

REEFTEMPS

THE PACIFIC INSULAR COASTAL WATER OBSERVATION NETWORK

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Abstract

ReefTEMPS is a sensor network which is part of the French national federative Research Infrastructure for coastal ocean and seashore observations ILICO.

Keywords: Observation infrastructure, Coastal observatory, Wave measurements, Pacific Islands, Environmental time series, Sensor Observation Service, FAIR data, ILICO

1. ReefTEMPS within the French ILICO RI

ReefTEMPS is a coastal monitoring network initiated in 1958 in the South and West Pacific. It is part of the French national federative Research Infrastructure for coastal ocean and seashore observations ILICO (Cocquempot *et al.*, 2019) and feeds the ODATIS ocean cluster of the DATA TERRA RI (Schmidt *et al.*, 2020) with observation data.

2. From difficult and remote access to sensor platforms... to a fair data dissemination

ReefTEMPS monitors 7 physical parameters (temperature, pressure, salinity...) on a hundred platforms covering 14 countries of the Pacific region, including the three French territories. Some stations require autonomous solutions due to very remote and difficult access. Data is acquired at rates from 1 sec to 30 mn. As of today, a total of 200 sensors record around 350 million measurements per year. According to open data and FAIR principles (Wilkinson *et al.*, 2016 ; Sansone *et al.*, 2019), all ReefTEMPS data are openly accessible via web services for visualization, access and download: www.reeftemps.science/en/data/ under a Creative Commons licence 'Attribution-Share alike' (CC BY-SA). A dataset containing all available time series is also published semi-annually in the SEANOE data portal: <https://doi.org/10.17882/55128>.

3. Range of observable events within the ReefTEMPS Network

3.1 Pressure: extreme wave events and long term wave climate, occasional tsunamis

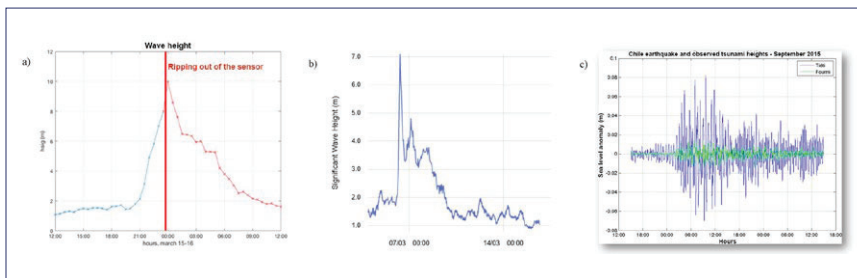


Fig. 1. Significant wave height recorded in New-Caledonia a) of 10.5 m on March 15, 2020 during the tropical cyclone GRETEL, b) of 7.1 m during the Tropical Cyclone NIRAN on March 6, 2021 with a real time Wave Buoy and c) water height anomalies during the post-earthquake tsunamis from Chile on September 16, 2015.

3.2 Temperature: global warming by long trend monitoring, heat waves potentially lead to coral bleaching

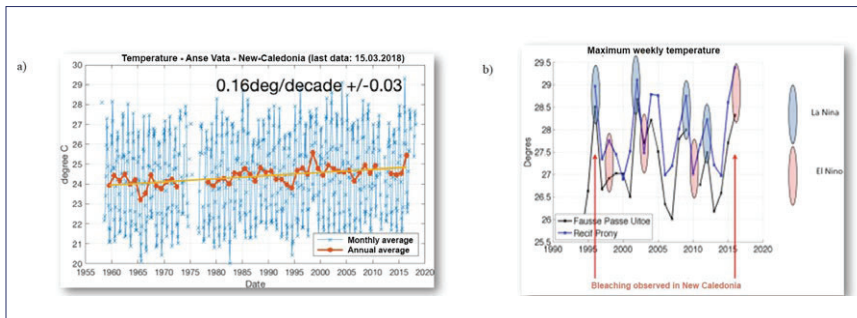


Fig. 2. a) Over 60 years of acquired data in New-Caledonia, b) Effects of La Niña and El Niño on maximum weekly temperatures.

4. R for Reusable

The data documents the local impact of climate change and El Niño phenomenon, the rapid appearance, at day scale, of cold water upwelling along reef barriers, in relation to winds and ocean thermal and biological structures. ReefTEMPS is also a support to the validation of lagoon models and coastal numerical simulations, finally it helps in the calibration for the reconstitution of past series from coral analysis.

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References

- Cocquempot L. et al., (2019). Coastal Ocean and Nearshore Observation: A French Case Study. *Frontiers in Marine Science*, 6, 324. <https://doi.org/10.3389/fmars.2019.00324>
- Fiat S., Aucan J. & Hocdé R. (2021). ReefTEMPS, FAIRs access to Reef ecosystem environmental measurements [Poster]. IMDIS 2021, Virtual.
- Fiat S., Varillon D., Pelletier B., Aucan J., Hocdé R. (2020). ReefTEMPS, Network of coastal oceanic sensors, Open access data portal [Poster]. Research Data Alliance, RDA's 15th Plenary Meeting, Melbourne (Australia).
- Fiat S., and Hocdé R. (2019). Critical Success Factors of the ReefTEMPS sensors-oriented environmental information system for a real operativity. Geospatial Sensing Conference 2019, Münster (Germany).
- Hocdé R., and Fiat S. (2013). Le système d'information du 'réseau de capteurs de température des eaux côtières dans la région du Pacifique Sud et Sud-Ouest'. Netcom, Special issue ' Les données environnementales en libre accès: politiques, expériences, usages ' 170–173. <https://doi.org/10.4000/netcom.1294>
- Schmidt S. et al., (2020). Streamlining Data and Service Centers for Easier Access to Data and Analytical Services: The Strategy of ODATIS as the Gateway to French Marine Data. *Frontiers in Marine Science*, 7, 548126. <https://doi.org/10.3389/fmars.2020.548126>
- Wilkinson M.D. et al., (2016). The FAIR Guiding Principles for Scientific Data Management and Stewardship. *Scientific Data*, 3, 160018. <https://doi.org/10.1038/sdata.2016.18>

Sansone S.A. et al., (2019). FAIRsharing as a Community Approach to Standards, Repositories and Policies. *Nature Biotechnology*, 37(4), 358–67. <https://doi.org/10.1038/s41587-019-0080-8>