# POCTEFA MARLIT
## INTERREG Va EFA344/19

Medios de evaluación y Atenuación de los Riesgos costeros Locales debidos a Impactos de los Temporales //

Moyens d'évaluation et d'Atténuation des Risques côtiers Locaux dus aux Impacts des Tempêtes

# Monitoring tools development and process analysis to characterize the storm impact on the coast

I.   **Progress in video monitoring**
II.  **Testing new technologies**

# Video monitoring network used in MARLIT



- **Station Anglet** (3 cameras)
  - Beach morphology
  - Coastal defense-groins
- **Station Biarritz** (4 cameras)
  - Beach morphology
  - Coastal flooding-6 timestacks
- **Station Artha** (1 camera)
  - Overtopping
  - Blocs movement
- **Station Socoa** (2 cameras)
  - Wave transformation
  - Wave loading on rocky cliff

# Video monitoring network used in MARLIT

- **Station Zarautz** (3 cameras)
  - Beach morphology
  - **Coastal flooding**
- **Station Bermeo** (4 cameras)
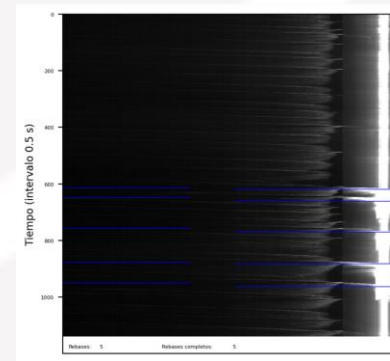  - Wave overtopping
  - Harbour agitation

## + New stations

- **Station Zurriola** (2 camera)
  - Wave overtopping
  - Coastal flooding
  - Beach morphology
- **Station Igeldo** (2 camera)
  - Wave overtopping
  - Coastal flooding
  - Beach morphology
- **Station Mutriku** (4 cameras)
  - Wave overtopping
  - Harbour agitation

Wave overtopping automatic detection in Zarautz and Bermeo: Wave overtopping operational automatic analysis algorithm has been **transferred to Euskalmet**
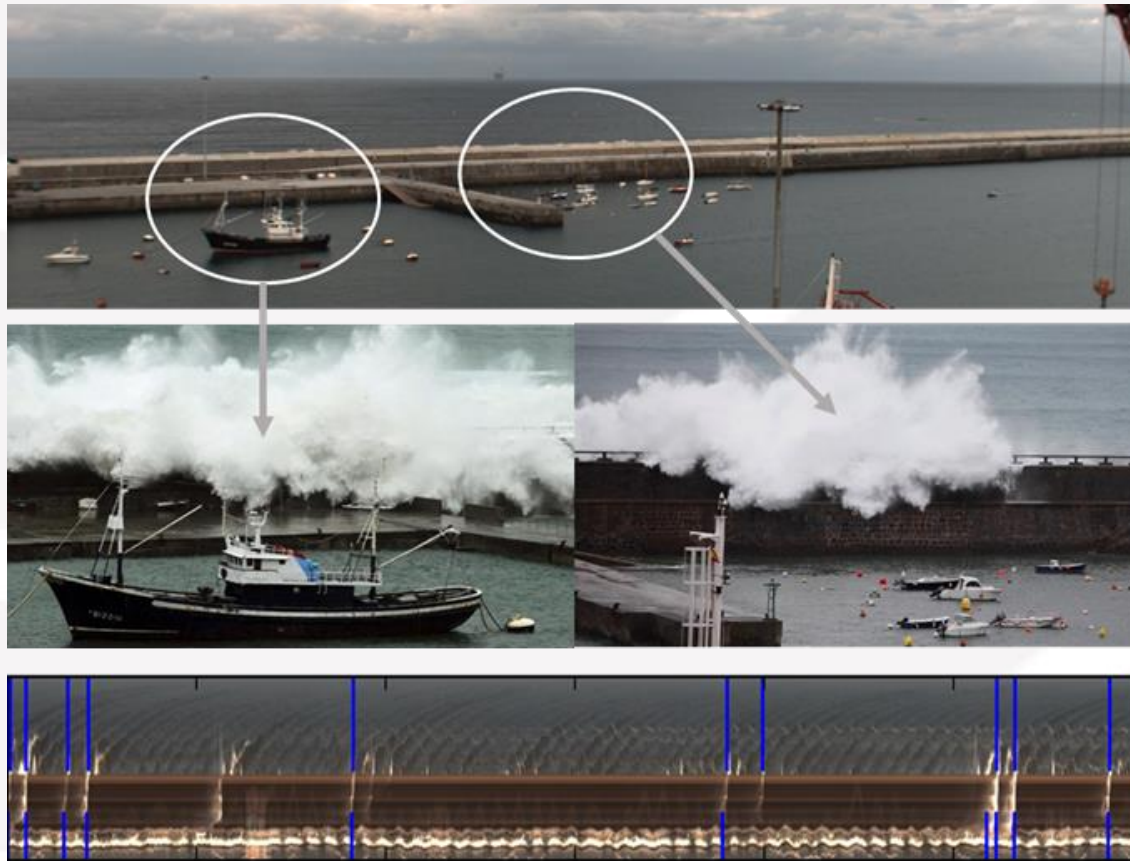
Wave overtopping automatic detection in Zarautz and Bermeo
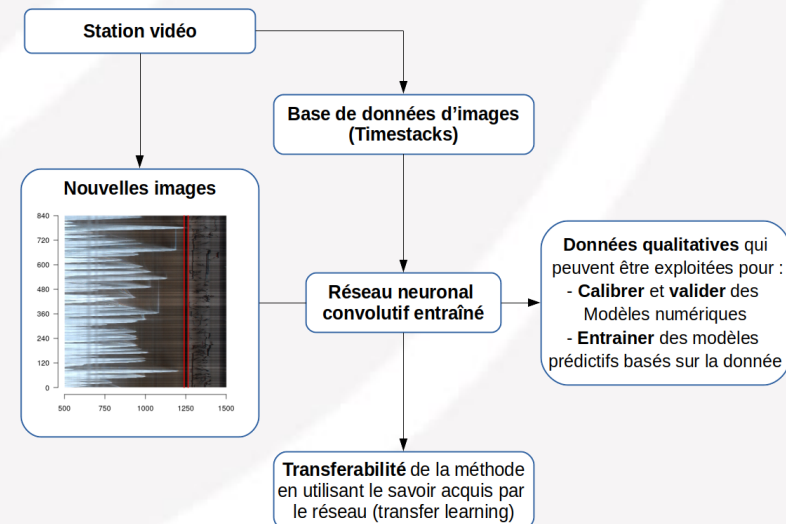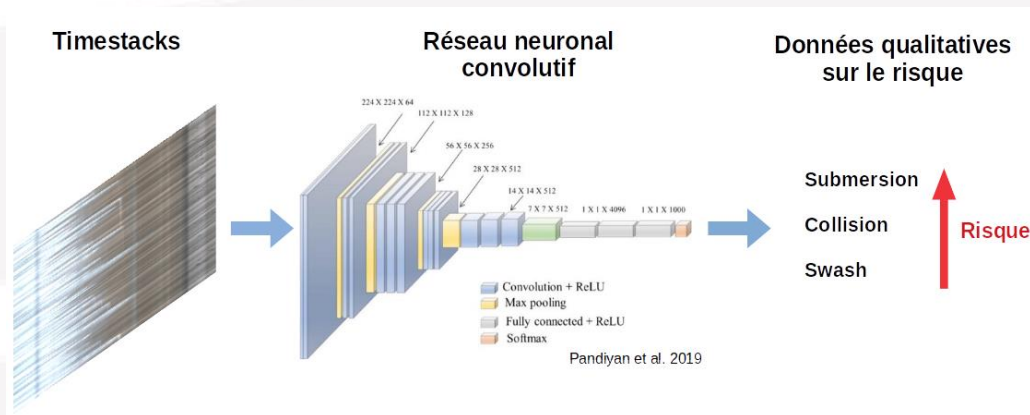
**Progress in video monitoring**

**Biarritz videometry station**: continuous monitoring of wave impact and coastal flooding all along an exposed urbanized beach

- Coastal flooding: adding 2 timestacks to cover northern beach → Total 6 timestacks
- Continuous functioning all year long + Near-real time data delivery on web portal
- Critical thresholds inserted on each stack for visual counting (collision, overtopping)
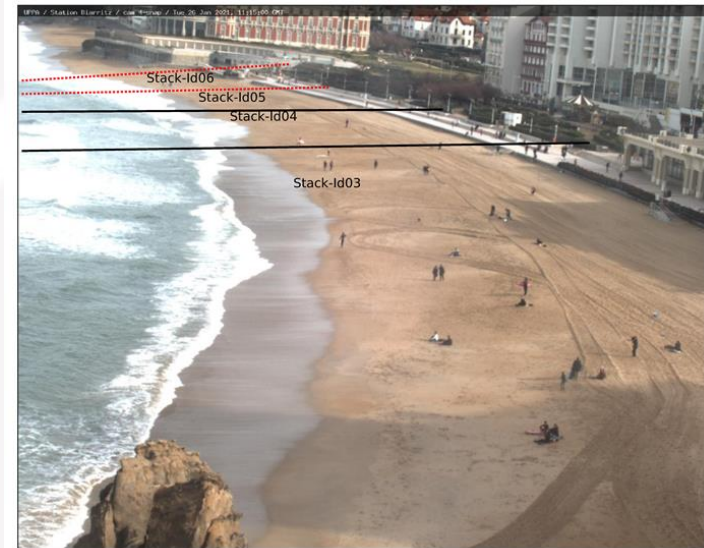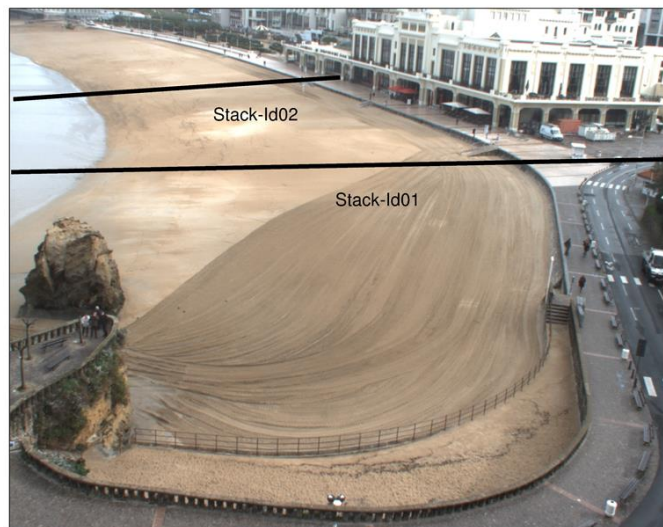
**Biarritz videometry station**: continuous monitoring of wave impact and coastal flooding all along an exposed urbanized beach

- **Critical runup thresholds: automatic impact regime detection based on new Artificial Intelligence (AI) algorithm**

**Progress in video monitoring**

**Biarritz videometry station**: continuous monitoring of wave impact and coastal flooding all along an exposed urbanized beach

- **Critical runup thresholds: automatic impact regime detection based on new Artificial Intelligence (AI) algorithm**

**Précision : 0.869**

**Rappel : 0.865**

**F1-score : 0.866**

**Matrice de confusion :**

|  | Swash | Collision | Overwash |
|---|---|---|---|
| Swash | **1576** | 7 | 0 |
| Collision | 4 | **34** | 2 |
| Overwash | 1 | 2 | **9** |



Collision 78% (Swash)

Swash 99% (Swash)
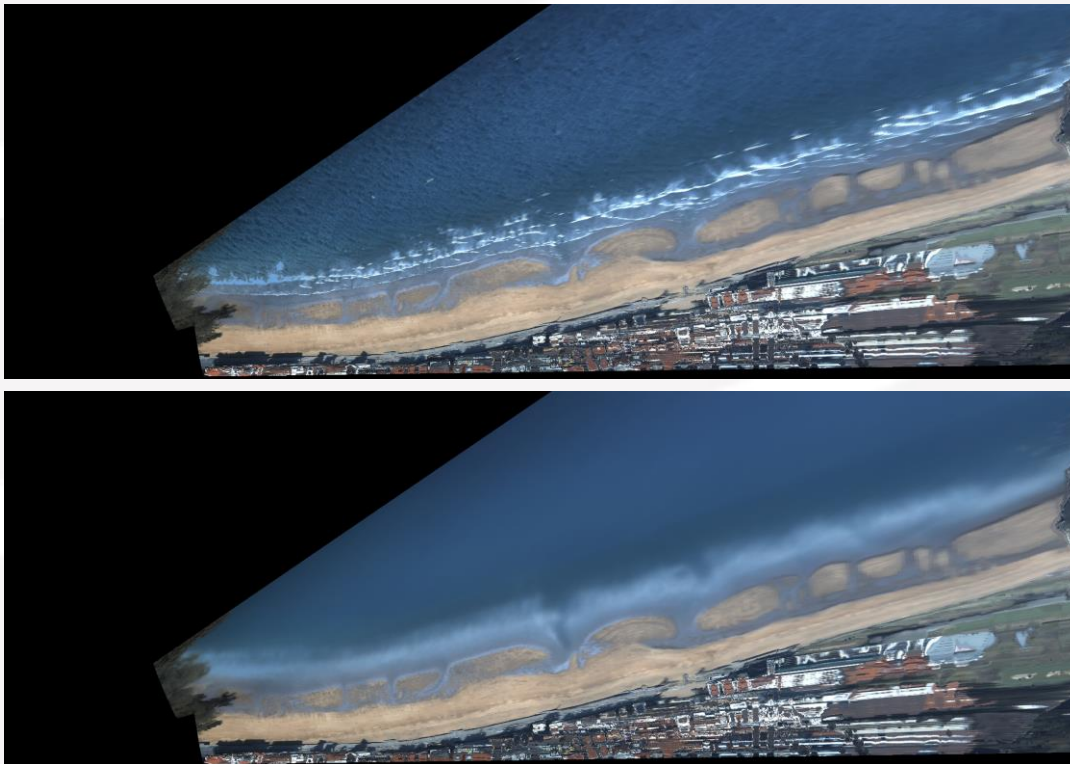
Collision 78% (Collision)

Overwash 100% (Overwash)
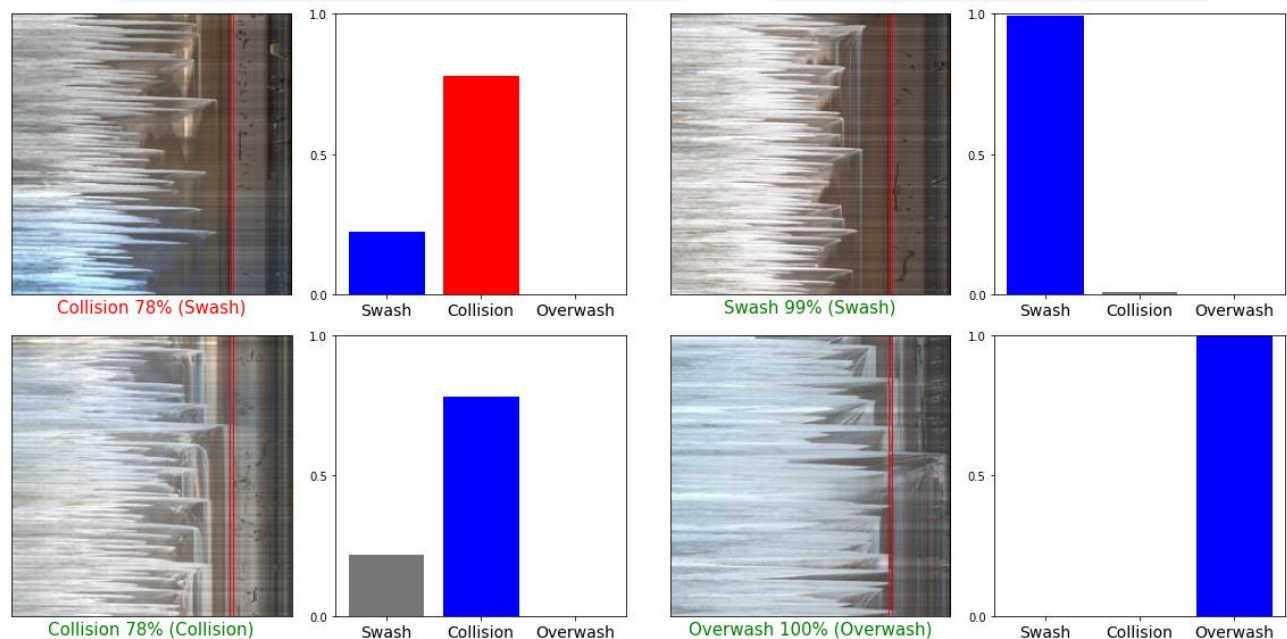
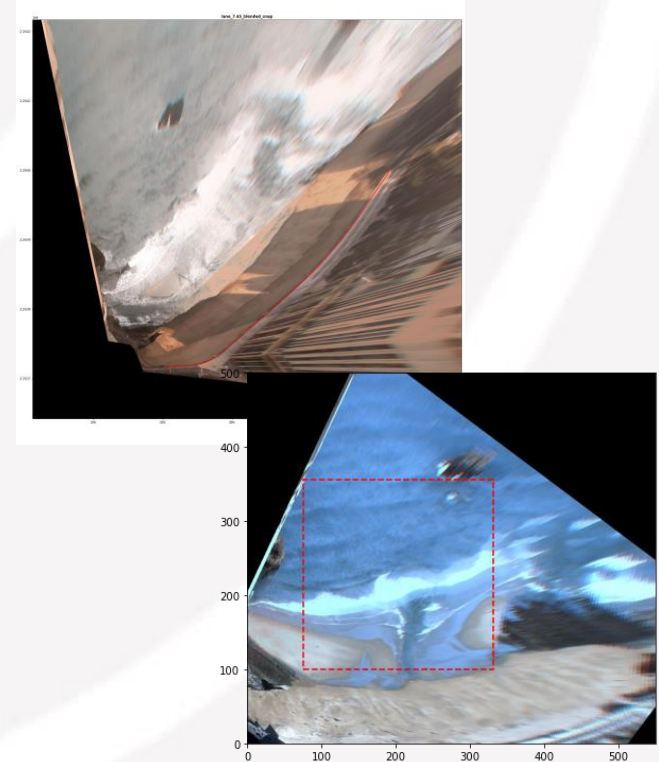**Examples of automatic classification from the neural network (Callens et al, 2021)**

New software for the calibration and restitution including harmonization and recalibration tools
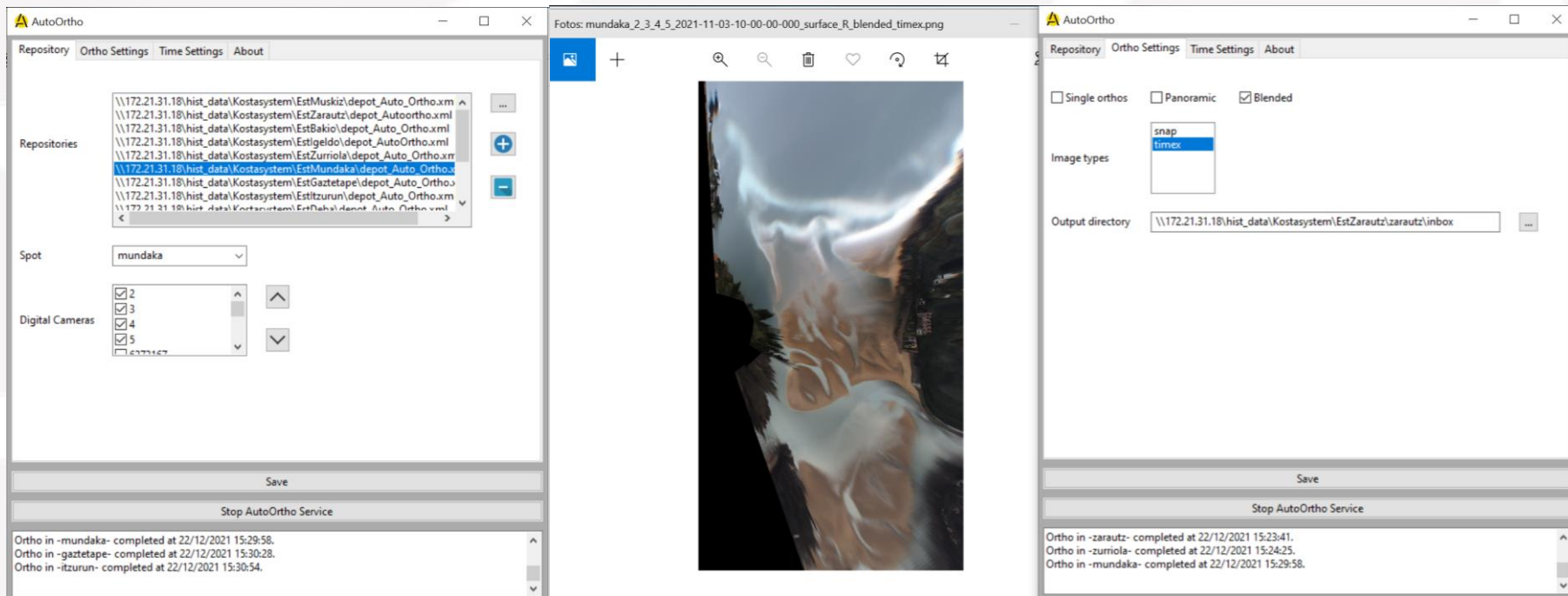
New software for the calibration and restitution including harmonization and recalibration tools
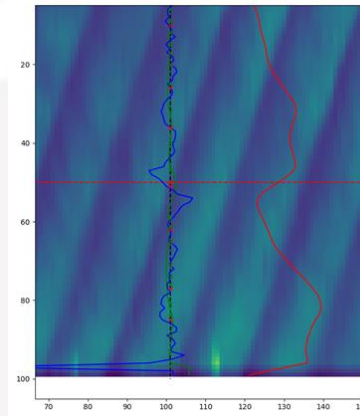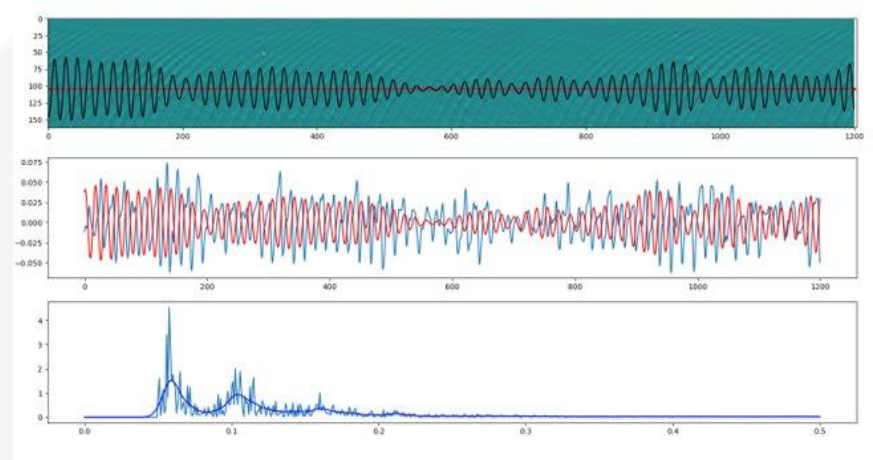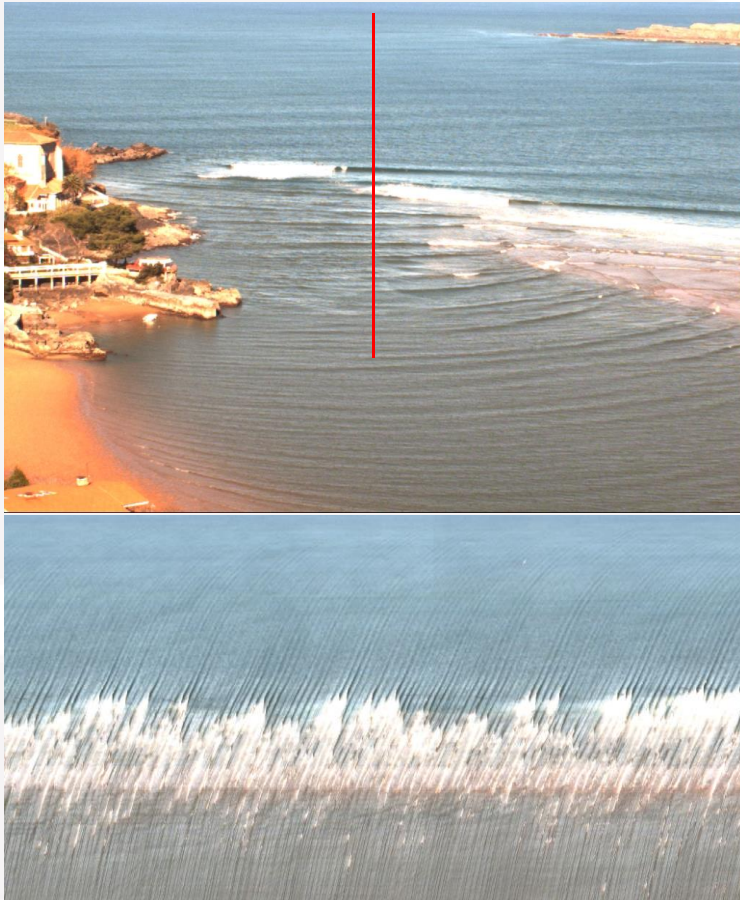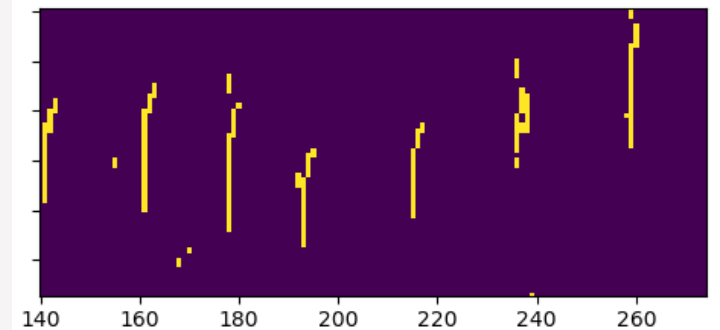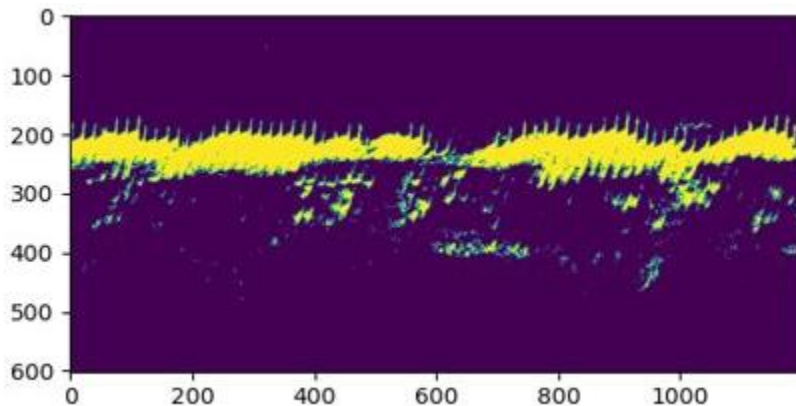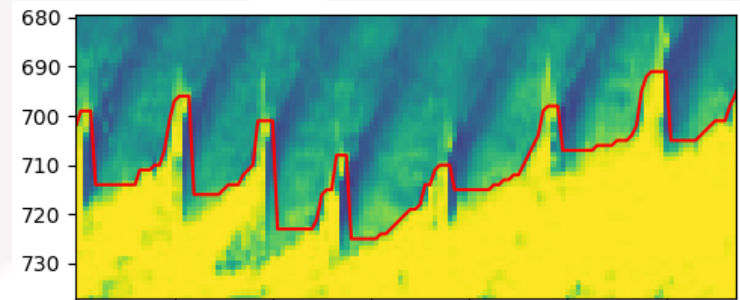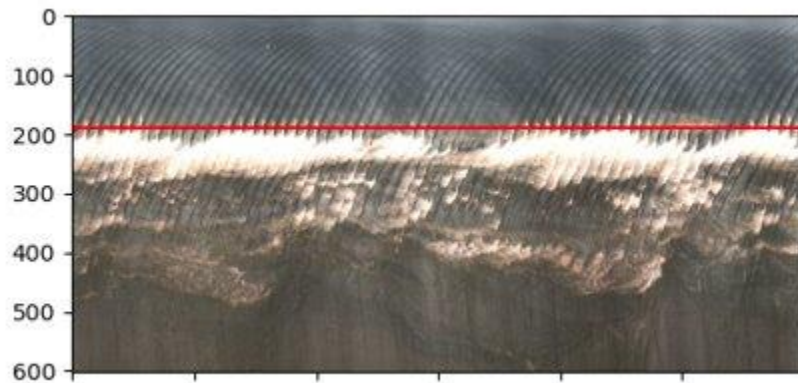
**Zarautz**

**Biarritz**
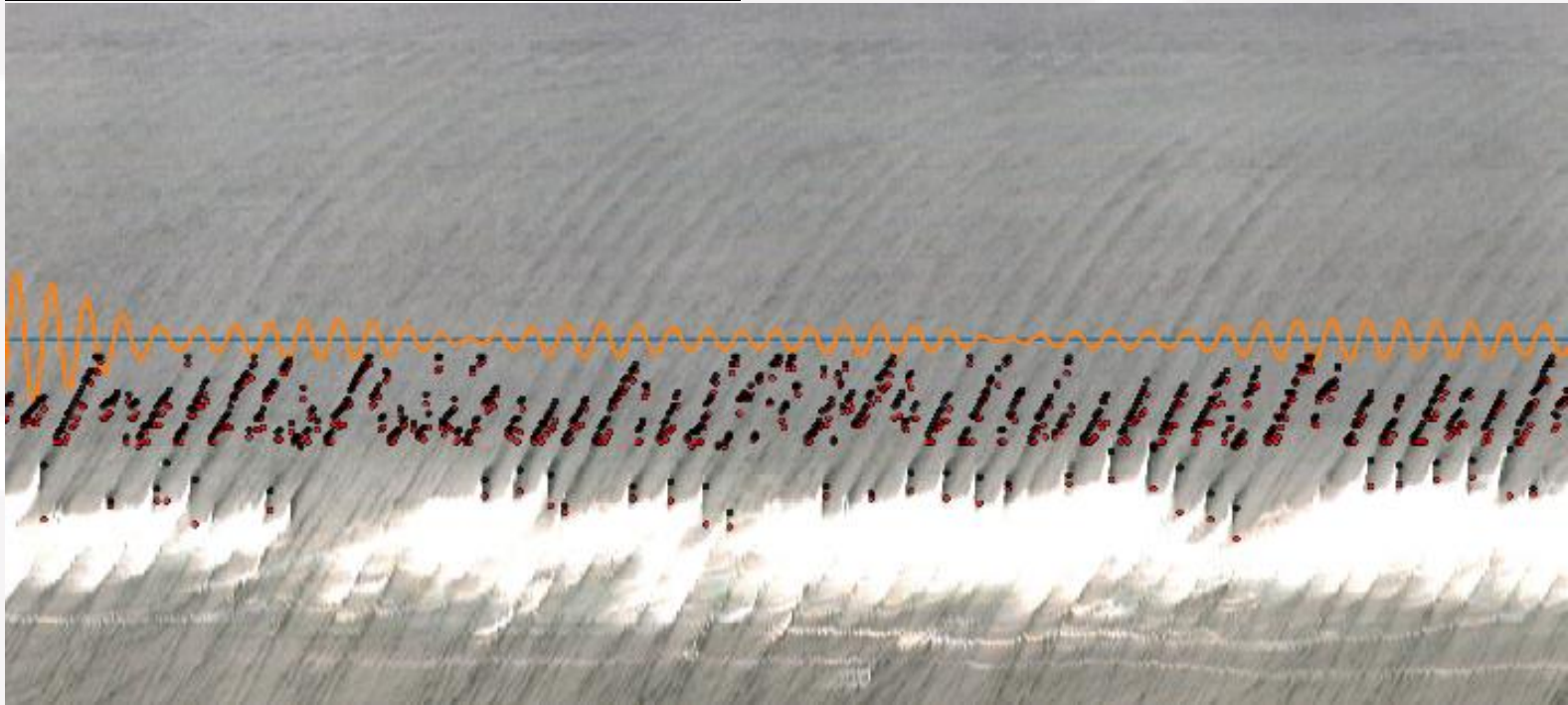
New software to obtain wave data from the video stations.

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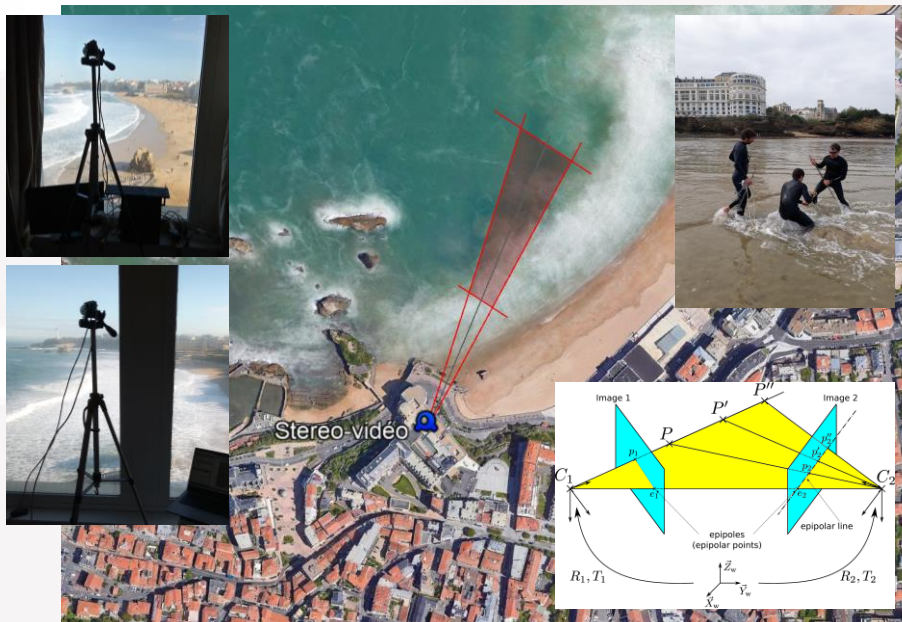| Fecha | Detectadas | | | | |
|---|---|---|---|---|---|
| | Nolas | H1/3 | Nolas_rotura | Hb1/3 | Tp |
| 2021-11-01 14:00:00 | 86 | 1,5 | 32 | 1,3 | 12,1 |

**Remote wave measurement with stereo-videometry**: experimentation and assessment on Biarritz beach
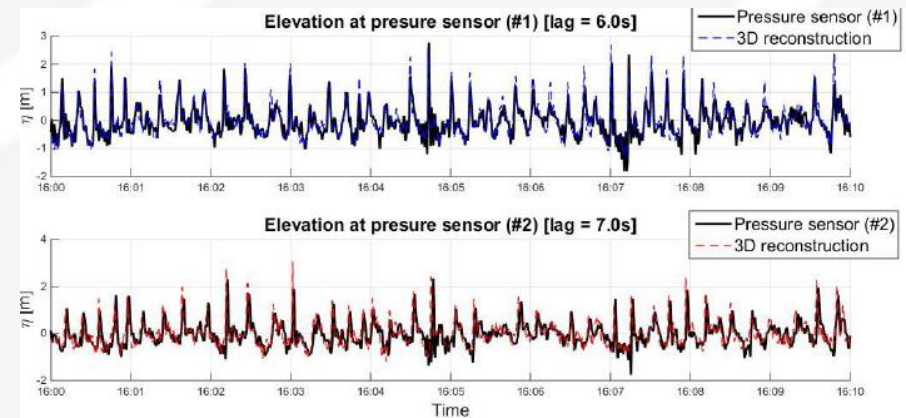
- Collaboration with France Energies Marines
- 3D free surface reconstruction from two cameras
- Assessment against pressure sensors in the surfzone

FRANCE
ENERGIES
MARINES

*Experimental setup*

*Validation:*
*comparison video v.s. in situ measurements*





Interreg
POCTEFA
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MaRLiT
MEDIOS DE EVALUACIÓN Y
ATENUACIÓN DE LOS RIESGOS
COSTEROS LOCALES DEBIDOS A
IMPACTOS DE LOS TEMPORALES

**Remote wave measurement with stereo-videometry**: experimentation and assessment on Biarritz beach

→ Very good performances obtained !
→ 3D free surface reconstruction during 11 different events
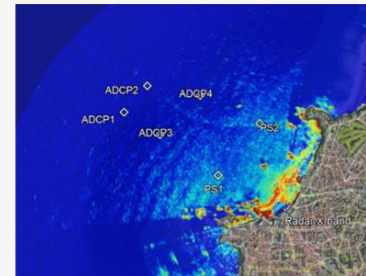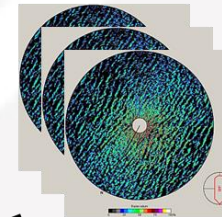→ Example:
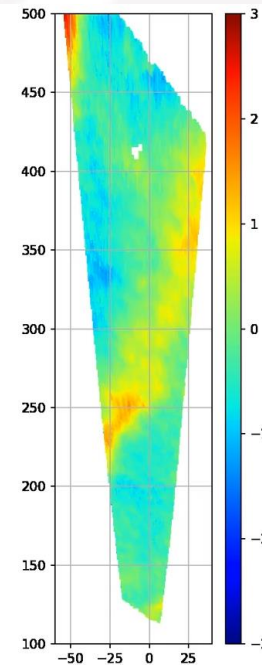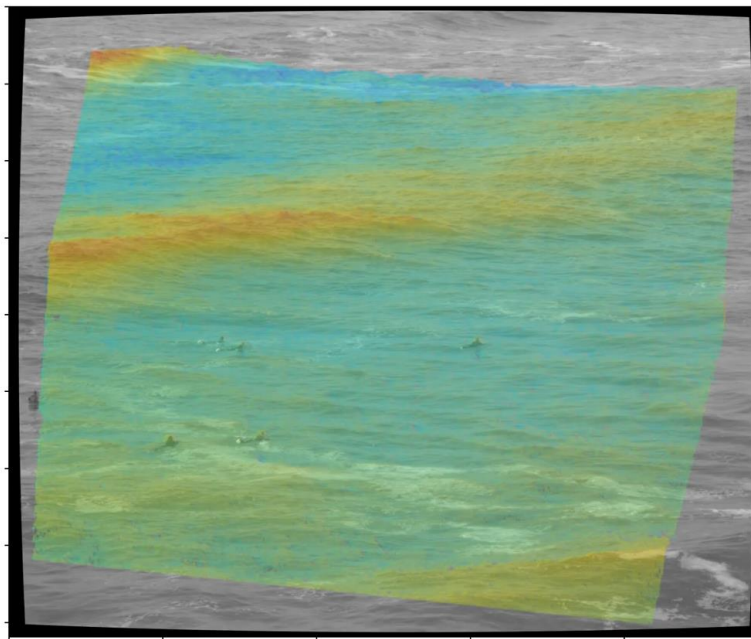
**Remote wave measurement with X-Band radar**: experimentation and assessment on Biarritz site

- Collaboration with Helmholtz-Zentrum Hereon and Energie de la Lune
- Installation on Biarritz Casino rooftop → Wave and current measurement
- Assessment against ADCPs/pressure sensors deployment

*Experimental setup*

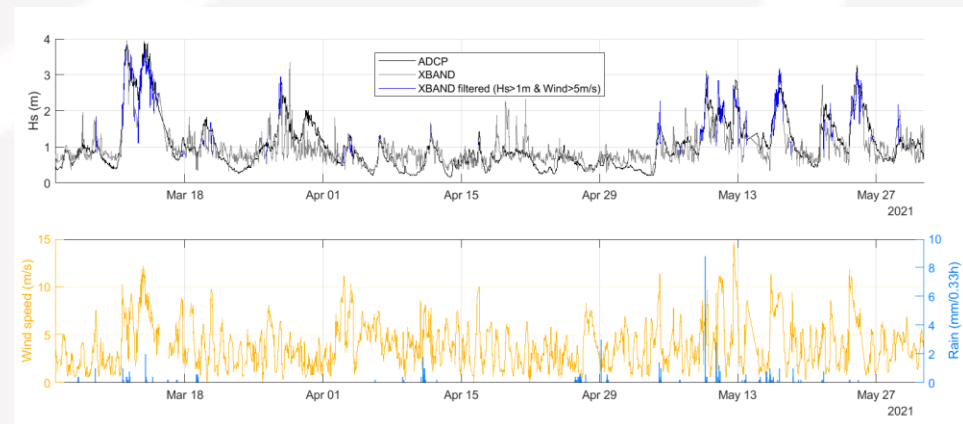**Remote wave measurement with X-Band radar**: experimentation and assessment on Biarritz site

→ Encouraging results on surface currents
→ Good results on waves providing data-based calibration
→ Perspective to provide spatialization
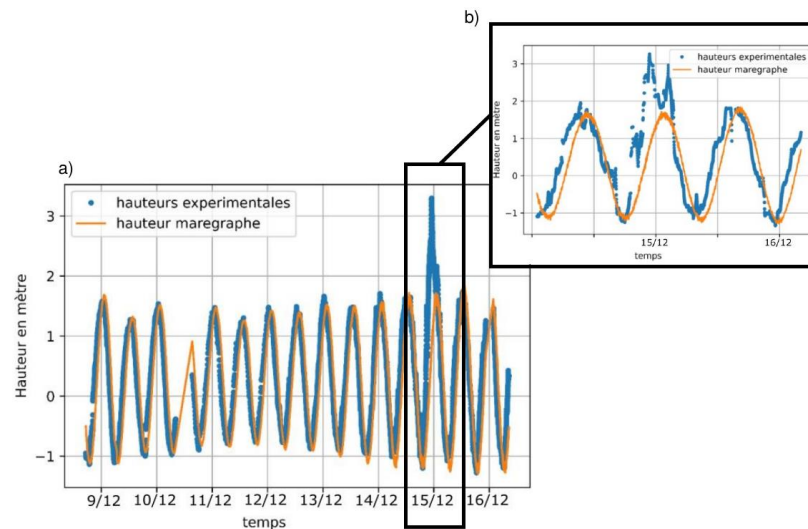
*Assessment radar v.s. in situ: surface currents*

*Assessment radar v.s. in situ: waves*

# GNSS-R receiver

- Installation of a GNSS-R receiver at the port of Bilbao

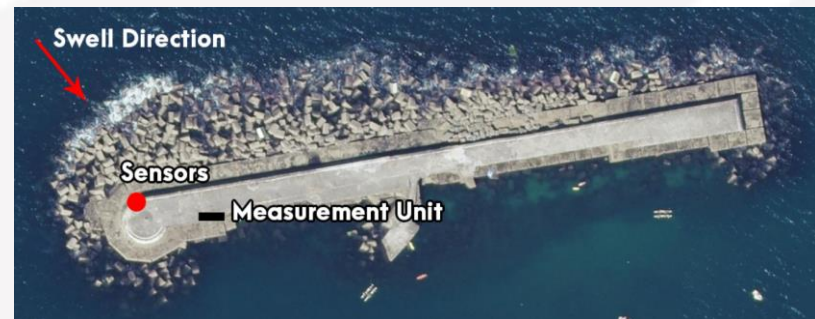- Analysis of GNSS-R data at the Sokoa station



Estimation of the water elevation off the bay of
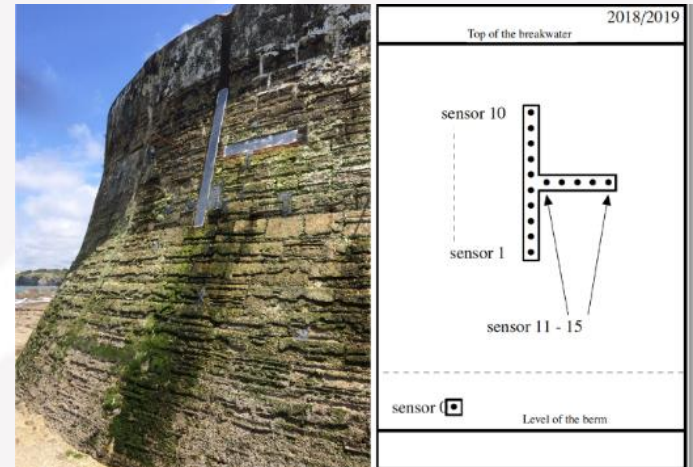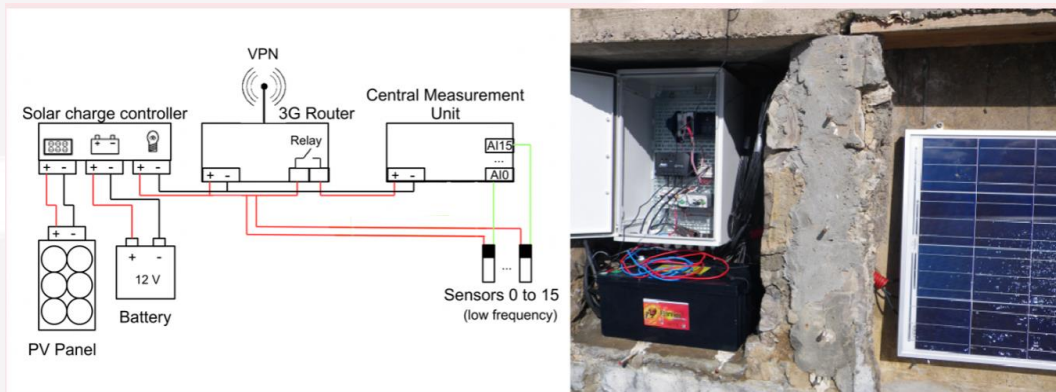St Jean de Luz-GNSS-R (Peron, 2021)



Bilbao-GNSS-R station

Wave impact pressure measurements at Artha Breakwater – Saint Jean de Luz

# Wave impact pressure measurements at Artha Breakwater – Saint Jean de Luz



## Characteristics of the station :
- Power supply: PV Panel, Solar charge controller and battery.
- Communication: 3G router + Raspberry Pi + PyScada
- Central measurement unit (CompactRIO system: controller with a processor anduser-programmable FPGA) :
- Host Unit: Controller, webserver (webservices, FTP protocol)
- Target Unit: FPGA for high accuracy data acquisition
- 16 pressure sensors 0-5bar – 10 kHz

New methodology to obtain topographic data from the supratidal part of the beach using the routinary cleaning activities has been developed and tested in Zarautz beach.

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