# Atmospheric electric field in the Atlantic marine boundary layer: first results from the SAIL project

**Susana Barbosa**<sup>1</sup>, Mauricio Camilo<sup>2</sup>, Carlos Almeida<sup>1</sup>, José Miguel Almeida<sup>1</sup>, Guilherme Amaral<sup>1</sup>, Karen Aplin<sup>3</sup>, Nuno Dias<sup>1</sup>, António Ferreira<sup>1</sup>, Giles Harrison<sup>4</sup>, Armando Heilmann<sup>5</sup>, Luis Lima<sup>1</sup>, Alfredo Martins<sup>1</sup>, Igor Silva<sup>1</sup>, Diana Viegas<sup>1</sup> and Eduardo Silva<sup>1</sup>

INESC TEC, Porto, Portugal
Marinha, CINAV (Centro de Investigação Naval), Portugal
University of Bristol, Bristol UK
University of Reading, Reading, UK
Universidade Federal do Paraná, Curitiba, Brasil





CINCO

ANOS

2020

# **Project SAIL**

SAI

Space-Atmosphere-Ocean Interactions in the Marine Boundary Layer



- Aim: increase the scientific understanding of the marine boundary layer
- Multi-parametric monitoring campaign onboard NRP Sagres sailing ship in its 2020 circumnavigation expedition
- Focus on the the atmospheric electric field



# NRP Sagres circumnavigation expedition (planned)

#### 371 days (5 January 2020 / 10 January 2021)







5

# 1985 TRINTA E CINCO ANOS 2020

# NRP Sagres circumnavigation expedition (current)

#### The ship is returning to Portugal from Cape Town following the Pandemic crisis









# SAIL monitoring system



#### Space/Atmosphere

- Kinematic high-precision GNSS
- Atmospheric electric field (2 field mills CS110)
- Gamma radiation + Cosmic radiation
- Visibility
- Solar radiation
- Ion counter (CIC, Airel)



# SAIL monitoring system





#### Tow-fish (INESC TEC)

#### Ocean

- CTD (temperature, conductivity, depth)
- Chlorophyll
- Dissolved O2
- pH
- Turbidity
- Spectral radiance
- Acoustic noise (hydrophone)





## **SAIL – Results**

Gamma radiation









2020-01-19







# **SAIL – Results**

#### Atmospheric electric field

9-

<u>م</u>

0-





04:00

09:00

14:00

19:00

00:00











**RINTA** 

E CINCO

ANOS

2020

# SAIL – Results

#### Atmospheric electric field







E CINCO

ANOS

2020

### Summary

- Multi-parametric data set

- Continuous measurements (1-sec) over the North and South Atlantic of the atmospheric electric field in oceanic air from January-May 2020

- GEC signature clearly visible in FW days
- Consistent variations of the Efield observed in the two field mills (non-FW days)



# 1985 TRINTA E CINCO ANOS 2020

### Check for news on the project & data!







