Tuamotu Archipelago’s wave and circulation patterns

A. Vega, P. Marchesiello, S. Andrefouet, F. Ardhuin, R. Le Gendre and D. Dagorne (IRD, SHOM)

From climate variability to operational oceanography : an integrated approach

Financed by the 9th European Development Fund

Service de la Perliculture

Institut de Recherche pour le Développement
A multi-disciplinary project to study the effect of the environment on pearl oyster

**CLIMATE - LARGE SCALE** ➔ **REGIONAL** ➔ **OPERATIONAL**

**ATOLL HYDRODYNAMIC MODELLING**

**Global Assimilated Models**
- Ocean: MERCATOR
- Atmosphere: ERA-40, NCEP, GFS
- Waves: ERA-40, WAVEWATCH 50km

**Regional Models**
- Ocean: ROMS
- Atmosphere: WRF
- Waves: WAVEWATCH 5km

**Forecasting Regional Models**
- Ocean: ROMS Forecast-Tools
- Atmosphere: WRF-Forecast

**Satellite Data**
- SST, WIND, OCEAN COLOR, SEA LEVEL

**Dedicated Dynamic Web Site**

**Examples ....**
El Niño effect on swell and wave’s variability

Mean wave heights from 1957-2002 ERA-40 (A. Sterl, KNMI)

December to March 1979-2002 mean

WIND SPEED

Hs SWELL

Hs WAVES

Anomalies El Niño’s 82/83-97/98 – Summer mean

WIND

Hs INCREASE = 13 %

Hs INCREASE = 80 %
Regional Modeling approach: effect of archipelago on waves

Wavewatch Global Model (low resolution)
Wavewatch Regional Model (high resolution)
Regional Modeling approach: effect of archipelago on waves

Significant Height

WaveWatch III (JAN - FEB 2007)
Regional Modeling approach: effect of archipelago on currents

Mesoscale variability

CLIMATOLOGY         REAL-TIME         FORECASTING

Surface currents

To study past, present and near-future
Any depth from surface to bottom
Also wind, temperature, salinity, etc.
Web Site and operational platform

**Description of the region and the data**

**Wind wave and swell’s module**

**Climatology of the ocean and Marine Atlas**

**Assimilated global model forecasts**
- Currents
- SST
- Sea Level...

**ROM’s 5-days high resolution forecasts**
- Waves
- Wind

**Real-time satellite maps**

**Next modules : Ahe and Takaroa dynamic and other applications**
GENERAL INFORMATIONS

TEAM
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Wave modeler : F. Ardhuin (4)
Satellite processing : D. Dagorne (5), A. Vega
Model Forecasting : A. Vega, P. Marchesiello
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WEB SITES (in French)
Polynesia : under construction
New Caledonia : http://prevision.ird.nc/

Financed by the 9th European Development Fund

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