WAVE STATISTICS AND SPECTRAL ANALYSIS IN THE MEDITERRANEAN SEA (i.e. SICILY CHANNEL): 9 YEARS OF WAVE DATA MONITORING

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GOALS
- Monitoring of the VEGA-A oil-platform, as required by EDISON;
- Define and characterize the wave field in the Mediterranean Sea, i.e. Sicily channel.

INTRODUCTION
Even if it is not always the appropriate wave spectrum, the JONSWAP spectrum is often used in the Mediterranean Sea as input for the most common 3rd-generation spectral wave models. The definition of site-specific spectral parameters by means of measured wave data allows to get a better assessment of the wave field in the coastal area with consequent better description of the wave characteristics to be used as design basis for coastal structures.

VEGA-A OIL-PLATFORM and METOCANE study
VEGA-A is the largest oil-platform in the Mediterranean Sea, Sicily channel, ~20 km far from the coast; EDISON has been actively supporting along the years the whole monitoring system at VEGA-A.

MONITORING SYSTEM
Ad hoc Monitoring System for VEGA-A location build-up by DEAM on the basis of the metocean analysis, as required by EDISON
Simultaneous measures of Pressure and orbital wave Velocities (x- and y- directions)
RAW DATA Sampling Frequency: 2 Hz
As usually done in oceanography every single raw data is recorded in ~20min, i.e.1024 s, to get 2048 records.

WAVE DATA ANALYSIS
Selection of raw data for storms with Hs>3.5 m
A total of 16 storms in 9 years (2002-2010)

Orbital Velocities
water level raw data orbital velocity EAST components orbital velocity NORTH components

SPECTRAL ANALYSIS

FOR (Fast Fourier Transformation) Method

Proposed JONSWAP parameters - fitting

\[ y = 0.1783 \exp\left(1.353 + 0.2225 \frac{H_s}{S_T}\right) \text{ valid for } \frac{S_T}{H_s} > 4.2 \]

For \( f < f_o \)
\[ H_s \text{ mean value } = 0.152 \]

For \( f > f_o \)
\[ H_s \text{ mean value } = 0.111 \]

Single Wave Analysis
For each couple of \( H_s-T_z \) (significant wave height and zero-crossing wave period)

number of couple \( H_s-T_z \) (wave height and single wave period)

Measured in raw data
Theor., i.e. Cavanié et al. 1976

REFERENCES
Cavanié, Arhan, and Ezraty, 1976. A statistical relationships between individual heights and periods of storm waves. 5th SPE Int.Conf. Stavenger, Norway

AKNOWLEDGEMENTS
The authors wish to acknowledge EDISON for supporting actively the metocean monitoring system and for allowing the use of the collected metocean data.

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