, SUVA (Fiji Islands)

Sep 09, 2002

11

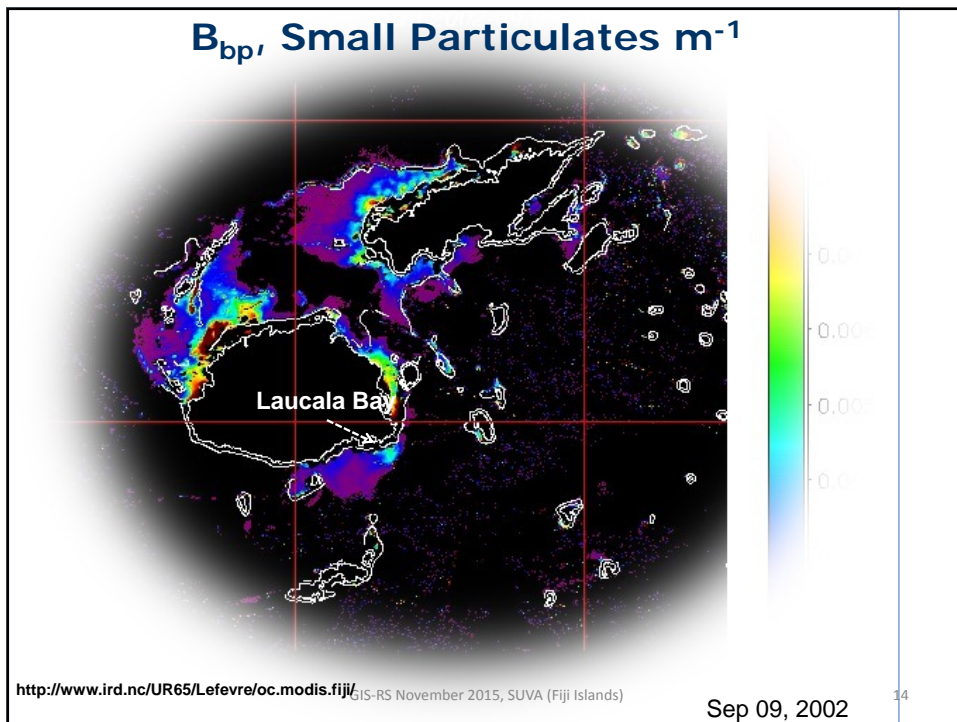
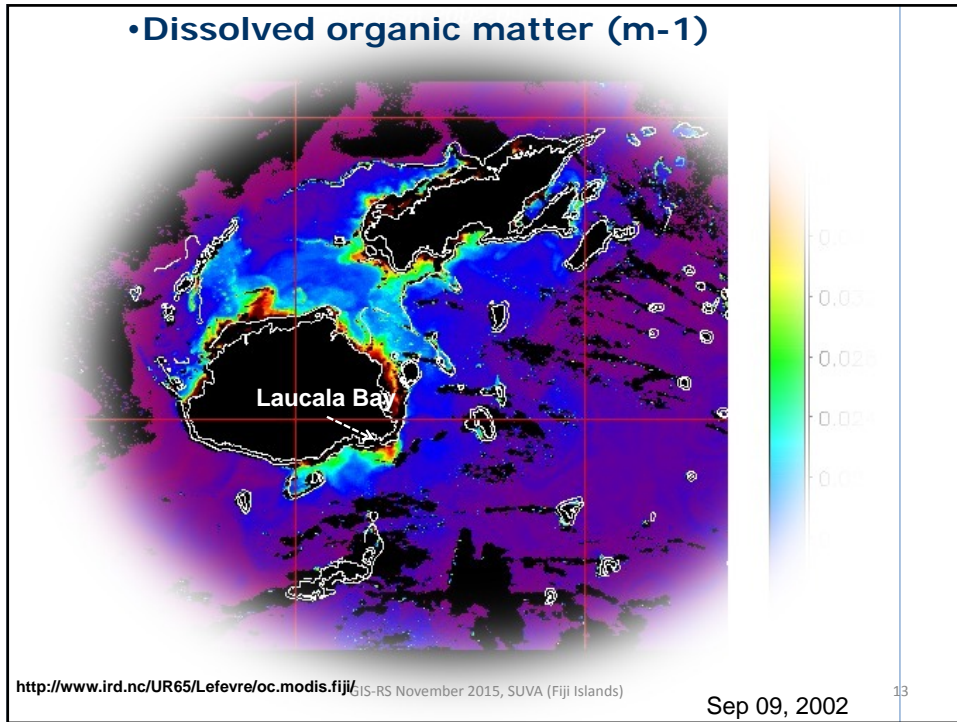
•Phytoplankton Chlorophyll a (mg.m⁻³)

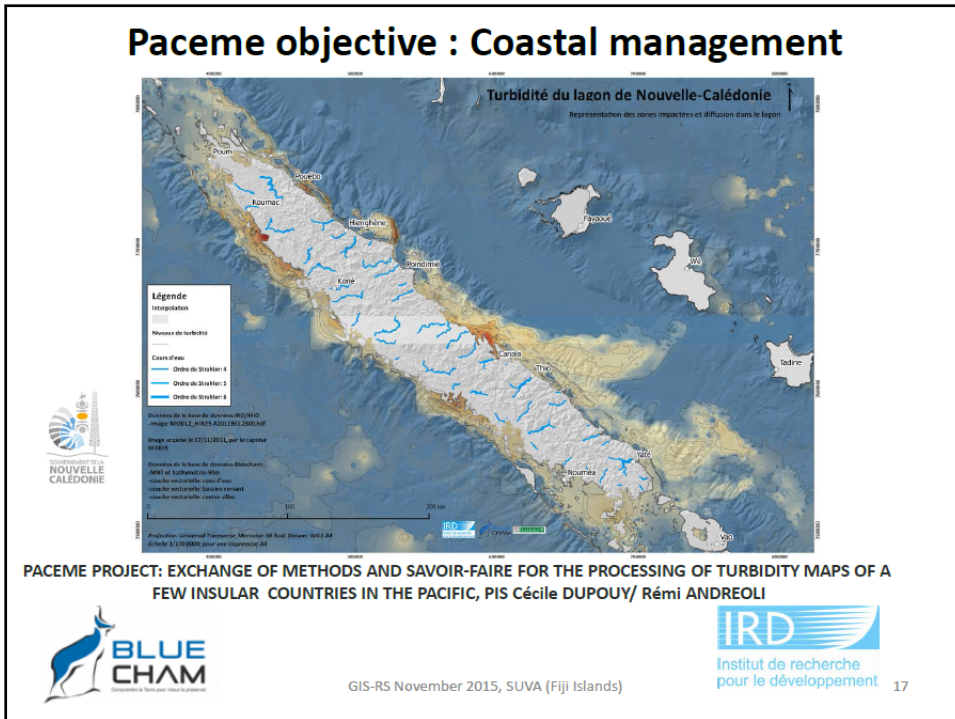
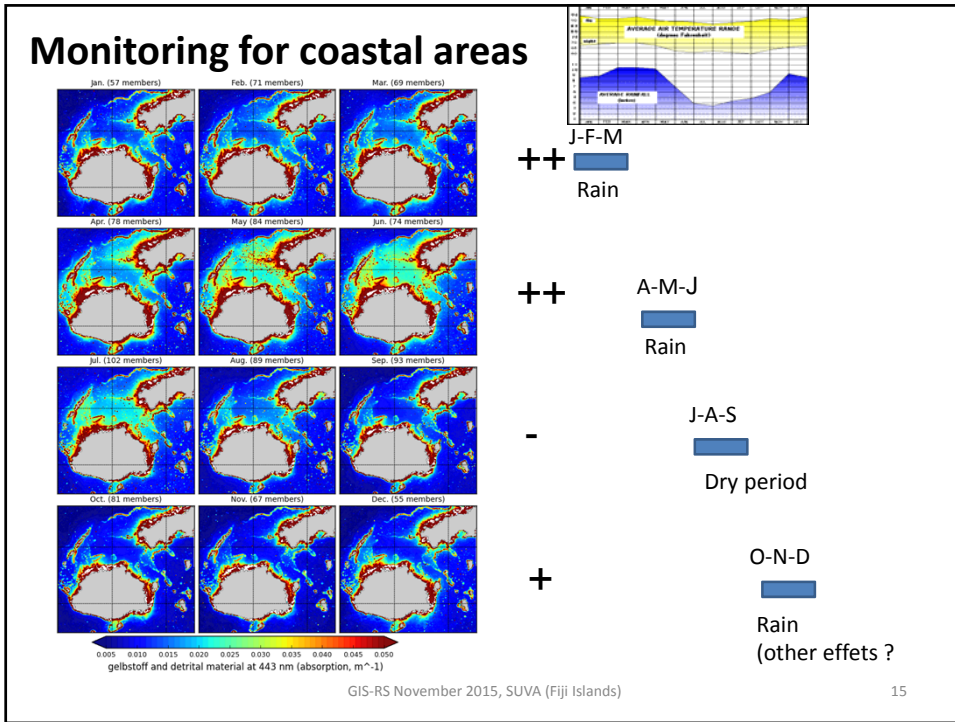


<http://www.ird.nc/UR65/Lefevre/oc.modis.fiji/> GIS-RS November 2015, SUVA (Fiji Islands)

Sep 09, 2002

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TURBIDITE 1:5000

Surface water turbidity

Legend:

- < 3 mg/l
- de 3 à 6 mg/l
- de 6 à 10 mg/l
- de 10 à 20 mg/l
- de 20 à 30 mg/l
- de 30 à 40 mg/l

Statistics:

Turbidity Min : 0.373 mg.l⁻¹
 Turbidity Max : 35.452 mg.l⁻¹
 Mean turbidity : 5.423 mg.l⁻¹

USES

Reproducible in time and at various sites, **TURBIDITE** may be requested in **RUSH** mode after a disaster. Robust and reproducible, **TURBIDITE** can also be used for regular tracking of turbidity in areas of particular interest.

TURBIDITE provides an instantaneous estimate of surface water turbidity. This innovative product was developed out of research and provides a quick idea of the propagation of sediment in a lagoon following rainfall. The causes can also be identified in this stage by using the **EROSION** product.

Developed using a scientifically approved method that has been specially adapted to lagoons, the **TURBIDITE** product provides an extremely precise spatialised estimate of the surface concentration of sediment.

The **TURBIDITE** product can be created on demand and is used to analyse impacts on lagoons, estimate water quality and monitor coastlines.

Lagoon Health of a coastal area on line

Once validated by in situ data, maps will be integrated in a SIG
 Example: UNC Noumea

Accom: indicator ,
 Temporal survey
 + compare with meteorology
 and all parameters...

GéoPortail de l'Université de la Nouvelle Calédonie

Le GéoPortail de l'Université de la Nouvelle Calédonie (UNC) a pour but la valorisation des données géographiques scientifiques, issues des projets de recherche menés à l'UNC, tout comme celles provenant de divers organismes partenaires comme la DTISI (Gouvernement de la Nouvelle Calédonie).

Accéder aux données publiques et sécurisées

Nom d'utilisateur: _____

Mot de passe: _____

Se souvenir de moi à la prochaine visite

OU Accéder aux données publiques uniquement

Wattelez, GIS session, Day YY

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Research perspectives and capacity building

Methodology:

Use multi-scale satellite data (MODIS NASA, L8, WV2&3, OLCI ESA in 2016) to produce calibrated maps at low and high resolution (better correct influence of bottom reflectance in shallow waters, Minghelli-Roman and Dupouy, 2013, 2014)

Application :

Study CDOM distribution, impact of rain/dry periods (rivers, anthropization, impact on coral reefs areas). Identify their terrestrial origin test site : Laucala Bay and other zones ?

Teaching :

Exchanges of Msc and PHD USP students

Funding sources:

ESA Sentinel 3 validation projets, PACENET+...

Courtesy P. Sharma, USP student



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Thank you to all partners

•IRD- (UMR MIO) : Cécile Dupouy, Scientific PI (Nouméa) CR1 IRD , Madeleine Goutx, DR2, CNRS, Marc Tedetti (Luminy), CR1 IRD, Chloe Martias, PHD Aix-Marseille University, 2015-2017 (Chemistry Team)

•PaCE-SD University of South Pacific (Fiji) Hélène Jacot des Combes, Awnesh Singh, Antoine N'Yeurt

•IRD-UMR LEGOS/M.I.O. Jérôme Lefèvre Research Ingeneer

•BLUECHAM SAS Rémi Andreoli / Didier Lille

•University of New Caledonia : Touraivane, Maître de Conférence,

•Guillaume Wattelez, Ingeneer, statistics, algorithms, GIS

•With collaborations of :

•EIO UMR 241 (Tahiti): Martine Rodier, CR1, IRD

•Rüdiger Röttgers, Helmholtz-Zentrum Geesthacht (Allemagne)

•Robert Frouin, Scripps Institution of Oceanography (USA)

•Hiroshi Murakami, JAXA (Japan Aerospace eXploration Agency) (Japon)



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