IH cantabria
INSTITUTO DE HIDRÁULICA AMBIENTAL

Mopla

REFERENCE MANUAL
MOPLA 2.5 - ENGLISH

FUNDACION INSTITUTO DE HIDRÁULICA AMBIENTAL DE CANTABRIA
UC UNIVERSIDAD DE CANTABRIA

WHAT IS THE Mopla?

The entire model of "Morphodynamic of beaches" (Mopla) is a program that allows us to simulate, in a coastal zone, the wave propagation from deep waters up to the coastline. From the wave results, the calculation of the currents induced in the surf zone, and the simulation of the morphodynamic evolution of the beach are made.
For more details, please refer to the Spanish version of the Mopla reference manual.

WHAT DOES THE Mopla DO?

Mopla aims to provide a numerical tool and a GIU (Graphic User Interface) within a friendly environment, which facilitate the user to perform the morphodynamic study of a beach in a short-time and length scales.

The Mopla allows the user to realize a great variety of tasks, such as:

1. **Wave propagation:**
    - Propagation of monochromatic or spectral waves from deep waters up to the beach, including the processes of refraction, shoaling, diffraction, dissipation due to breaking and post-breaking.
    - Wave characteristics in the coastal zone.
    - Determination of mean directional wave regimes in the coastal zones.
    - Numerical simulations of extreme events like storms, which allow the user to define the wave heights to design structures.
2. **Nearshore currents:**
    - Nearshore currents characteristics.
    - Determination of nearshore current magnitude with parameters previously calibrated in field campaigns.
    - Determination of nearshore currents for the sediment transport calculation.
3. **Morphological evolution of beaches:**
    - Determination of the initial sediment transport induced by nearshore waves and currents.
    - Determination of erosion / sedimentation zones in beaches.
    - Morphological evolution of a beach after a storm event.

GLOBAL STRUCTURE OF THE Mopla

Mopla consists of six numerical models which have been organized in two groups: (1) the models associated with the propagation of monochromatic waves, and (2) the models associated with the propagation of a sea state, represented by means of an energy spectrum.

1. The first models (monochromatic waves) are used, fundamentally, to characterize the mean morphodynamics in a stretch of coast. The first group contains the following programs:

    - Oluca-MC: Parabolic model to propagate monochromatic waves
    - Copla-MC: Nearshore current model (current induced by waves)
    - Eros-MC: Erosion / sedimentation model (morphological evolution of beaches)

2. The second models (spectral waves) are used to simulate storm events, or in cases where major precision in wave height calculation is needed (designs of dikes or any kind of construction). This group contains the following models:

    - Oluca-SP: Parabolic model to propagate spectral waves
    - Copla-SP: Nearshore current model for spectral waves
    - Eros-SP: Erosion / sedimentation model for spectral waves

Monochromatic Oluca (TOT)

	1	2	3	4	5	6	7	8	9	10
Column	A	B	C	D	E	F	G	H	I	J
Meaning	x	y	x	y	Bathymetry	Amplitude	Free srfce.	Direction	Phase	Direction
Reference	Grid		Bathymetry					Grid		Bathymetry

Spectral Oluca (TOT)

	1	2	3	4	5	6	7	8	9	10	11	12	13
Column	A	B	C	D	E	F	G	H	I	J	K	L	M
Meaning	x	y	x	y	Bathymetry	Amplitude	Free srfce.	Direction	Phase	Direction	Hs	Direction	Direction
Reference	Grid		Bathymetry					Grid		Bathymetry		Grid	Bathymetry
						Component					Spetrum		

Copla (TC)

	1	2	3	4	5	6	7	8	9
Column	A	B	C	D	E	F	G	H	I
Meaning	x	y	x	y	Velocity	Direction	Direction	3D Height*	2D Height
Reference	Grid		Bathymetry			Grid	Bathymetry		

*It is used for 3D graphics. The only difference with 2D Height is the value for points in the coast.

Eros (TM)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Meaning	x	y	x	y	H?	Direction	Direction	Velocity	Velocity direction	Velocity direction	?	Initial depth	Transport	Transport direction	Transport direction	Depth change rate	Final depth	Depth change
Reference	Grid		Bathymetry			Grid	Bathymetry		Grid	Bathymetry				Grid	Bathymetry			

Figure 1.1. MOPLA output files