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RAMONES

Exploring the hydrothermal vent field of Milos Island in Aegean Sea using novel radiation instrumentation

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NUSTRAP
Nuclear Structure, Reactions & Applications

Receives funding from European Union under Horizon 2020 FET Proactive Programme via grant agreement No. 101017808

www.ramones-project.eu

- Innovative Project
- Milos Field Test
- Instrument calibration
- Risk Information System

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RAMONES
RADIOACTIVITY MONITORING IN OCEAN ECOSYSTEMS

Outline

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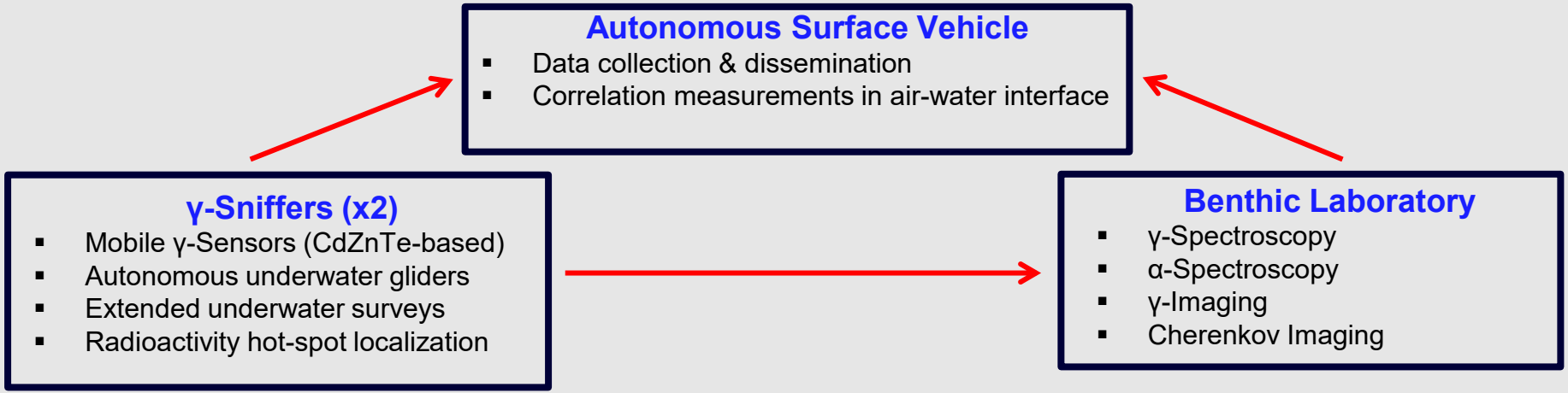
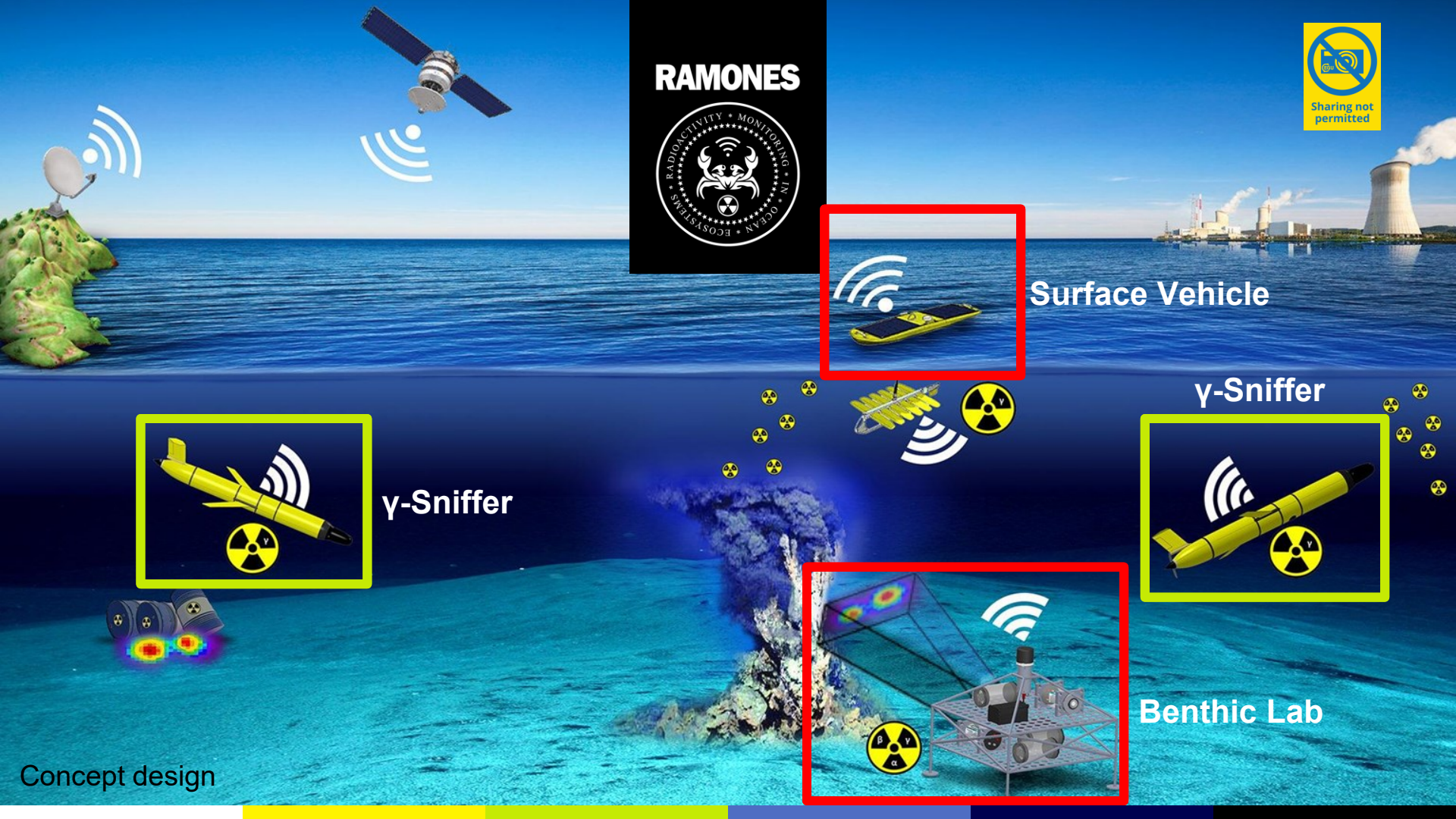
Innovative Project

RAMONES (*RAdioactivity Monitoring in OceaN EcosystemS*) is a highly ambitious FET Proactive Research Programme aiming to provide *in-situ*, extended and in near-real time radioactivity monitoring in the marine environment. To that extend a wide set of prototype underwater sensors is currently being under development and testing.

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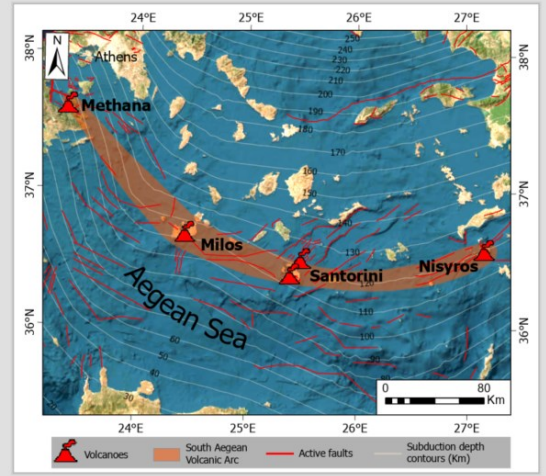
Surface Vehicle
γ-Sniffer
γ-Sniffer
Benthic Lab
Concept design

Milos

- Milos is an island located on the Aegean Sea that belongs to the Southern Aegean Volcanic Arc.
- The shallow active hydrothermal system of Milos is associated with calc-alkaline volcanic rocks from basaltic andesites to dacites, and rhyolites that have been deposited over several cycles of volcanic activity.
- The existence of the hydrothermal system leads to elevated levels of natural radioactivity in the water, especially from the emission of the noble gas ^{222}Rn.
- *In-situ* measurements using novel instrumentation and sample collection were performed in coastal locations of the island.



The Southern Aegean Volcanic Arc [**doi:** 10.3390/geohazards4010006]

In-situ measurements

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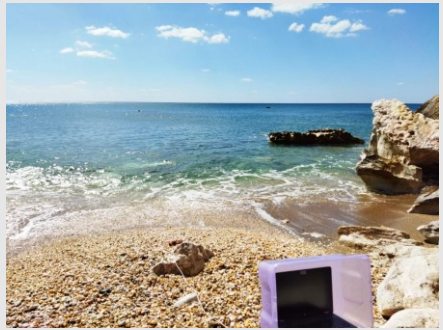
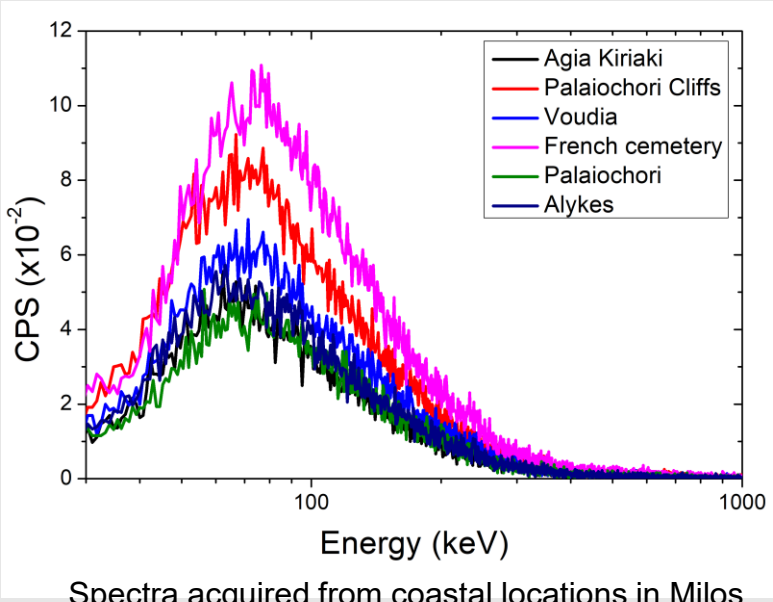
γ-Sniffers

- CdZnTe-based spectrometer
- Al housing





Spectra acquired from coastal locations in Milos

Sample Analysis

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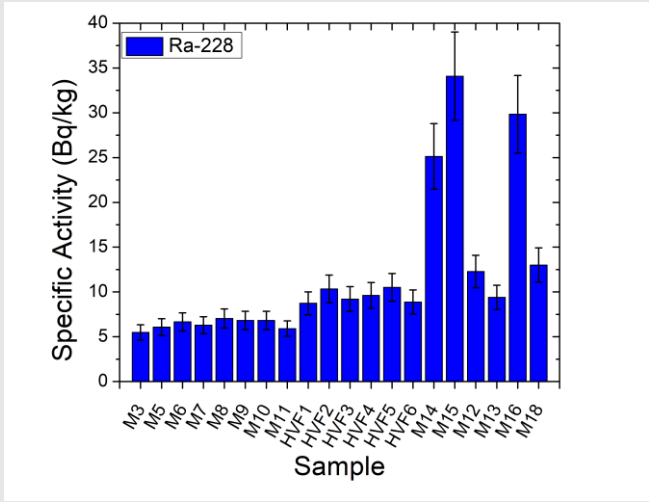
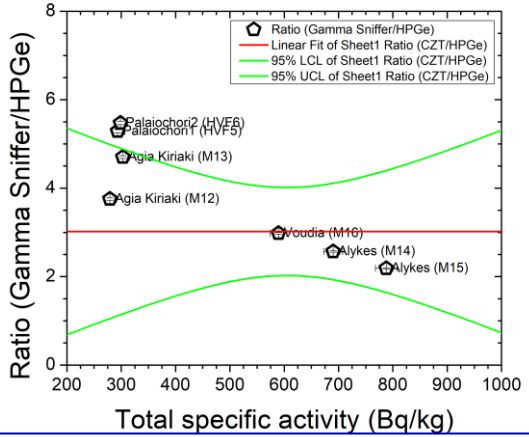
- Samples of sediment were collected.
- Analysis of the samples, through γ-spectroscopy, using a fully-shielded HPGE detector.
- Efficiency calibration was performed with aid from bulk reference samples.

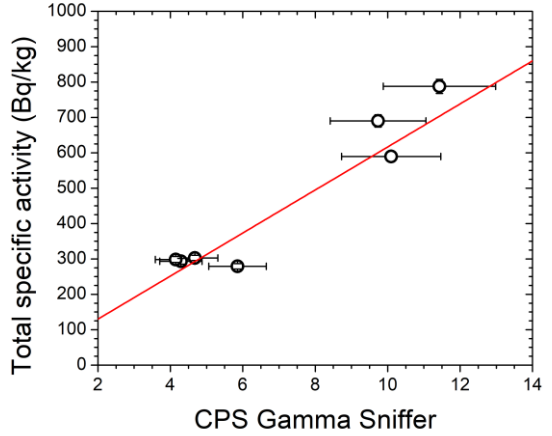
The HPGe detector



Activity levels of ^{228}Ra calculated for the samples collected from Milos

Field-based calibration





Correlation of response between two instruments: γ-Sniffer & HPGe, as a function of the specific activity values extracted from sample analysis

Specific activity as a function of the total count rate integral registered by the γ-Sniffer

Risk Information System

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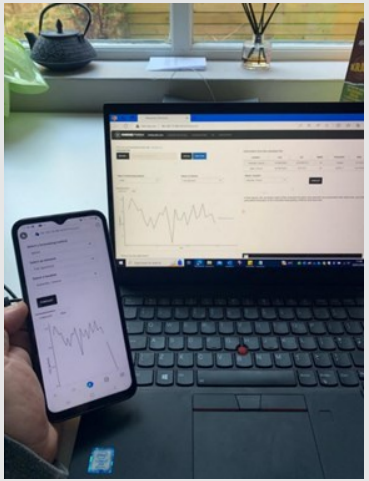
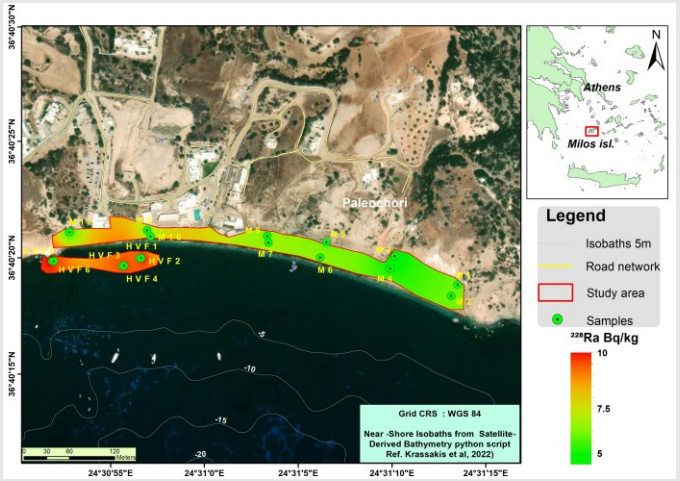
- An innovative Risk Information System (POIS^{2}ON) has been developed by our RAMONES colleagues, providing forecasts and risk indices, based on actual radioactivity data collected in the field by the sensors of RAMONES.
- POIS^{2}ON database will include datasets accompanied by geoinformation to be visualized though NORM levels heat maps, as well as support detailed Monte Carlo simulations to evaluate the radiation doses on local marine ecosystems.



The POIS^{2}ON app



Heatmap of ^{228}Ra concentrations for the Paleochori Bay in Milos