

MOHID Studio Quick Start Guide for MOHID Water

User Guide for setting up MOHID Water Projects with MOHID Studio Professional Edition

David Brito Frank Braunschweig Luis Fernandes

May 2016

This document is the MOHID Studio Quick Start Guide for MOHID Water. It contains a tutorial on how to create a MOHID Water project with MOHID Studio.

This document makes part of the MOHID Studio Documentation.



Index

1	PREFACE							
1.1	Сору	right	1					
1.2	Warranty							
1.3	3 Further Information							
2	QUI	ICK START TUTORIAL FOR MOHID WATER	2					
3	EXE	ERCISE 1 - EXPLORE A PREVIOUSLY CONFIGURED PROJECT	4					
3.1	Intro	duction	4					
3.2	Prep	aration	4					
3.3	Start	MOHID Studio and import the preconfigured example	5					
3.4	Visu	alize the digital terrain of the Tagus Sample	13					
3.5	Runr	ning a simulation	17					
3.6	Explo	oring the Results	19					
4	EXE	ERCISE 2 - SIMULATING 2D HYDRODYNAMICS FORCED WITH TIDE	27					
4.1	Intro	duction	27					
4.2	Prep	aration	27					
4.3	4.3 Step 1 – Creating a new Workspace, Solution and Domain 24							
4.4	Step	2 – Generate the Bathymetry	31					
4	4.4.1 Introduction 3							
4	4.4.2 Importing the base data into the simulation 33							
4	4.4.3 Adding the base data to the map 33							
4	4.4.4 Generate the computational grid 34							
4	4.4.5 Generate the digital terrain (Bathymetry in form of a grid data) 32							
4	.4.6	Edit and verify the bathymetry	39					

i

MOHID Water Quick Start



4.5	Step	3 – Generate Tide	43
4.6	Step	4 – Associate the domain with the bathymetry	45
4.7	Step	5 – Create a new simulation	46
4.8	Step	6 – Define the simulation properties	48
4	8.1	Step 6.1 – Define general simulation options	48
4	8.2	Step 4.3 – Define tidal components	49
4	8.3	Step 4.4 – Define hydrodynamic options	50
4	8.4	Step 4.5 – Define turbulence parameters in Turbulence file	51
4	8.5	Step 4.6 – Other Files	51
4.9	Step	7 – Run the simulation and explore results	52
4.10	S	tep 8 – Add time series output and rerun the model	54
5	EX	ERCISE 3 - EXPLORING ADDITIONAL EXAMPLES	57
5.1	Intro	oduction	57
5.2	Step	1 – Startup Page	57
5.3	Step	2 – Download and open advanced examples	58
6	FIN	AL REMARKS	61



Index of Figures

FIGURE 3.1: MOHID STUDIO WORKSPACE MANAGER6FIGURE 3.2: MOHID STUDIO SOLUTION MANAGEMENT7FIGURE 3.2: MOHID STUDIO SOLUTION WINDOW7FIGURE 3.3: THE IMPORT MOHID SOLUTION WINDOW7FIGURE 3.4: CREATING THE DESTINATION DIRECTORY8FIGURE 3.5: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.6: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED9FIGURE 3.7: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUSSAMPLE PROJECT"12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW WITH TAGUS SAMPLE BATHYMETRY16FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY16FIGURE 3.14: ADD A BACKGROUND LAYER16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER17FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF FILES19FIGURE 3.21: MOHID STUDIO MODEL FINISHED19FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (CHANNELSRH"12FIGURE 3.		
FIGURE 3.3: THE IMPORT MOHID SOLUTION WINDOW7FIGURE 3.4: CREATING THE DESTINATION DIRECTORY8FIGURE 3.4: CREATING THE DESTINATION DIRECTORY9FIGURE 3.6: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED9FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.7: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS12FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS13FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW - DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW MIDAW14FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.15: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER18FIGURE 3.12: ONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL ONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (POD OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL SRH"21FIGURE 3.22: MODEL RUN LOG FILE (POD OF FILE)19FIGURE 3.23: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 123FIGURE 3.23: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 2 <td>FIGURE 3.1: MOHID STUDIO WORKSPACE MANAGER</td> <td>6</td>	FIGURE 3.1: MOHID STUDIO WORKSPACE MANAGER	6
FIGURE 3.4: CREATING THE DESTINATION DIRECTORY8FIGURE 3.5: MOHID STUDIO IMPORT SOLUTION9FIGURE 3.6: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED9FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW11FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS13FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW - DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL FINISHED18FIGURE 3.21: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE10FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TINE SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.25: LIST OF TINE SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.25: LIST OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF THE SIMULATION SIM #121FIGURE 3.25: LIST OF THE SIMULATION SIM #121	FIGURE 3.2: MOHID STUDIO SOLUTION MANAGEMENT	7
Indiana Structure9FIGURE 3.5: MOHID STUDIO IMPORT SOLUTION9FIGURE 3.5: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED9FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW11FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO MODEL FINISHED17FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL FINISHED18FIGURE 3.21: MOHID STUDIO MODEL FINISHED19FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)12FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES OF VELOCITY MODULUS (SIM #1)21FIGURE 3.25: LIST OF TIME SERIES OF VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.26: MOHID STUDIO THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.26: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.26: DISPLAYING	FIGURE 3.3: THE IMPORT MOHID SOLUTION WINDOW	7
FIGURE 3.6: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED9FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW11FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW AFTER IMPORTING AND OPENING THE "TAGUS12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.15FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.15FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.16FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.16FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.16FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO GF LE (END OF FILE)19FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.22: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM #1)21FIGURE 3.22: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.22: DISPLAYING THE VELOCITY MODULUS AS A	FIGURE 3.4: CREATING THE DESTINATION DIRECTORY	8
FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)10FIGURE 3.7: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS SAMPLE PROJECT"12FIGURE 3.0: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP	FIGURE 3.5: MOHID STUDIO IMPORT SOLUTION	9
FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW11FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS SAMPLE PROJECT"12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILES)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE) "CHANNELSRH"21FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"22FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"23FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 123FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424<	FIGURE 3.6: MESSAGE INFORMING THAT THE IMPORT PROCESS HAS FINISHED	9
FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS SAMPLE PROJECT"12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER16FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.3: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE <td< td=""><td>FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)</td><td>10</td></td<>	FIGURE 3.7: MOHID STUDIO SOLUTION MANAGEMENT (AFTER IMPORT)	10
SAMPLE PROJECT"12FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.4: MOHID STUDIO CREA	FIGURE 3.8: THE "CREATE OR OPEN SOLUTION" WINDOW	11
FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES13FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM #1)21FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.9: MOHID STUDIO'S EXPLORER WINDOW AFTER IMPORTING AND OPENING THE "TAGUS	
FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP14FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.22: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.22: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.22: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.23: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	SAMPLE PROJECT"	12
FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.14FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNELSRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.10: MOHID STUDIO'S EXPLORER WINDOW – DATA FILES	13
FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY15FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.19: CONFIRM THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.26: MOHID STUDIO THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.11: SELECTING THE BATHYMETRY TO BE DISPLAYED IN THE MAP	14
FIGURE 3.14: ADD A BACKGROUND LAYER15FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.26: IDSPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 3.29: CISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.12: THE "ADD VECTOR LAYER" WINDOW.	14
FIGURE 3.15: CHANGING THE COORDINATE SYSTEM16FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.13: MOHID STUDIO MAP WINDOW WITH TAGUS SAMPLE BATHYMETRY	15
FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER16FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 3.29: CISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.14: ADD A BACKGROUND LAYER	15
FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER16FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.15: CHANGING THE COORDINATE SYSTEM	16
FIGURE 3.18: RUNNING THE SIMULATION SIM #117FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.16: SELECTING THE TYPE OF BACKGROUND LAYER	16
FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #117FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER - STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.17: MOHID STUDIO THE TAGUS BATHYMETRY AND A BACKGROUND LAYER	16
FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER18FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.18: RUNNING THE SIMULATION SIM #1	17
FIGURE 3.21: MOHID STUDIO MODEL FINISHED18FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.19: CONFIRM THE EXECUTION OF THE SIMULATION SIM #1	17
FIGURE 3.22: MODEL RUN LOG FILE19FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.20: MOHID STUDIO MODEL CONTROLLER	18
FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)19FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.21: MOHID STUDIO MODEL FINISHED	18
FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #120FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.22: MODEL RUN LOG FILE	19
FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"21FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.23: MODEL RUN LOG FILE (END OF FILE)	19
FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)21FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.24: RESULT FILES OF THE SIMULATION SIM #1	20
FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 122FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.25: LIST OF TIME SERIES IN THE FILE "CHANNEL.SRH"	21
FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 223FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.26: MOHID STUDIO TIME SERIES OF VELOCITY MODULUS (SIM # 1)	21
FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 323FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.27: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 1	22
FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 424FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.28: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 2	23
FIGURE 4.1: WORKSPACE MANAGER WINDOW - CREATING A NEW WORKSPACE28FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.29: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 3	23
FIGURE 4.2: CREATE OR OPEN A SOLUTION - CREATING A NEW SOLUTION29FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 3.30: DISPLAYING THE VELOCITY MODULUS AS ANIMATED LAYER – STEP 4	24
FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION29FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN30	FIGURE 4.1: WORKSPACE MANAGER WINDOW – CREATING A NEW WORKSPACE	28
FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN 30	FIGURE 4.2: CREATE OR OPEN A SOLUTION – CREATING A NEW SOLUTION	29
	FIGURE 4.3: EXPLORER WINDOW AFTER CREATING A SOLUTION	29
FIGURE 4.5: EXPLORER WINDOW AFTER CREATING WORKSPACE, SOLUTION AND DOMAIN 31	FIGURE 4.4: MOHID STUDIO CREATE NEW DOMAIN	30
	FIGURE 4.5: EXPLORER WINDOW AFTER CREATING WORKSPACE, SOLUTION AND DOMAIN	31



FIGURE 4.6: IMPORTING THE BASE DATA	32
FIGURE 4.7: FILES AFTER IMPORTING	33
FIGURE 4.8: ADDING THE BASE DATA TO THE MAP 1/2	33
FIGURE 4.9: ADDING THE BASE DATA TO THE MAP 2/2	33
FIGURE 4.10: MAP WITH BASE DATA	34
FIGURE 4.11: CREATE CONSTANT SPACED GRID TOOL	35
FIGURE 4.12: CREATE CONSTANT SPACED GRID TOOL - 2	36
FIGURE 4.13: SELECTING THE DESTINATION OF THE GRID FILE	36
FIGURE 4.14: THE CONSTRUCT GRID DATA TOOL	37
FIGURE 4.15: STATUS MESSAGE OF THE CONSTRUCT GRID DATA TOOL	38
FIGURE 4.16: WINDOW AFTER CREATION OF THE BATHYMETRY	39
FIGURE 2-4.17: TIDAL TOOL WINDOW	43
FIGURE 4.18: STATUS MESSAGE OF THE TIDAL TOOL	44
FIGURE 4.19: ACCESSING THE PROPERTIES OF THE DOMAIN	45
FIGURE 4.20: ASSOCIATING THE BATHYMETRY TO THE DOMAIN.	46
FIGURE 4.21: CREATING A NEW SIMULATION	47
FIGURE 4.22: EXPLORER WINDOW AFTER CREATING A NEW SIMULATION	47
FIGURE 4.23: MODEL_1.DAT IN THE FILE EDITOR	48
FIGURE 4.24: SAVING AND CLOSING A FILE IN THE FILE EDITOR	49
FIGURE 4.25: OPENING 2 FILES IN THE FILE EDITOR.	50



1 Preface

1.1 Copyright

This document refers to MOHID Studio, proprietary computer software which is protected by copyright. All rights are reserved. Copying or other reproduction of this document or related programs is prohibited without prior written consent of Action Modulers, Consulting & Technology (Action Modulers).

MOHID Water Modelling System is proprietary software of the Instituto Superior Técnico (University of Lisbon).

1.2 Warranty

The warranty given by Action Modulers is limited as specified in your Software License Agreement. Please note that numerical modeling software programs are very complex systems and may not be free of errors, so you are advised to validate your work. Action Modulers shall not be responsible for any damage arising out of the use of this document, MOHID Studio, MOHID Water Modelling System or any related programs or documents.

1.3 Further Information

For further information about MOHID Studio please contact:

Action Modulers, Consulting & Technology, Ltd. Estrada Principal, nº 29 - Paz 2640-583 Mafra, Portugal Tel.: +351 261 813 660 Fax: +351 261 813 666 E-mail: geral@actionmodulers.com Web: http://www.actionmodulers.com



2 Quick Start Tutorial for MOHID Water

This "Quick Start Tutorial for MOHID Water" is intended to help first-time users creating their first projects, following a sample project, an implementation in the Tagus Estuary, near Lisbon, Portugal.

It is suggested that you follow the tutorial, which progresses with increasing complexity, trying to replicate the provided sample project. After finished exploring all simulations with the samples, it is suggested that you revisit the tutorial applying the model examples to your own study site.

The tutorial starts with a preconfigured sample project, which is downloaded from Action Modulers' web site, so you can get used to MOHID Studio's environment, including projects and simulation structure, graphical visualization, running the model. All these tasks can be performed without any previous knowledge about using MOHID Studio / MOHID Water.

After the first play-around you are invited to independently create a simple project with 2D hydrodynamics forced with tide, generating the bathymetry and tide files, prepare the input files, run the model and explore results as previously.

The tutorial then shows how to access more complete example covering full 3D simulation with river discharges and meteorology, sediment transport, point sources and nutrient transport and transformation (full water quality simulation), resulting in a quiet complete simulation that can be run with MOHID Water.

For each step, the require options to configure the model are explained in detail.

This is intended to be a step-by-step tutorial to implement in a straightforward way a MOHID Water project from simpler to complex simulations. Detailed description of the governing equations used by the model is not provided in this guide; neither a detailed description of the processes solved by the model is provided. For further information about these topics, you should explore the following MOHID related sources:

Action Modulers website – http://www.actionmodulers.com



MOHID website - http://www.mohid.com/

MOHID wiki – http://wiki.mohid.com/wiki

MOHID forum – http://www.mohid.com/forum/

MOHID code repository – http://mohid.codeplex.com/

It is assumed that you have installed already MOHID Studio (following MOHID Studio's Installation Guide) and that you understand the functioning of the different windows, environments and buttons (following MOHID Studio User Guide).

This manual applies to MOHID Studio 2016 (version 3.0).

In order to complete all steps in this document, you must have a Professional or an Evaluation License.



3 Exercise 1 - Explore a previously configured project

3.1 Introduction

The tutorial starts by providing a sample project so you can get familiarized to MOHID Studio. You will use a previously configured project and produce results with it.

3.2 Preparation

For Exercise 1, please prepare your PC the following steps:

- 1. Create a directory C:\MOHID Water Quick Start Guide¹
- 2. Create a directory C:\ MOHID Water Quick Start Guide\Temp
- 3. Create a directory C:\MOHID Water Quick Start Guide\Projects

Download the demo project from the link below and store it in the "temp" directory created in 2.

http://www.actionmodulers.com/Downloads/TagusSample.zip

Please do **not** "unzip" this file, since MOHID Studio is expecting a ZIP file.

Now your directory should look like shown in the next figure.

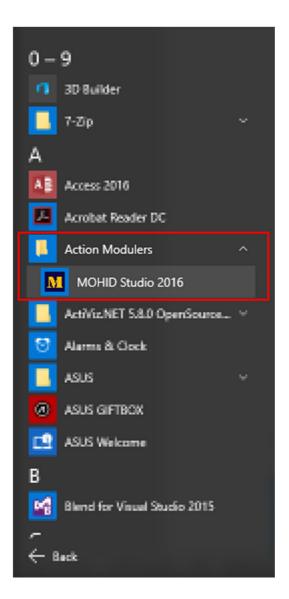
📕 🗹 📕 🖛 1	emp													-	×
File Home	Share View														~ 🕜
Pin to Quick Copy access	Paste Cut Paste Paste shortcut	Move Co to * to	opy E	Delete Rename	Nev	New item •	Propertie	Denia	Select all Select none						
C	lipboard		Organi	ise		New		Open	Select						
← → ~ ↑	> This PC > OS (C:) >	MOHID Wa	ter Qui	ick Start Guide	Tem	p						~ Ō	Search Temp		P
MOHID Water Quick Start Guide			^	Name	^		Date modified	Туре	Size						
Projects				TagusSample.zip			24/05/2016 11:29	Compressed (zipp	775 KB						
- Temp															

¹ You can alternatively create this structure on a different disk (e.g. D:\)



3.3 Start MOHID Studio and import the preconfigured example

Start MOHID Studio by selecting Start -> Action Modulers -> MOHID Studio 2016.



You can alternatively use the icon on your desktop.



For this example, we have to create a new workspace. After MOHID Studio started, please select Home -> Workspace -> Open from MOHID Studio's main menu.



 Note:
 Project
 May
 VY Graph
 Reid Management
 Copentional Modeling
 CM Management

 Image:
 Image
 Image

MOHID Studio's Workspace Manager Window appears which allows you to create a new work space. Choose "Start with an empty Workspace" and name it "MOHID Water Quick Start Guide".

Workspace		Σ							
Workspace Manager MOHID Studio									
elect Works	bace								
Start with	an empty Workspace								
Name:	MOHID Water Quick Start Guide								
Load exis	ting Workspace								
List of W	orkspaces	Modified							
		✓ OK 🗙 Cancel							

Figure 3.1: MOHID Studio Workspace Manager

Press ok to close the window.

Now we will import the previously configured example. Please select Project -> Solution -> Manage.

	MOHID Water Quick Start Guide - MOHID Studio - MOHID Studio Professional	_ m X
Home Project Map XY Graph Risk Management Operational Modellin	g Oil Mapping Coastal Risk Administration	?
New Open Close Manage New Open Properties Remove Manage Data	New Propertie Delete Cory Compare Diameter Lags Was	





MOHID Studio's "Solution Management" window appears (Figure 3.2).

Solution 🛙						
Solution Management MOHID Studio						
List of Solutions	Options					
	Rename Remove Export E Import					
	Close					

Figure 3.2: MOHID Studio Solution Management

In this window press the button "Import", located on right. The window "Import MOHID Solutions" will appear.

💑 Import File	🔓 Import File 🛛 🕅							
Import MOHID	MOHID Studio							
Import Settings								
Solution Type: Project File Name: Destination Directory:	MOHID Studio MOHID GUI							
		Close						

Figure 3.3: The Import MOHID Solution window



Select Solution Type "MOHID Studio" and under "Project File Name" browse for the file previously downloaded and stored in the "temp" directory ("C:\MOHID Water Quick Start Guide\Temp\TagusSample.zip").

The "Destination Directory" must be an empty directory. Please create a directory called "Tagus Sample" in "C:\MOHID Water Quick Start Guide\Projects"). You can to this after clicking the 🗎 button, as shown in the next figure.

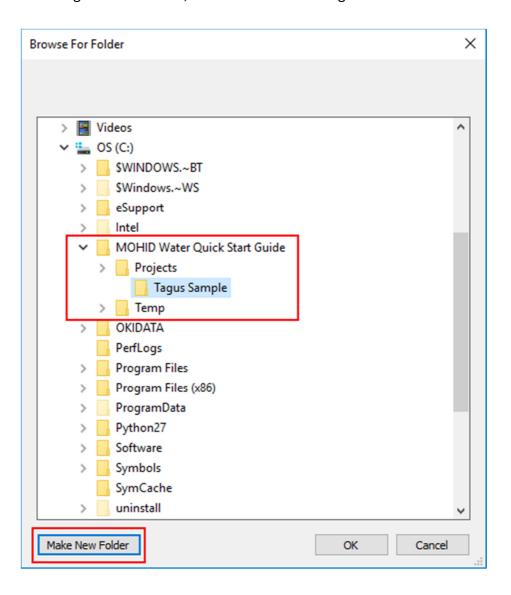


Figure 3.4: Creating the destination directory



Once you are done, the "Import MOHID Solutions" window should look like the one shown next.

🐔 Import File		23							
Import MOHID Solutions MOHID									
Import Settings									
Solution Type:	MOHID Studio OMOHID GUI								
Project File Name:	C:\MOHID Water Quick Start Guide\Temp\TagusSample.zip								
Destination Directory:	C:\MOHID Water Quick Start Guide\Projects\Tagus Sample								
	Click to start the import process ->	•							
	Close	٦							
		_							

Figure 3.5: MOHID Studio Import Solution

Press the import button (^E) and wait until the import process is complete.

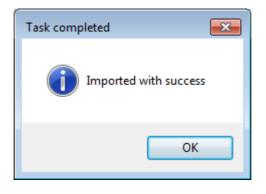


Figure 3.6: Message informing that the import process has finished

Close the message box and the "Import MOHID Solutions" window. In the "Solution Management Window" you should see now the imported solution, like shown next.



Solution 23					
Solution Management	MOHID Studio				
List of Solutions	Options				
Tagus Sample					
	E Close				

Figure 3.7: MOHID Studio Solution Management (after import)

NOTE: If a solution with the same name of the solution to import already exists, the newly imported solution is automatically renamed (example: Tagus Sample_1). Close this window also.

Now we have to open the solution we just imported and associate it to the current workspace, by selecting Project -> Solution -> Open.



The "Create or Open Solution" window appears with the solution "Tagus Sample", like shown in the next figure.

NOTE: The "Create or Open Solution" window looks very similar to the "Create Workspace window". The differences between workspaces and solutions are explained in the user manual.



Solution 🕅								
Create or Open Solution MOHID Studio								
Options								
Create a ne	ew Solution							
Name:	New Solution							
Open an et	kisting Solution							
List of Solu	tions							
Tagus Sam	nple							
		✓ OK 🗶 Cancel						

Figure 3.8: The "Create or Open Solution" window

In this window select "Open an existing solution" and select the "Tagus Sample". Press "OK" to close the window.

This action will open the "Tagus Sample" solution in "Explorer" tab. Press on the triangles (⁴) to expand the tree view in the "Explorer". You screen should now look like shown in the next figure.



	MOHID Water Quick Start Guid	de - MOHID Studio - MOHID Studio Professional	- 0
	erational Modelling Oil Mapping Coastal Risk Administration		
Open Close Manage New Open Properties Re Solution Domain	move Manage New Properties Delete Copy Compare Clean Lagr. Wiz. Ru	m Now Schedule Execute Models	
Map Explorer	Modules	File Editor	问题の高州上目編員
roject Tree			
Tagus Sample	Data Files	/	
 Tagus Sample 	Name	Size Time	
 General Data 			
 Boundary Conditions Boxes 			
Digital Terrain			
Initial Conditions			
TimeSeries			
Sim #1 2D Tide			
Sim #2 3D Tide + River			
Sim #3 3D Tide + River + Sediment Transport			
Sim #4 3D Tide + River + Sed. + WWTP discha		@ ペ ≤ 亩	
Sim #5 3D Tide + River + Sed + WWTP + Nutr	ientCyc Name	A Size Time	
	Time Series Files	<u> </u>	
	Name	▲ Size Time	
odel Controller	*		
gus Sample			

Figure 3.9: MOHID Studio's Explorer window after importing and opening the "Tagus Sample Project" Step 2 – Navigating in the project structure

Like all MOHID Studio solutions, this solution is divided into the following items:

the root element – the "Solution"

mone or more "Domains", in this case the "Tagus Sample".

special folders for storing data common to all simulations

Simulations to run specific scenarios.

In the middle of the explorer window you will find the "Modules". By selecting any item in the "Project Tree", the "Modules" in the middle of the explorer window will be updated. For example, if you select the simulation "Sim #1 2D Tide", your window shows the data files associated with this simulation, as shown in the next figure.



		MOHID Studio - MOHID Studio Professional		
Home Project Map XY Graph Risk Management Operat	ional Modelling Oil Mapping Coastal Risk Administration			
Copen Close Manage Solution Domain	e Manage New Properties Delete Copy Compare Clean Lagr. Wiz. Run M	low Schedule cute Models		
Map Explorer Project Tree	Modules		File Editor	0000FFB8
	Data Files	/		5.001104
Tagus Sample	Name	Size Time	-	
Tagus Sample	Atmosphere_1.dat	0 KB 24-05-2016 11:43		
 General Data 	Geometry_1.dat	0 KB 24-05-2016 11:43		
Boundary Conditions	Hydrodynamic_1.dat	0 KB 24-05-2016 11:43		
Boxes	InterfaceSedimentWater_1.dat	0 KB 24-05-2016 11:43		
Digital Terrain Initial Conditions	InterfaceWaterAir_1.dat	0 KB 24-05-2016 11:43		
	Model_1.dat	0 KB 24-05-2016 11:43		
TimeSeries	Tide_1.dat	0 KB 24-05-2016 11:43		
Sim #1 2D Tide	Turbulence_1.dat	0 KB 24-05-2016 11:43		
Sim #2 3D Tide + River	WaterProperties_1.dat	0 KB 24-05-2016 11:43		
Sim #3 3D Tide + River + Sediment Transport	HDF Files	● ペ ≤ 前	-	
 Sim #4 3D Tide + River + Sed. + WWTP discharges Sim #5 3D Tide + River + Sed + WWTP + Nutrient 		Size Time		
			Ĩ	
	Time Series Files	🖆 hu 🖉 🕅 🕱		
	Name	▲ Size Time		
odel Controller	Y			
ulation 1				

Figure 3.10: MOHID Studio's Explorer window – Data files

NOTE: The "Modules" are divided into 3 areas: Data Files, HDF Files and Time Series Files. Details about these file types are explained in the user manual.

The project management is one of the core features of MOHID Studio. Another feature is the internal GIS engine, which allows you to visualize all spatial data. Next we will show how to visualize the digital terrain of the Tagus Sample.

3.4 Visualize the digital terrain of the Tagus Sample

Adding layers to the GIS engine can be done directly from the "Explorer". To add the digital terrain of the Tagus Sample, proceed in the following way:

In the Project Tree select the folder "Digital Terrain" (1). This will fill the Data Files under "Modules". Select the file "TagusBathymetry.dat" (2) and right click it. In the popup which appears select "Add to Map..." (3). Next screen shot shows these steps.



•	MOHID Water Quick Start Gu	ide - MOHID Studio - MOHID Studio Professional	_ m X
Home Project Map XY Graph Risk Management Operations	al Modelling Oil Mapping Coastal Risk Administration		?
New Open Close Manage Solution	Manage New Properties Deter Copy Compare Circuit Lags. Wit. 1 Simulation	Termine Schedule Execute Models	
B Map Explorer	1		-
Project Tree	Modules	File Editor	0 C 0 C !+ !- H H # #
Tagus Sample	Data Files	/	
🔺 🍲 Tagus Sample	Name	▲ Size Time 936 KB 24-05-2016 11:43	
a 📻 General Data	CoastLinexy PortugueseCoast_bath_points.vyz	936 KB 24-05-2016 11:43 2 MB 24-05-2016 11:43	
Boundary Conditions	Tegus bath points xyz	423 KB 24-05-2016 11:43	
Boxes 1	TagusBathymetry.dat Ø Open	293 KB 24-05-2016 11:43	
Digital Terrain	TagusBathymetryGrid.grd 📅 Delete	4 KB 24-05-2016 11:43	
Initial Conditions	a Add to Map	3	
Sim #1 2D Tide	- Automap.		
Sim =2 3D Tide + River			
Sim =3 3D Tide + River + Sediment Transport			
Sim #4 3D Tide + River + Sed. + WWTP discharges	HDF Files	Ø 🔨 🗏 🗊	
Sim #5 3D Tide + River + Sed + WWTP + NutrientCyc	Name	▲ Size Time	
	Time Serie File	iii in ≠ 页 页	
	Name	▲ Size Time	
Model Controller ¥			
Tagus Sample			

Figure 3.11: Selecting the bathymetry to be displayed in the map

The window "Add Vector Layer" appears.

Vector Layer		Σ
Add Vector	Layer	MOHID Studio
ayer Properties		
Layer Name:	TagusBathymetry	
Max. Visibilty:	1000000000	
Min. Visibility:	0	
Feature:	Value	•
Style:	Gradient Style [-5.00 - 4,600.00]	•
Projection:	Projection	
	Type 💿 Projected 💿 Geographic 💿 Non	e 🔘 Custom
	Major World	•
	Minor WGS1984	•
	Proj 4	
		✓ OK X Cancel
		Cancer

Figure 3.12: The "Add Vector Layer" window.

Just leave all default values as they are and press "OK".



NOTE: If in this step appear a message complaining about the license, you don't have a valid license to proceed (MOHID Studio Professional). We encourage you to request a temporary evaluation license. Check MOHID Studio's Installation Guide for more information.

Now switch to the "Map" tab to see the digital terrain in the map window. Your screen should look like shown in the next figure.

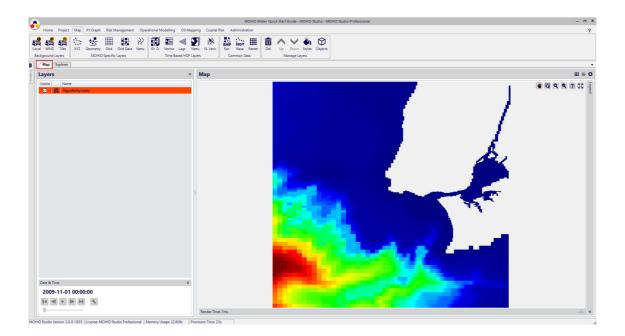


Figure 3.13: MOHID Studio Map Window with Tagus Sample Bathymetry

To add a background map go to "Map" -> "Background Layers" -> "Tiles" (Figure 3.14).



Figure 3.14: Add a background layer

A warning appears informing you that the coordinate system of the map has to be changed to "Web Mercator Projections" (Figure 3.15). Click "Yes" to continue.





Figure 3.15: Changing the coordinate system

A window which lets you choose from a range of background layers will appear (Figure 3.16). Choose "Bing – Aerial" and OK to add the layer to the map.

💑 Load Tile Layer	23
Load Tile Layer	MOHID Studio
Tile Layers	
Open Street Map	
	:
O Bing - Roads	
Bing - Aerial	
🔘 Bing - Hybrid	
	:
Google Map	
Google Terrain	
Google Labels	
	✓ OK X Cancel

Figure 3.16: Selecting the type of background layer

Your main window now should look like the one in the next figure.

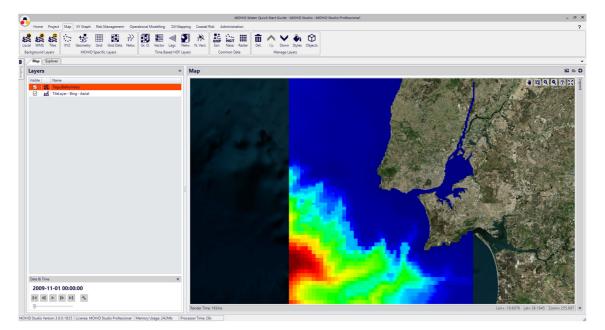


Figure 3.17: MOHID Studio the Tagus bathymetry and a background layer



3.5 Running a simulation

Now we will run a simulation of the sample project. Please switch back to the "Explorer" and in the "Project Tree" select the simulation "Sim #1 2D Tide" (1) and then select "Project" -> "Execute Models" -> "Run Now" (2). Figure 3.18 shows these two steps.

n	MOHID Water Quick Start Guide - MOHID Studio - MOHID Studio Profess	sional	- 0
Home Project Map XY Graph Risk Management Operational	Modelling Oil Mapping Coastal Risk Administration		?
Image Image <th< th=""><th>** S* S*<</th><th></th><th></th></th<>	** S* S*<		
Map Explorer			
Project Tree	Modules	File Editor	○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○○
Tagus Sample	Data Files		
🖌 🎰 Tagus Sample	Name Size Time		
General Data	Atmosphere_1.dat 0 KB 24-05	-2016 11:43	
Boundary Conditions	Geometry_1.dat 0 KB 24-05	-2016 11:43	
Boxes	Hydrodynamic_1.dat 0 KB 24-05	-2016 11:43	
Digital Terrain	InterfaceSedimentWater_1.dat 0 KB 24-05	-2016 11:43	
Initial Conditions	InterfaceWaterAir_1.dat 0 KB 24-05	-2016 11:43	
Timbal Conditions		-2016 11:43	
1		-2016 11:43	
Sim #1 2D Tide		-2016 11:43	
Sim #2 3D Tide + River	WaterProperties_1.dat 0 KB 24-05	-2016 11:43	
Sim #3 3D Tide + River + Sediment Transport			
Sim #4 3D Tide + River + Sed. + WWTP discharges		** ◎ 苗	
Sim #5 3D Tide + River + Sed + WWTP + NutrientCyc	Name Size Time		

Figure 3.18: Running the simulation Sim #1

A window appears to confirm the execution of the model (Figure 3.19). Press "Yes" to continue.

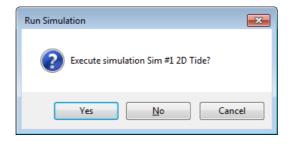


Figure 3.19: Confirm the execution of the simulation Sim #1

The box window called "Model Controller" below the domains and simulations is filled showing the progress bar of the simulation (Figure 3.20). To check more details on the simulation status press "Output" button to be able to see what is the current simulation time, the current computer time and the expected computer time when the simulation will end. The "Cancel" button in the window allows you to abort the simulation at any time.



Nex V Carbon Nex V			- MOHID Studio - MOHID Studio Professional		-
Open Open Paperine Runde Openeapaperine Runde Open Paperin Runde<	Home Project Map XY Graph Risk Management Opera	ional Modelling Oil Mapping Coastal Risk Administration			
Tops formed: Modules Image formed:	Open Close Manage New Open Properties Remo Solution Domain	e Manage New Properties Delete Copy Compare Clean Lagr. Wiz. Ru	Now Schedule		
March Data Sample Image March Sam 7 Taya Sample Image March				ett. e. tt.	
Bederation Image: Section 100 Image: Section 100 Image: Section 100 Image: Image: Section 100 Image: Section 100 Image: Image: Image: Section 100 Image:				File Editor	la t; t2 l3 i+ i− H H
Secure DR Beachy Conditions By Dy Inferioni By Dy Dy Infering By Dy Infering					
add Combin Generaly, Jad 0.00 24-0-300 Hu3 B Res Generaly, Jad 0.00 24-0-300 Hu3 G Sent 3 D Tale - Nev - Sciencer Thranget Generaly, Jad 0.00 24-0-300 Hu3 S Sent 3 D Tale - Nev - Sciencer Thranget Generaly, Jad 0.00 24-0-300 Hu3 Hybridgemut, Jud? Generaly Generaly, Jad 0.00 24-0-300 Hu3 Hybridgemut, Jud? Generaly Generaly Generaly Generaly G Sent 3 D Tale - Nev - Sciencer Thranget Generaly Generaly Generaly Generaly Generaly Mathematic Andrew Generaly	 Tagus Sample 				
Biological fields 0.00 240-300 Hu3 Boar 0.00 240-300 Hu3 Dig Lineiko 0.00 240-300 Hu3 Education 0.00 240-300 Hu3 Markens, Lad 0.00 240-300 Hu3	 General Data 				
Bed Indication 0.00 24-0-300 H HQ Indication	Boundary Conditions				
Bright Family 0 mide Londonic In Indication 0 mide Tindenics 0 mide Start 20 Totel: Nore - Sold + WUP Schoolen Start 20 Totel: Nore - Sold + WUP Schoolen Start 20 Totel: Nore - Sold + WUP Schoolen Start 20 Totel: Nore - Sold + WUP Schoolen Interface Start 20 Totel: Nore - Sold + WUP Schoolen Interface Interface Start 20 Totel: Nore - Sold + WUP Schoolen Interface	- Boxes				
Add Controls Used 1.4d 0.6d 240-306114.0d Image: Solid Sol	 Digital Terrain 				
Endense 0.00 S Smr4 20 Tote: Nore - Sid: + WUP studied; 0.00 S Smr4 30 Tote: Nore - Sid: + WUP studied; 0.00 S Smr4 30 Tote: Nore - Sid: + WUP studied; 0.00 Medioacci, 1.1d 0.00 S Smr4 30 Tote: Nore - Sid: + WUP studied; 0.00 Medioacci, 1.1d	Initial Conditions				
effect effect effect find 10 Tele - Nove - Schweit Threnget find 10 Tele - Nove - Schweit Threnget	TimeSeries				
Sind 2 D Table - Nor - Stader Marger Sind 2 D Table - Nor - Stader Marger Sind 2 D Table - Nor - Stader Marger Sind 2 D Table - Nor - Stader Marger Sind 3 D Table - Nor - Stader - WOPP Solution Marker Norma	Sim #1 2D Tide				
Sim 43 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 53 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 56 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transport Box 50 D Tate - Nove - Softwart Transpo	Sim #2 3D Tide + River				
S Sm 4J. 10 Tate - Nore - Sd - WVTP Buckages S Sm 4J. 30 Tate - Nore - Sd - WVTP - Notacing S Sm 9J. 30 Tate - Nore - Sd - WVTP - Notacing Microsoft 100 Total Access - Sd - WVTP - Notacing Doconacin - Oconacing - Oconacing - Oconacing - Oconaci					
Sin xh 3 10 Tale + Nor + Sal + WWP > Nacional T Ison			Ø < < 1 m		
def Controler 0		Name	A Size Time		
And Consoline Series Files International Int	•	Hydrodynamic_1.hdf5	1 MB 24-05-2016 11:55		
Name Size Transmit Charmodiu/ Oral 24-05-2016 1155 Maddetawaya/n Oral 24-05-2016 1155 Consuming Oral 24-05-2016 1155		Turbulence_1.hdf5	493 KB 24-05-2016 11:55		
Name Name Name ode Controller 013 2445-2016 11.55 Ocknowlar 013 2445-2016 11.55 Ocknowlar 013 2445-2016 11.55 Ocknowlar 013 2445-2016 11.55 Operation 013 2445-2016 11.55 Upper Model 013 2445-2016 11.55					
Cannot den 0.03 24-05-2019 10.35 Addificatury with Medificatury		Time Series Files	🗷 🖻 🖉 🖬		
olde Controller 94 24 0-5010 155 ohick Water Model 016 24 0-5010 155 one water 016 24 0-5010 155 Operative 018 24 0-5010 155 Operative 018 24 0-5010 155		Name	▲ Size Time		
Operation Operation Orac Operation Ope		Channel.srh	0 KB 24-05-2016 11:55		
Uble Where Moded Usa 24-25-2016 (125) Upperformance Upperformance 038 24-25-2016 (125)		MiddleEstuary.srh			
uning uning of the second seco					
os l		UpperEstuary.srh	0 KB 24-05-2016 11:55		
	Iohid Water Model				
	lohid Water Model unning				

Figure 3.20: MOHID Studio Model Controller

At the end of the simulation a window notifies the user that the model has finished.

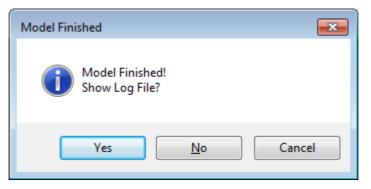


Figure 3.21: MOHID Studio Model Finished

To see the log file of the model run select "Yes". A window with the log of the model run will appear.



S Output	Σ
Model Output	MOHID Studio
Model Output	0
MOHID	A
AUTHOR : IST/MARETEC, Marine Modelling Group WWW : <u>http://www.mohid.com</u>	=
Copyright (C) 1985, 1998, 2002, 2006. Instituto Superior Tecnico, Technical University of Lisbon 	
Constructing Mohid Water Please Wait 	
Constructing : Tagus Sample ID : 1 HYDRODYNAMICS	
Courant Number is : 56.48679	-
	🔳 Close

Figure 3.22: Model run log file

We recommend scrolling down this window until the end, so you can verify if the model did end successfully (Figure 3.23).

💑 Output						X
Model Output						MOHID Studio
Model Output						0
Program Mohid Water suc	cessfully	terminat	ed			*
Total Elapsed Time	:	35.27	0h	Omin	35s	
Total CPU time	:	29.23				
CPU usage (%)	:	82.89				
Workcycle Elapsed Time	:	33.41				↓
Workcycle CPU time	:	27.83				
Workcycle CPU usage (%)):	83.29				
						E
						📕 Close

Figure 3.23: Model run log file (end of file)

3.6 Exploring the Results

During the simulation the model output files are created. When selecting the simulation that just finished running ("Sim #1 2D Tide"), the "Modules" section in the middle pane is filled with "HDF Files" and "Time Series Files" result data (Figure 3.24).



Hore Project Map XY Graph Risk Management Operation Copen Close Manage New Open Properties Remove Solution	Image Image <th< th=""><th>w Schedule ute Models</th><th></th><th></th><th></th></th<>	w Schedule ute Models			
Map Explorer Project Tree	Modules			File Editor	回行公式 F F 目前 I
Tagus Sample	Data Files		1		
Tagus Sample Tagus Sample	Name	▲ Size	Time		
General Data	Atmosphere_1.dat	0 KB	24-05-2016 11:43		
	Geometry_1.dat	0 KB	24-05-2016 11:43		
Boundary Conditions	Hydrodynamic_1.dat	0 KB	24-05-2016 11:43		
Boxes	InterfaceSedimentWater_1.dat	0 KB	24-05-2016 11:43		
Digital Terrain	InterfaceWaterAir_1.dat	0 KB	24-05-2016 11:43		
 Initial Conditions 	Model_1.dat	0 KB	24-05-2016 11:43		
- TimeSeries	Tide_1.dat	0 KB	24-05-2016 11:43		
Sim #1 2D Tide	Turbulence_1.dat	0 KB	24-05-2016 11:43		
Sim #2 3D Tide + River	WaterProperties_1.dat	0 KB	24-05-2016 11:43		
Sim #3 3D Tide + River + Sediment Transport					
Sim #4 3D Tide + River + Sed. + WWTP discharges	HDF Files		<i>∎</i> < < ā		
Sim #5 3D Tide + River + Sed + WWTP + NutrientCyc	Name	▲ Size	Time		
	Hydrodynamic_1.hdf5 Turbulence_1.hdf5	5 MB 2 MB	24-05-2016 11:55 24-05-2016 11:55		
	Time Series Files	▲ Size	iei iu 🖋 🛱 🗶		
	Channel.srh	51 KB	24-05-2016 11:55		
	MiddleEstuary.srh	51 KB	24-05-2016 11:55		
	Ocean.srh	51 KB	24-05-2016 11:55		
	UpperEstuary.srh	51 KB	24-05-2016 11:55		
Aodel Controller					

Figure 3.24: Result files of the simulation Sim #1

HDF files contain model results for the entire computational grid at different time instants of the simulation, similar to instantaneous snapshots of the study area. These results can be plotted as maps animated in time.

Time series files contain results for predefined computational grid points with high output frequency. These results can be plotter as time series graphs.

They way how these outputs can be configured will be explained later. More information on how to visualize results can be found in the "MOHID Studio User Guide".

We will start with creating a time series plot of the velocity modulus. For this we double click on the file "Channel.srh" in the "Time Series Files" list. A window appears with a list of available time series. We choose "[velocity modulus] [Tagus Sample] (Figure 3.25).



	ime Series		MOHID Studie
ailable Tir	ne Series		
.oad	Name		Model Domain
	[velocity U] [Tagus Sample]		Tagus Sample
	[velocity V] [Tagus Sample]		Tagus Sample
	[velocity W] [Tagus Sample]		Tagus Sample
V	[velocity modulus] [Tagus Sample]		Tagus Sample
	[velocity direction] [Tagus Sample]		Tagus Sample
	[water level] [Tagus Sample]		Tagus Sample
	[OpenPoint] [Tagus Sample]		Tagus Sample
	eck All	Chart Style:	
Cł		chart style.	<default template=""></default>
Cł /indow		Chart Style.	<default template=""></default>

Figure 3.25: List of time series in the file "Channel.srh"

After pressing ok MOHID Studio creates a new XY Graph window with a plot of the selected series. Your screen should look like the one in the next figure.

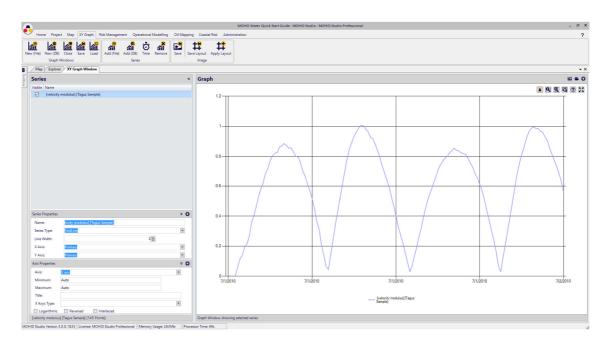


Figure 3.26: MOHID Studio time series of velocity modulus (Sim # 1)



Now we will add the velocity of the entire domain as animated layer to the map window.

First we switch back to the "Explorer Tab" and select the simulation "Sim #1 2D Tide" in the "Project Tree". Then we double click on the file "Hydrodynamic_1.hdf5" in the HDF Files list. These steps are shown in the next figure.

Open Close Manage Solution 1		Run Now Schedule Execute Models			
Map Explorer XY Graph Window oject Tree	Modules			File Editor	0 # 0 & F H H H H
Tagus Sample	Data Files		1		
🖌 🎰 Tagus Sample	Name	▲ Size	Time		
General Data	Atmosphere_1.dat	0 KB	24-05-2016 11:43		
Boundary Conditions	Geometry_1.dat	0 KB	24-05-2016 11:43		
Boxes	Hydrodynamic_1.dat	0 KB	24-05-2016 11:43		
Digital Terrain	InterfaceSedimentWater_1.dat	0 KB	24-05-2016 11:43		
Initial Conditions	InterfaceWaterAir_1.dat	0 KB	24-05-2016 11:43		
TimeSeries 2	Model_1.dat	0 KB	24-05-2016 11:43		
Sim #1 2D Tide	Tide_1.dat	0 KB	24-05-2016 11:43		
	Turbulence_1.dat	0 KB	24-05-2016 11:43		
Sim #2 3D Tide + River Sim #3 3D Tide + River + Sediment Transport	WaterProperties_1.dat	0 KB	24-05-2016 11:43		
Sim #4 3D Tide + River + Sed. + WWTP discharge	s HDF Files		Ø < ≤ = =		
Sim #5 3D Tide + River + Sed + WWTP + Nutrien		A Size	Time	3	
•	Hydrodynamic_1.hdf5	5 MB	24-05-2016 11:55	T	
	Turbulence_1.hdf5	2 MB	24-05-2016 11:55		
	Time Series Files		🕍 ш 🖉 🖻 🗵		
	Name	▲ Size	Time		
	Channel.srh	51 KB	24-05-2016 11:55		
	MiddleEstuary.srh	51 KB	24-05-2016 11:55		
	Ocean.srh	51 KB	24-05-2016 11:55		
	UpperEstuary.srh	51 KB	24-05-2016 11:55		
odel Controller	8				

Figure 3.27: Displaying the velocity modulus as animated layer – step 1

A window will appear which allows you to configure a set of options of what to display. Just leave all options unchanged (velocity modulus is the default property to display -Figure 3.28).



HDF Animation							2
Time Based \	ector L	ayer				M	OHID Studio
ayer Properties							
Group:	Results						•
Feature:	velocity m	odulus					•
Mapping:	OpenPoin	ts					-
Geo Dataset:	Geograph	ic Coordinates					-
Slice:		1 🜲					
Approximated I	Memory Usa	ge for Layer: 3	Mb				
Time Filter:		Start Date:	2010 -07 -	01 00:	• 00	Skip Step:	1 ‡
		End Date:	2010 -07 -	02 00:	• 00	skip step.	۱. ب
Grid Filter:		Clip J From:	1 ‡	To:	145 💲		
		Clip From:	1 ‡	To:	120 💲		
Layer Name:	Hydrodyn	amic_1 [velocit	ty modulus]			
Max. Visibility:	1.79769313	3486231					
Min. Visibility:		0					
Style:	Hydrodyn	amic_1 [velocit	ty modulus]			•
Projection:	Projection	i					
	Туре	Projected	Geog	raphic	Nor	ne 🔘 Cus	stom
	Major	World					•
	Minor	WGS1984					•
	Proj 4						
	L					ОК	X Cancel

Figure 3.28: Displaying the velocity modulus as animated layer – step 2

Now you have to switch to the "Map" tab. Your screen should look like the one shown in the next figure.

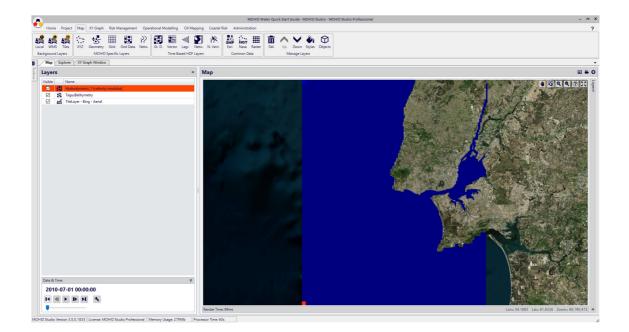


Figure 3.29: Displaying the velocity modulus as animated layer – step 3



You can now use the "Date & Time" controller, located in the lower left corner, to step forward and backward in time (Figure 3.30)

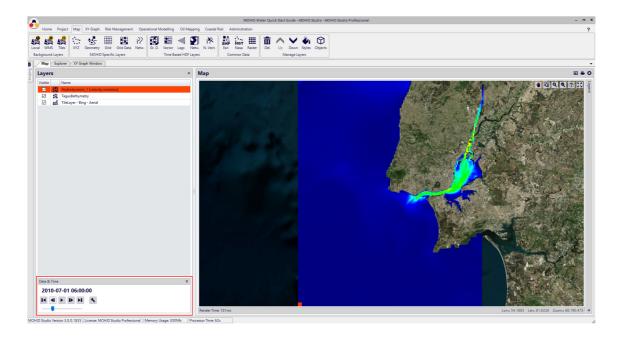
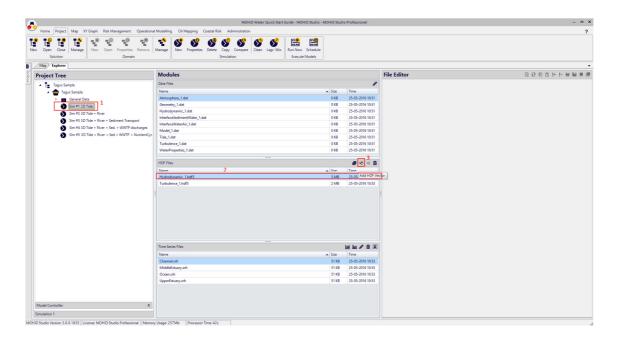


Figure 3.30: Displaying the velocity modulus as animated layer – step 4

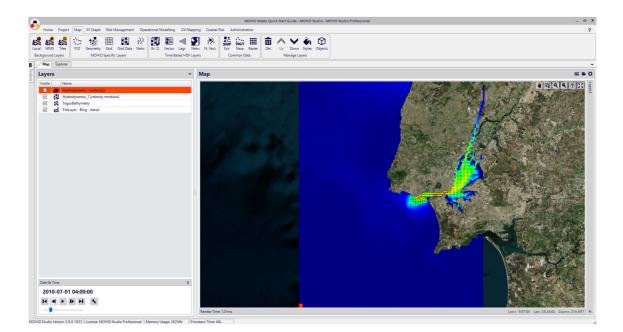
Now we switch back to the "Explorer Tab" and select the simulation "Sim #1 2D Tide" in the "Project Tree". Then we select (this time NO double click) file "Hydrodynamic_1.hdf5" in the HDF Files list and use the small icon with the arrows in the upper right corner of this list. These steps are shown in the next figure.





Again a window will appear which allows you to configure a set of options of what to display. Just leave all options unchanged (velocity is the default property to display) and press OK. Switch to the Map TAB.

Using again the timer to step forward in time, you can now see the velocity represented as colors and as arrows, as shown in the next figure.



There are many ways to customize how these layers are displayed. You can access the properties of the current selected layer by pressing "F4". For example, the next window shows the properties of the layer "Hydrodynamic_1 [velocity modulus]".



Layer Sty	le Properties		MOHID Studie
.ayer Propertie	25	Gradient Style	
 Enable Name: Visibility: Legend 	Hydrodynamic_1 [velocity modulus] Min.: 0 Max.: 1.7976931348 <legend text=""> Height: 300 €</legend>	Name: Gradient: Min. Value: Max. Value:	Hydrodynamic_1 [velocity modulus] Rainbow MOHID 0 1.164734125137:
Advanced Style Type:	Gradient 🔹	Below Min.: Above Max.: Transparency:	
	 Non Compute Points Smooth Polygons Cache Rendering on GPU 	Logarithmic:	
Style Library:	Gradient Style [0.00 - 1.00] 👻 🔁 🕇		

To know more on how to customize the time series window (axis titles, series names and colors, etc.) and map images (color scale, horizontal scale, etc.) check the MOHID Studio User Guide.

With this we finished the first exercise. In the next exercise we will create a new project from scratch.

Please close MOHID Studio.



4 Exercise 2 - Simulating 2D Hydrodynamics forced with tide

4.1 Introduction

This section will show how to create a MOHID Water project to simulate 2D hydrodynamics. We will simulate the same area as in the previous example, but rather than using a prepared project, we will go through all steps required to set up the model. The area we will simulate is the same as in the previous example.

4.2 Preparation

For Exercise 2, please download the files "LandArea.xy" and "TagusBathymetryPoints.xyz" and store them in C:\MOHID Water Quick Start Guide\Temp (or any other directory created in 3.2)

- http://www.actionmodulers.com/Downloads/LandAreaPolygon.xy
- http://www.actionmodulers.com/Downloads/TagusBathymetryPoints.xyz

Now your "temp" directory should look like shown in the next figure.

📙 🛃 🖛 Temp									-	- 0	×
File Home Share View											^ 🔞
Pin to Quick Copy Paste Copy path	Move Copy to * to *		new item •	Propertier Edit	Select all Select none						
Clipboard	Organise		New	Open	Select						
\leftarrow \rightarrow \checkmark \uparrow \square \rightarrow This PC \rightarrow OS (C:) \rightarrow	MOHID Water Quick Start Guide	> Temp						ٽ ~	Search Temp		,P
🗸 📙 MOHID Water Quick Start Guide		^ Na	ime	^	Date modified	Туре	Size				
> Projects			LandAreaPolygon	axy	25/05/2016 11:09	XY File	937 KB				
> 📙 Temp			TagusBathymetry	Points.xyz	25/05/2016 11:10	XYZ File	424 KB				
> 📙 OKIDATA		~	TagusSample.zip		25/05/2016 10:48	Compressed (zipp	833 KB				
3 items											800

Download the global tidal file (~518Mb) from here:

ftp://ftp.legos.obs-mip.fr/pub/soa/maree/tide_model/global_solution/fes2004/tide/tide.fes2004.nc

Store this file under C:\MOHID Water Quick Start Guide.



4.3 Step 1 – Creating a new Workspace, Solution and Domain

First we will create a new workspace for our project. Start MOHID Studio and select Home -> Workspace -> Open from the main menu. The Workspace Manager Window appears. Select "Start with an empty Workspace" and provide the name "My First Workspace". Your window should look like the one shown in Figure 4.1.

Workspace		٤
Workspace Manager		MOHID Studio
Select Workspace		
Start with an empty Workspace		
Name: My First WorkSpace		
Coad existing Workspace		
List of Workspaces	Mo	dified
MOHID Water Quick Start Guide	6/9/	/2015 3:30:2
	🗸 ОК	🗙 Cancel



Click on "OK" to close the window.

Create a new solution by selecting Project -> Solution -> New from the main menu.





The Create or Open Solution Window appears. Select "Create a new Solution" and provide the name "My First Solution". Your window should look like the one shown in Figure 4.2.²

💑 Solution		×
Create o	r Open Solution	MOHID Studio
Options		
Create a n	ew Solution	
Name:	My First Solution	
Open an e	xisting Solution	
List of Sol	utions	
Tagus Sar	nple	
-		<i>(</i>
		✓ OK X Cancel

Figure 4.2: Create or Open a Solution – Creating a new Solution

Click OK to close the window. You should now see the solution in the Explorer Window

-> Project Tree as shown in the next figure.



Figure 4.3: Explorer Window after creating a solution

² Even in a first approach it seems that a "Workspace" and a "Solution" are the same, they aren't. You will later understand the differences.



Now we select the solution in the Project Tree and select Project -> Domain -> New from the main menu. The Domain window appears. As "Domain Name" use "Tagus 2D" and for the root directory select the following directory:

C:\MOHID Water Quick Start Guide\Projects\Tagus 2D

You can use the button to browse for the Root Directory. Here you can browse for the directory where you like to store the files associated with the domain. In this example we created a subdirectory "Tagus 2D" in the directory created in 3.2

Domain	MOHID Studie
Properties	
Domain Name:	Tagus 2D
Root Directory:	\MOHID Water Quick Start Guide\Projects\Tagus 2D
Numerical Model:	Mohid Water 🔹
Digital Terrain Model:	E
Parent Domain:	•
Specific Executable:	
Executable:	

Your window should now look like the one shown in Figure 4.4.

Figure 4.4: MOHID Studio create new domain

Leave all the other fields empty and press OK to close the window.

Now we have created the basic structure to create the actual files we need to run MOHID. Your Explorer Window should look like shown in the next figure.



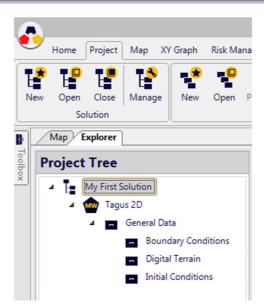


Figure 4.5: Explorer Window after creating workspace, solution and domain

More information on how to manage solutions and domains can be found in "MOHID Studio User Guide" in chapter 3.

4.4 Step 2 – Generate the Bathymetry

4.4.1 Introduction

Now we will generate a bathymetry file. This file defines the horizontal domain (computational grid and bathymetry values for each grid cell) and is the basic and most essential information need to run any MOHID Water simulation.

To create a bathymetry file, the following is needed:

- **Digital terrain data** in point format (XYZ)
- A polygon defining the areas where the model will not calculate any values (land points).
- The computational grid for the model.

The **digital terrain data** can be obtained from many sources (e.g. ETOPO, local data provider), but it must be formatted into MOHID's XYZ format. More information about MOHID's XYZ format can be found here:

http://www.mohid.com/wiki/index.php?title=XYZ Points



For this exercise we downloaded already, during the preparation process, the file "TagusBathymetryPoints.xyz". You can open this file with any text editor to check the format.

The polygon defining the areas where the model will not calculate any values can be provided in MOHID's XY format, MOHID Studio's XML format or as ESRI Shapefile. For this exercise we downloaded already, during the preparation process, the file "LandAreaPolygon.xy". You can open this file with any text editor to check the format. More information about this XY format here:

http://www.mohid.com/wiki/index.php?title=Polygon

The computational grid will be constructed with a specific tool found inside MOHID Studio.

4.4.2 Importing the base data into the simulation

Even not strictly required, we will copy the two previously downloaded files into the directory structure of the solution we just created. Expand the "Project Tree" and select the folder "Digital Terrain". After selecting, right click it and choose "Import File...", as shown in the next figure.



Figure 4.6: Importing the base data

Browse to the directory (C:\ MOHID Water Quick Start Guide\Temp) where you stored the files "TagusBathymetryPoints.xyz" and "LandAreaPolygon.xy", select the two files and click Open. You should now see these files listed under Modules -> Data Files.







Figure 4.7: Files after importing

4.4.3 Adding the base data to the map

Under the Modules -> Data Files, select the file "TagusBathymetryPoints.xyz" and select "Add to Map" from the context menu (Figure 4.8).

0	N	My First Workspace - MOHID Studio - MOHID Studio Professional	- a X
é	Home Project Map XY Graph Risk Management Operational	Adelling Oil Mapping Coastal Risk Administration	?
	ev Open Close Manage New Open Properties Remove	tarage New Properties Defete Copy Compare Clean Lage.Wiz New Properties Defete Copy Compare Clean Lage.Wiz	
	Solution Domain	Simulation Execute Models	
B	Map Explorer		•
Toolb	Project Tree	Modules	File Editor 🛛 단 선 효 🕂 는 브 월 🗏 🖉
<u>×</u>	My First Solution	Data Files	
	🔺 🎰 Tagus 2D	Name Size Time	
	General Data	LandAreaPolygon.xy 936 KB 25-05-2016 11:14	
	Boundary Conditions	TagusBathymetryPoints.xyz Ø Open 423 KB 25-05-2016 11:14	
	Digital Terrain Digital Conditions	Delete Add to Map	

Figure 4.8: Adding the base data to the map 1/2

On the dialog which appears, just press OK to continue.

💑 Vector Layer					23
Add Vector	Layer				MOHID Studio
Layer Properties					
Layer Name:	TagusBath	ymetryPoints			
Max. Visibilty:		100000	00000		
Min. Visibility:			0		
Feature:	Value				•
Style:	Gradient St	yle [-4.41 - 347	.55]		•
Projection:	Projection				
	Туре	Projected	 Geographic 	None	Custom
	Major	World			•
	Minor	WGS1984			•
	Proj 4				
_					
				✓	OK Cancel

Figure 4.9: Adding the base data to the map 2/2

Repeat the steps above for the file "LandAreaPolygon.xy".



Now, when switching to the "Map" you should see an image similar to the one shown in the next figure.

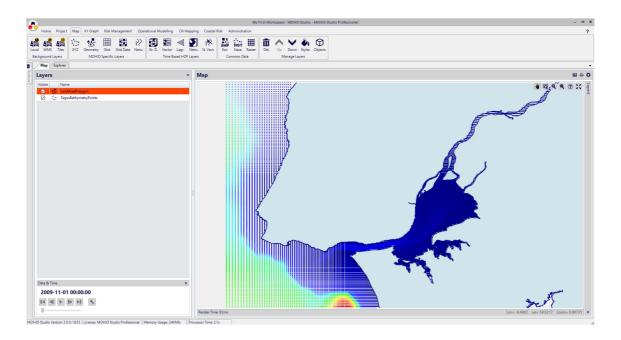


Figure 4.10: Map with base data

4.4.4 Generate the computational grid

The Tagus Sample (from Exercise 1) was built with a grid of variable resolution to make it more suited to describe the details of the Tagus Estuary and at the same time save computational time. To simplify the grid generation, in this exercise we will use a constant spaced grid.

Open the Tool Box and double click on Grid -> Constant Spaced Grid. This will open the "Constant Spaced Grid Tool" docked on the right of the main area. Your window should look like the one shown in the next figure.



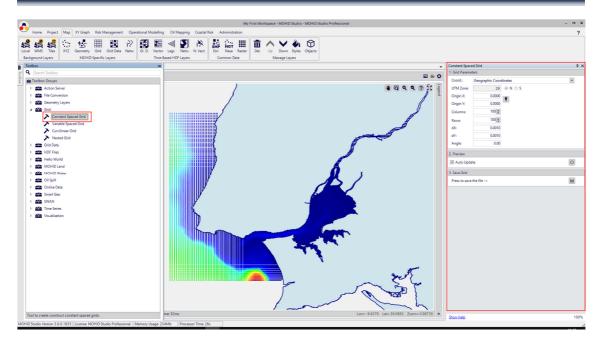


Figure 4.11: Create Constant Spaced Grid tool

We will create a constant spaced horizontal grid with the parameters indicated in the next table.

Parameter	Value	Description
Coordinate Type	Geographic Coordinates (the default)	Type of the coordinates to use. Options are geographic, UTM and metric (local) coordinates.
Origin X	-9.57	X coordinate of the lower left corner.
Origin Y	38.54	Y coordinate of the lower left corner.
Columns	230	Nº of columns of the grid
Rows	180	№ of rows of the grid
dX	0.003	Size of the grid cells along the X axis. Given in units of the coordinate system (in this case ⁹).
dY	0.003	Size of the grid cells along the Y axis. Given in units of the coordinate system (in this case ⁹).
Angle	0.0	Rotation of the grid.

After filling this options, your window should look like shown in the next figure.



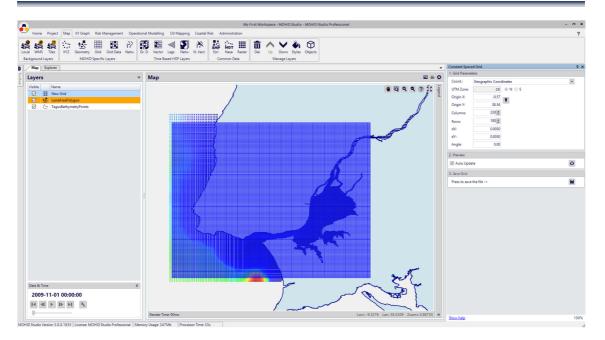


Figure 4.12: Create Constant Spaced Grid tool - 2

Press the save button () in the lower right corner of the tool window and to save the grid file with the name "TagusGrid.grd" in the directory C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain.

M Save Grid As								×
← → • ↑ <mark> </mark> «	MOHID Water Quick Start	t Guide > Projects > Tagu	s 2D → General Data	 Digital Terrain 	~ Ū	Search Digital Terrai	n	٩
Organise 👻 New f	folder							?
🖈 Quick access	▲ Name	^	Date modified	Туре	Size			
📃 Desktop 🚿			No items n	natch your search.				
👆 Downloads 🖈								
🔮 Documents 🖈								
📰 Pictures 🛛 🖈								
Digital Terrain								
- Temp								
🧞 v2.0								
v3.0								
🐔 OneDrive								
This PC								
Desktop								
🔮 Documents								
👆 Downloads								
👌 Music	~							
File <u>n</u> ame: Ti								~
Save as <u>t</u> ype: G	rid Files (*.grd)							~
∧ Hide Folders						<u>S</u> ave	Cancel	



When the tool closes, the grid remains loaded in the Map Window.



4.4.5 Generate the digital terrain (Bathymetry in form of a grid data)

The base data for any MOHID Water model is the digital terrain (or bathymetry), which is provided in form of a Grid Data file. More information about MOHID's Grid Data format can be found here:

http://www.mohid.com/wiki/index.php?title=Grid_Data

MOHID Studio contains several tools to create and manipulate grid data files.

Now, to create the bathymetry we will need three data sets:

- XYZ points (Tagus_bath_points.xyz already loaded)
- Definition of the non-compute areas (CoastLine.xy already loaded)
- The computational grid (TagusGrid created in the previous step)

To create the grid data we will use the "Grid Data" -> "Construct from Points" tool. Double click the tool to open it, as shown in the next figure:

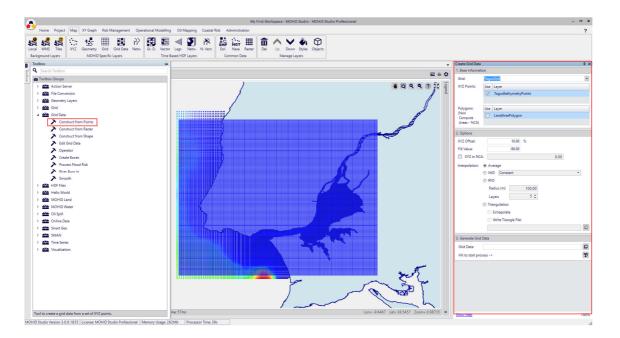


Figure 4.14: The Construct Grid Data Tool

We will know construct the bathymetry with the following options indicated in the following table.

MOHID Water Quick Start



Parameter	Value	Description
Grid	Tagus Grid	The grid which is to be used to create the grid data.
XYZ Points	Tagus_bath_points	The point dataset(s) which are to be used to fill the grid. In this example we only have one, but you can use multiple XYZ files.
Polygons	CoastLine (check it!)	The polygon(s) which define non compute areas (land in the case of MOHID Water). The model will not compute any values in the cell covered by these polygons.
XYZ Offset	10%	Offset from the grid, in percentage, of the maximum distance from the "XYZ Points" are considered when using interpolation algorithms.
Fill Value	-99.0	The value to be attributed in non-compute areas. You should not change this value unless you have a specific reason for.
XYZ in NCA	Leave uncheck	If you want to consider a specific height in the non- compute areas for the interpolation process near the land-water interface.
Interpolation	Triangulation	The interpolation method you want to use. If the density of points is smaller than the number of grid cell (not every cell contains a XYZ Point), then this option is the recommended one.
Grid Data	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\ TagusBathymetry_v01.dat	The name of the file which will be created. It's recommended to place this file inside the folder General Data\Digital Terrain of your project.

After filling all data, choose the process button (*) to generate the bathymetry. This process might take a couple of minutes and it finished with a status message.



Figure 4.15: Status message of the Construct Grid Data Tool



Close the status message and the tool window (using the x). Your main window should now like the one in the following figure.

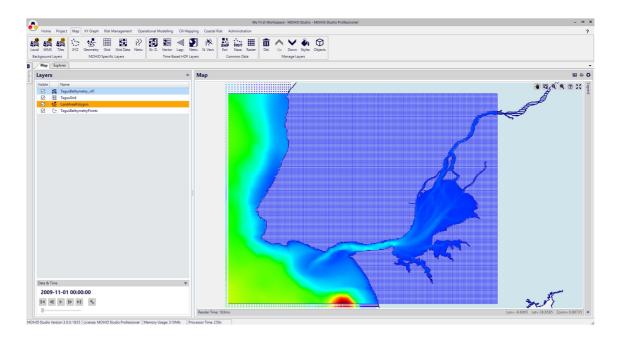


Figure 4.16: Window after creation of the bathymetry

4.4.6 Edit and verify the bathymetry

After creating the bathymetry with the tool with must check if the created file is suited for MOHID, namely regarding two points: (i) are all boundary cells correctly defined, (ii) are there disconnected areas.

The first point we have to address by editing the bathymetry. The second point can be correctly automatically by the model.

Please note that, points where you want to impose tide must be open (no land point between the bathymetry and the border) and points where you don't want to impose tide must be closed (a land point between water and the border). We will now use the Edit Grid Data tool to modify an inconsistency at the boundary right border of our bathymetry.

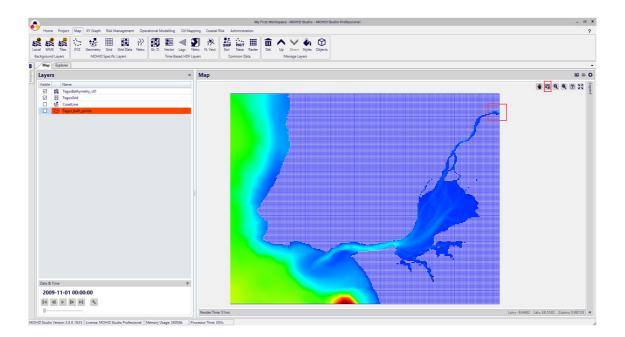
For simplicity we switch off the layers "LandAreaPolygon" and "TagusBathymetryPoints" by unchecking them from the "Layers" list.



	Мар	Exp	lorer	
Toolbox	Layer	s		«
×	Visible		Name	
			TagusBathymetry_v01	
	\checkmark		TagusGrid	
		5	LandAreaPolygon	
		\mathbb{C}_{2}^{n}	TagusBathymetryPoints	

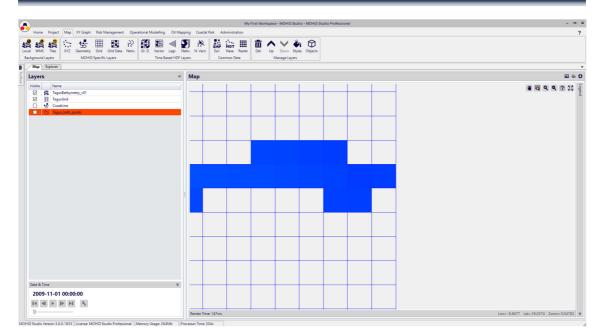
Now we zoom into the problematic area, using the map tool box

 Image: Image with the map window, as shown in the next figure.



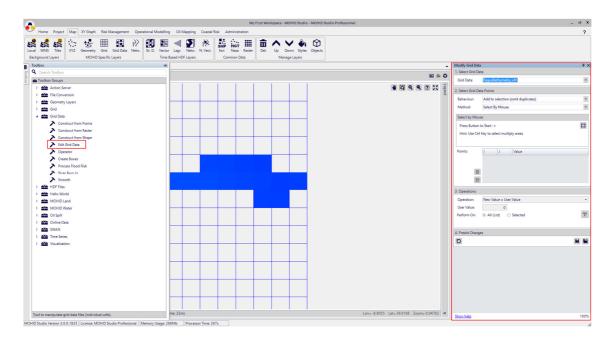
After zooming in, your screen should look like:





As you see, close to the border of the grid there is an open point. If we wouldn't change the bathymetry the model would impose tide here, which is wrong since at this border ends the Tagus River. So we will close this point using the "Edit Grid Data Tool".

Open the "Edit Grid Data Tool" from the tool menu.



Leave all options as default and use the select area button (\square) to select the grid cell at the open boundary (you might find it useful to adjust your zoom level).



					Workspace -	MOHID Studie	- MOHID Studio Professional				- 1
Home Project Map XY Graph Risk Management Open							<u>^</u>				
WMS Titles XYZ Geometry Grid Grid Data Netw.	Gr. D. W	ector Lagr. Time Based HDF	Esri Nasa	Raster 0	el. Up	Down Styles					
Map Explorer									Modify Grid Dat	ta	
	« Ma	-							1. Select Grid D	lata	
	w IVIA	P							Grid Data:	TagusBathymetry_v01	
fisible Name	-							• Q Q Q X §	2. Select Grid D	lata Points	
TagusBathymetry_v01				_	_	_			Behavioun	Add to selection (omit duplicates)	
TagusGrid									Method:	Select By Mouse	
CoastLine				Nase Rett Def. Def. Def. Nase Rett Def. Def. Marage Layer Marage Layer *							
									Press Buttor	to Start ->	
					_	_			Hint: Use Ct	rl Key to select mutliply areas	
									Pointr	1 I Value	
		+ +				-			P Office		
					-						
										<u> </u>	
									Operation:	New Value = User Value	
									User Value:		
									Perform On:	All (List) O Selected	
										ges	
					_				0		1
ate & Time a											
2009-11-01 00:00:00											
6 H 4 F											
	Ren	der Time: 32ms					Lon	= -8.8734 Lat= 39.0271 Zoom= 0.04782 «	Show help		

If you select wrong points you can always use the buttons "Clear Selected Point" (¹) or "Clear All Points" (¹).

Once you have selected the correct point (I = 164, J = 270) select from 3.Operations Operation = Close Points and hit the process button.

3. Operations			
Operation:	Close Points		•
User Value:		0	
Perform On:	All (List)	Selected	Ŧ

The color of the select point will disappear and a value of -99 is assigned, which means that this point is now closed.

Under "4. Persist Changes" press the save button (📕) to save and close the tool.

We are done with preparing the bathymetry.



4.5 Step 3 – Generate Tide

One of the main drivers for water circulation in coastal areas is tide and in almost every coastal simulation you probably want to use tide as boundary conditions. MOHID Water receives tide as boundary condition through a specific file which contains the harmonic components of the tide.

FES (finite element solution) tide model is the most common source of tidal components being available for the entire world and MOHID Studio incorporates a tool to obtain harmonic tidal component from FES (version 2004), which data base you downloaded during the preparation process.

We will know generate a simple tidal file, with a single tidal gauge, to be used our simulation. From the tool box choose "MOHID Water"->"Generate Tidal File". You window should now look like the one in the following figure.

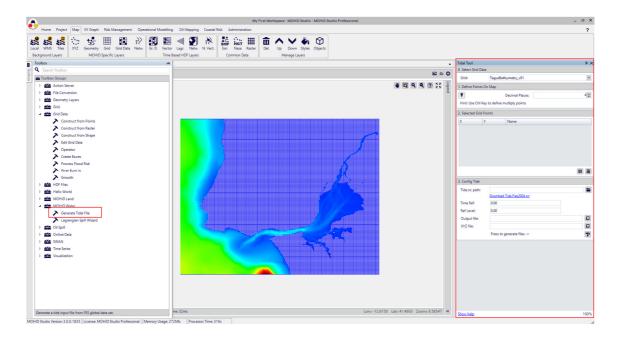


Figure 2-4.17: Tidal Tool window

Use the pick button () and select a point near the lower left origin of the bathymetry and use the following options under 3. Config Tide:

MOHID Water Quick Start



Parameter	Value	Description
Grid	Tagus Grid	The grid which is to be used to create the grid data.
Tide nc. Path	C:\MOHID Water Quick Start Guide\tide.fes2004.nc	Path to the file which contains the global tide solution. Downloaded during the preparation.
Time Ref.	0.0	The time difference between the area you are running the model and UTC (e.g. Portugal (0), Spain (1))
Ref. Level	2.08	Difference between the hydrographic zero and the mean sea level. In the area of the example it's 2.08m
Output File	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Boundary Conditions\Tide_x.dat	The file which will contain the tidal harmonics in in MOHID format. You should always place this file in the General Data\Boundary Condition folder of your project.
XYZ File	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Boundary Conditions\TidePoints.xyz	File with the coordinates which you used. Useful if you are using multiple gauges.

After filling all data, choose the process button (12) to generate the tide files. This process finishes with a status message.

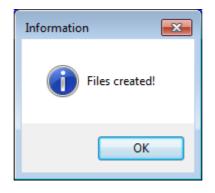


Figure 4.18: Status message of the Tidal Tool

Close the status message and the tool window (using the x).

Please note that in real applications you want to use multiple tides as boundary conditions (instead of a single one), placing all tides in a triangular way along the open boundary, as described here:

http://www.mohid.com/wiki/index.php?title=How to generate tide for Mohid%3F

Now we finished steps 3 and are ready to create our first simulation.



4.6 Step 4 – Associate the domain with the bathymetry

In step 1 we created a new workspace, solution and a domain. In step 2 we created the bathymetry. We will now associate the domain with the bathymetry (this is needed because you may have more than on bathymetry). To do so, please switch back to the Explorer Window, select the domain "Tagus 2D", right click and choose "Properties".

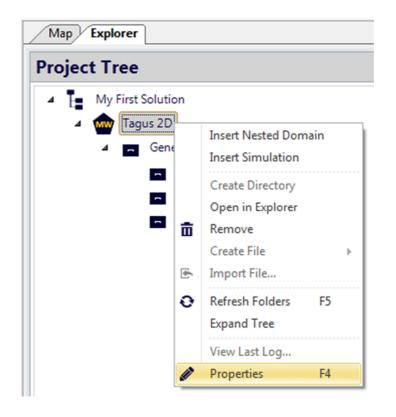


Figure 4.19: Accessing the properties of the domain

A window with the properties of the domain will show. Under "Digital Terrain", browse for the bathymetry you created earlier (C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\TagusBathymetry_v01.dat) as shown in the next figure.



Domain	Σ
Domain	MOHID Studio
Properties	
Domain Name:	Tagus 2D
Root Directory:	C:\MOHID Water Quick Start Guide\Projects\Tagus 2
Numerical Model:	Mohid Water
Digital Terrain Model:	C:\MOHID Water Quick Start Guide\Projects\Tagus .
Parent Domain:	
Specific Executable:	
Executable:	
	✓ OK X Cancel

Figure 4.20: Associating the bathymetry to the domain.

Now close the window.

4.7 Step 5 – Create a new simulation

So far we created the basic input files which are need to run any MOHID Water model. We will now create a simulation and fill the compute options for all modules.

In the Explorer Window select again the domain "Tagus 2D" right click and select "Insert Simulation". A window with the properties of a new simulation will appear. In the window you have to provide a name of the simulation, a small description and choose which modules you want to activate.



MOHID Water Quick Start

Simulation				Σ
Simulation	ı			MOHID Studio
Properties				
ID:	1]		
Name:	Sim #1			Use as template
Description:				
Specific DTM:				
Modules in Simu	ation		Avaliable Modules	
Atmosphere		<	Assimilation	
Geometry		>	BenthicCEQUALW2	
Hydrodynamic			BenthicEcology	E
InterfaceSedime	ntWater		Benthos	
InterfaceWaterA	ir		Bivalve	
Model			CeQualW2	
			Consolidation	
Tide			Discharges	
Tide Turbulence			Discharges	
			Free Vertical Movement	

Figure 4.21: Creating a new simulation

Without changing any option, press OK to close the window. A new simulation is created and will appear in the project tree. When you select this simulation, the module data files will appear.

My First Solution Image: Solution Data Files Image: Solution Name Image: Solution Size Image: Solution Image: Solution	Project Tree	Modules			
Image: Second	Tagus 2D	Data Files			ø
General Data 1 KB 30-07-2015 11:53 Sim #1 1 KB 30-07-2015 11:53 Hydrodynamic_1.dat 1 KB 30-07-2015 11:53 Hydrodynamic_1.dat 0 KB 30-07-2015 11:53 InterfaceSedimentWater_1.dat 1 KB 30-07-2015 11:53 HDF Files # W < 1		Name	▲ Size	Time	1
Sim#1 KB 30-07-2015 11:53 Hydrodynamic_1.dat 0 KB 30-07-2015 11:53 InterfaceSedimentWater_1.dat 1 KB 30-07-2015 11:53 InterfaceWaterAir_1.dat 1 KB 30-07-2015 11:53 HDF Files Image: Non-1-2015 11:53 Image: Non-1-2015 11:53		Atmosphere_1.dat	1 KB	30-07-2015 11:53	Ξ.
Hydrodynamic_1.dat 0 KB 30-07-2015 11:53 InterfaceSedimentWater_1.dat 1 KB 30-07-2015 11:53 InterfaceWaterAir_1.dat 1 KB 30-07-2015 11:53 HDF Files Ø 🗞 < 🖬	D General Data	Geometry_1.dat	1 KB	30-07-2015 11:53	
InterfaceWaterAir_1.dat 1 KB 30-07-2015 11:53 → HDF Files 🦉 🔨 📹		Hydrodynamic_1.dat	0 KB	30-07-2015 11:53	
HDF Files 🖉 🔨 🗐		InterfaceSedimentWater_1.dat	1 KB	30-07-2015 11:53	
HDF Files 🖉 🔊 🔄 🛅		InterfaceWaterAir_1.dat	1 KB	30-07-2015 11:53	۰.
Name Size Time		HDF Files		a 1. 1	Ē
		Name	🔺 Siz	e Time	
	Model Controller	*			





4.8 Step 6 – Define the simulation properties

Selecting the simulation you just created shows that it has several input files listed in the "Modules" section and in "Data Files". In these files we have to specify the options for each module. Main files have already default options and here we will only change the files which require modification.

4.8.1 Step 6.1 – Define general simulation options

The simulation start, end and time step is provided in the file Model_X.dat where is X is the simulation number (e.g. Model_1.dat). Under "Modules" double click the file "Model_1.dat", which will open in the file editor.

Project Tree	Modules			File Editor 🛛 🔂 🔂 🕼 🕂 🗄 🗎 🗮
My First Solution	Data Files		ø	Model_1.dat V
Tagus 2D	Name	▲ Size	Time	1 !MOHID Studio Sample Data File
General Data	Atmosphere_1.dat	1 KB	30-07-2015 11:53	2 !This file contains the most common options. 3 !MODULE: Model
Sim #1	Geometry_1.dat	1 KB	30-07-2015 11:53	4 Please complete and comment/uncomment for you
	Hydrodynamic_1.dat	0 KB	30-07-2015 11:53	5 !
	InterfaceSedimentWater_1.dat	1 KB	30-07-2015 11:53	6
	InterfaceWaterAir_1.dat	1 KB	30-07-2015 11:53	START : 2015 4 2 0 0 0
	Model_1.dat	0 KB	30-07-2015 11:53	9 END : 2015 4 3 0 0 0
	Tide_1.dat	0 KB	30-07-2015 11:53	10 DT : 60
	Turbulence_1.dat	0 KB	30-07-2015 11:53	11 VARIABLEDI : 0
	WaterProperties_1.dat	1 KB	30-07-2015 11:53	13 GMTREFERENCE : 0
				14 DT_PREDICTION_INTERVAL : 60
	HDF Files		日本人自	15
	Name	▲ Size	Time	16 ! 17 !For more information about MOHID please visit
				18 !Copyright (C) 2012. Action Modulers, http://w
lodel Controller	¥			19 !
				20
	Time Series Files		ш <i>и</i> п х	
	Name	▲ Size	Time	

Figure 4.23: Model_1.dat in the File Editor

Change the values to the following options (You should avoid using TABs).

Parameter	Value	Description
START	2015 1 1 0 0 0	Start instant of the simulation. Values are year, month, day, hour minute and second.
END	2015 1 2 0 0 0	End instant of the simulation. Values are year, month, day, hour minute and second.
DT	60.0	Time step of the model, in seconds.
VARIABLEDT	0	If a variable DT is to be used. 0 to switch off, 1 to switch on. For simulations with tide it does not make sense to switch this option on (generally only used by MOHID Land).
MAXDT	For variable DT only	Maximum DT if variable time step is used.



GMTREFERENCE	0	Has the same as the time reference as in the tidal tool. If running the model in a place other than in GTM + 0 than need to edit accordingly (positive to east and negative to west).
DT_PREDICTION_INTE RVAL	15.0	Interval, in seconds, when progress notifications are displayed.

After editing the file and changing the values as shown in the table above, save and close the file by pressing close button.

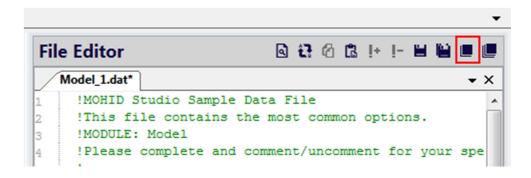


Figure 4.24: Saving and closing a file in the file editor

4.8.2 Step 4.3 – Define tidal components

The information on the tidal components with info separated by gauges is provided in file Tide_X.dat where is X is the simulation number (e.g. Tide_1.dat). We have to replace the information in this file with the information generated during Step 3 – Generate Tide. To do so, we do the following: double click the file Tide_1.dat under "Modules" to open the tidal file. Then we navigate in the explorer to Tagus 2D -> General Data -> Boundary Conditions, where we stored the file Tide_X.dat. Double click to also open this file. We now have both files open in the file editor, as shown in the next figure.



Project Tree	Modules			File Editor		a 🕄 🖄	🗈 !+ !- 🗎 🗎	•
My First Solution	Data Files		1	Tide_1.dat T	ide_x.dat			• ×
🔺 🎰 Tagus 2D	Name	▲ Size	Time	1 <beginga< th=""><th></th><th></th><th></th><th>-</th></beginga<>				-
General Data	Tide_x.dat	0 KB	28-07-2015 18:12	2 NAME 3 LONGITUD		n test .00000 33.0000 41	0000	
_	TidePoints.xyz	0 KB	28-07-2015 18:12	4 LATITUDE		.0000 32.0000 51.0		
Boundary Conditions	inder enteringe			5 METRIC X		.56150	0000	
Digital Terrain				6 METRIC Y	: 38.			
Initial Conditions				7 REF LEVE		2.08000		
				8 TIME_REF		0.000000		=
Sim #1				9 M2		0.992659	63.5166	
				10 52	1.0	0.343647	90.2642	
				11 K1	1.1	0.0705504	56.5242	
				12 K2		0.0920693	83.8227	
	1				÷	0.213385	46.6037	
				14 2N2		0.0315954	25.1965	
	HDF Files		日本人	15 01		0.0595344	-42.5974	
	Name	▲ Size	Time	16 Q1	1.1	0.0232574	55.7880	
				17 P1		0.0186636	-93.5168	
				18 M4		0.000000	0.000000	
				19 Mf 20 Mm		0.00138825	-154.697	
				20 Mtm		0.000282000	75.5264	
						5.77274e-005	97.7773	
	Time Series Files		🛍 🔟 🖉 🖬 🖾	22 MSqm 23 <endgaug< td=""><td></td><td>5.772716-005</td><td>51.1115</td><td></td></endgaug<>		5.772716-005	51.1115	
	Name	▲ Size	Time	2.5 conagaag				

Figure 4.25: Opening 2 files in the file editor.

We now select the entire content in the file Tide_x.dat (by pressing Ctrl+A) and copy it (by pressing Ctrl+C). Then we switch to the file Tide_1.dat and select the entire content (Ctrl+A) and replace it with the content from the first file (Ctrl+V). Now close and save the file Tide_1.dat and close the file Tide_x.dat.

Under the Project Tree select again the simulation "Sim #1".

4.8.3 Step 4.4 – Define hydrodynamic options

The options of the hydrodynamic module are provided in the file Hydrodynamic_x.dat (e.g. Hydrodymamic_1.dat). Double click the file to open it in the File Editor.

Parameter	Value	Description
TIDE	1	If tide is to be considered at the open boundary. 1-Yes, 0 – No
WIND	0	If the effect of wind is to be considered. 1- Yes, 0 – No
WATER_DISCHARGES	0	If the effect of water discharges (e.g. riveres) is to be considered. 1- Yes, 0 – No
BAROCLINIC	0	If the effect of baroclinic forces are to be considered (3D only). 1- Yes, 0 – No
CONTINUOUS	0	If this simulation is a continuation from a previous simulation. 1- Yes, 0 – No

Change the values to the following options (You should avoid using TABs).



INITIAL_ELEVATION	0	If an initial elevation should be considered (only when running without tide or in sub-models). 1- Yes, 0 – No
SLOWSTART	43200	Time to gradually increase the tide water level at the open boundary to its full value. This will start the model smoothly (recommended value is 86400). In seconds.
INITIAL_ELEVATION_ VALUE	-	Value of the initial elevation. Only read if previous value is 1.
TIME_SERIE	0	If we want to create time series outputs
TIME_SERIE_LOCATIO N	-	Path to a file which contains a list of grid points where the model should make outputs. Only read if previous option is 1
OUTPUT_TIME	0 3600	Output frequency of map outputs. First instant and frequency between outputs. In seconds.

Once done, save and close the file.

4.8.4 Step 4.5 – Define turbulence parameters in Turbulence file

The horizontal and vertical viscosities are specified in the file Turbulence_X.dat (this case Turbulence_1.dat). Double click the file to open it in the File Editor.

Change the values to the following options.

Parameter	Value	Description
VISCOSITY_H	30.0	Horizontal viscosity in m2/s. Good initial guess is 10% * (grid size (in m) * average velocity).
VISCOSITY_V	0	Vertical viscosity in m2/s. 3D simulations only.

Once done, save and close the file.

4.8.5 Step 4.6 – Other Files

Other files which are included in this simulation are not needed to be changed, since the default values are acceptable for this first simulation.

4.9 Step 7 – Run the simulation and explore results

Everything now is prepared to run the simulation. In the Explorer Window select the simulation Sim #1 and then select the option "Project" -> "Run Now" from the main menu (further details have been described earlier). In the message box which appears, click "Yes" to start the run.

When the model finishes, a message box will pop, asking if you would like to see the model results. Click "Yes" and a window like the one shown in the next figure will be shown.

💑 Output	23
Model Output	MOHID Studio
Model Output	Ð
MOHID	•
AUTHOR : IST/MARETEC, Marine Modelling Group WWW : <u>http://www.mohid.com</u>	E
Copyright (C) 1985, 1998, 2002, 2006. Instituto Superior Tecnico, Technical University of Lisbon MOHID	- II
Constructing Mohid Water Please Wait MODEL	
Constructing : Tagus 2D	
ID: 1 Isolated cell in horizontal (i,j,k): 94 163 1	↓
Isolated cell in horizontal (i,j,k):	
	Close

After any simulation, you should scroll down to the end of the window, checking the final status message, as shown in the next figure.

MOHID Water Quick Start



Model Output	Ν	AOHID Studio
Model Output		G
New Bathymetry f	ick Start Guide\Projects\Tagus 2D\General Data\	\Digital

In this case the model log tells us that a new bathymetry has been created (isolate cells have been removed). This type of message can appear in a set of occasions and we must address them in order to get the model running from start to end.

In this particularly case we have to change the bathymetry from:

C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\TagusBathymetry_v01.dat

to:

C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\TagusBathymetry_v02.dat

So we will close the model output window and select the domain "Tagus 2D" in the Explorer Window. Through a right mouse click we can access the properties of the domain (as described earlier). Change the digital terrain to the new file created by the model, as shown in the next figure.



Domain	5	
Domain MOHID Stud		
Properties		
Domain Name:	Tagus 2D	
Root Directory:	C:\MOHID Water Quick Start Guide\Projects\Tagus 🕻 🔚	
Numerical Model:	Mohid Water 👻	
Digital Terrain Model:	neral Data\Digital Terrain\TagusBathymetry_v02dat	
Parent Domain:	-	
Specific Executable:		
Executable:		
	✓ OK X Cancel	

Close this window and run the simulation again, by selecting "Sim #1" in the Project Tree and then pressing "Run Now" in the main menu. The simulation now should start and work properly. Progress is indicated in the progress window. Wait and until the simulations finishes.

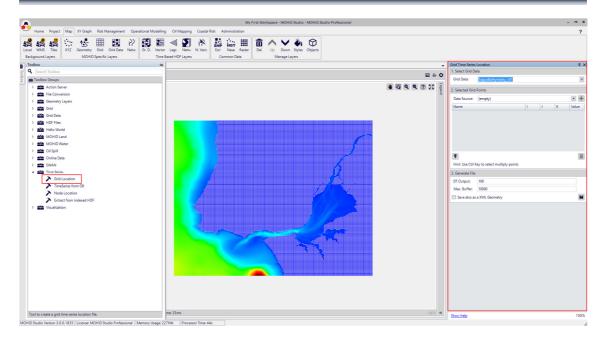
You can know explore the results by adding layers to the map, as described in section 3.6.

You will not see any time series results (as shown in section 3.6), so in the next step we will change the configuration of this model in a way that also time series are written.

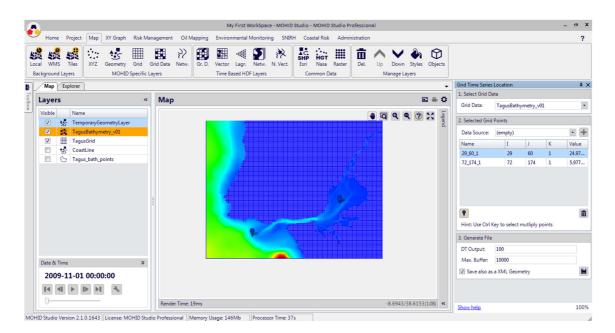
4.10 Step 8 – Add time series output and rerun the model

Time series output is complementary to the map output. In order to create time series output you have to create a file with the points where you want to make time series output. This can be done with the tool "Grid Location".





With this tool use the "Add Points" button (?) to add new places. Select one place at the mouth of the estuary and another one inside the estuary. Then also select the "Save also as XML Geometry" option. Your screen should now look like:



Now save all information, by pressing the "Save Button" (**H**), using the following path:

C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\TimeSeriesLocation.dat

After saving the tool window will close and the layer with the marks will be removed.

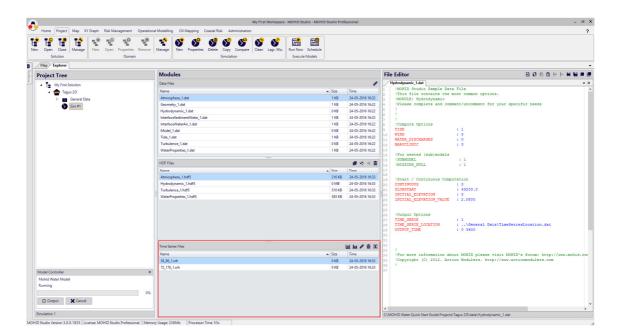


Now we will switch to the explorer window, select the simulation "Sim #1" and open the Hydrodynamic_1.dat file (by double clicking it). Change the following options in this file.

Parameter	Value	Description
TIME_SERIE	1	If time series output is to be written. 1- Yes, 0 – No
TIME_SERIE_LOCATIO N	\General Data\TimeSeriesLocation.dat	Path to the file with the point locations.

Once done, save and close the file.

Now you can rerun the model, following the steps defined in the previous chapter. Once the model is finished, time series results should appear in the Explorer Window, as shown in the next figure.



You can now open and see these results, following the steps described in 3.6.



5 Exercise 3 – Exploring Additional Examples

5.1 Introduction

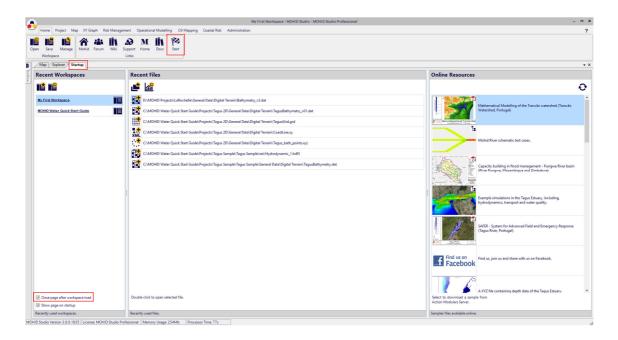
In Exercise 1 we downloaded a previously created model setup and imported it into MOHID Studio. The goal was to learn a little bit how MOHID Studio works.

In Exercise 2 we created a new model setup from scratch using some basic data files. The goal of the second exercise was to learn the basic steps you need to setup a simple 2D MOHID Water simulation.

MOHID Water has hundreds of options, so sometimes it's tricky to find the right option for all the data files. In this exercise, Exercise 3, we will show how to open existing online resources which you can use as guidance to setup you own model.

5.2 Step 1 – Startup Page

MOHID Studio's Start-up page has on the right side a set of online resources, which we update frequently. To access the start page, select Home -> Links -> Start.



This page is allows shown after start up but, by default, it closes after opening a work space. You can change this behaviour in the lower left corner of the Start-up page.



We will now select a more advanced sample of the Tagus Estuary, which contains different types of simulations.

5.3 Step 2 – Download and open advanced examples

In the Startup Page check for the resource "Example Simulations in the Tagus Estuary, including hydrodynamics, transport and water quality", as indicated in the figure below.

Home Project Map XY Graph Risk Mana	My First Workspace - MOHID Studio - MOHID Studio Professional gement Operational Modelling Oil Mapping Coastal Risk Administration	-		
📔 🏥 📫 Amarge Mange Mange Mange Laks Support Ham Deci Start				
Map Explorer Startup				
Recent Workspaces	Recent Files	Online Resources		
My First Workspace	D\MOHID Projects\LaRochelle\General Data\Digital Terrain\Bathymetry_v3.dat	Mathematical Modelling of the Trancão watershed (Trancão		
MOHID Water Quick Start Guide	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\TagusBathymetry_v01.dat	Watershed, Portugal)		
	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\TagusGrid.grd	A second and a sec		
	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\CoastLine.xy	1		
	C:\MOHID Water Quick Start Guide\Projects\Tagus 2D\General Data\Digital Terrain\Tagus_bath_points.xyz	Mohid River schematic test cases.		
	C\\MOHID Water Quick Start Guide\Projects\Tagus Sample\Tagus Sample\res\Hydrodynamic_1.hdf5			
	Ci.MOHD Water Quick Start Guidel Projects Tagus Samplel Tagus Samplel General Data Digital Terrain TagusBathymetry.dat	Capacity building in flood management - Pungwe River basin (River Pungwe, Mezambique and Zimbabiwa)		
		E Example simulations in the Tages Educary, including, hydrodynamics, transport and water quelip.		
		SAFE-System for Advanced Field and Emergency Response (Hagas River, Pontugel)		
		Find us on Facebook Find us, join us and share with us on Facebook.		
		A XYZ file containing depth data of the Tagus Estuary.		
Close page after workspace load	Double click to open selected file.	Select to download a sample from Action Modulers Server.		
Show page on startup Recently used workspaces.	Recently used files.	Samples files available online.		

Click on this line.

A popup window will appear which asks for where to store this example.



Browse For Folder	×				
Select destination folder (Must be empty)					
V 💻 This PC	^				
> Desktop					
> 🔮 Documents					
> 🔶 Downloads					
> 🎝 Music					
> E Pictures					
> 📑 Videos					
🗸 🏪 OS (C:)					
> \$WINDOWS.~BT					
> \$Windows.~WS					
> eSupport					
> Intel					
MOHID Water Quick Start Guide					
V Projects					
> Tagus 2D					
Tagus Advanced					
> Tagus Sample					
> Temp					
> OKIDATA					
	~				
Make New Folder OK Cance					

Create a directory in c:\MOHID Water Quick Start Guide\Projects called "Tagus Advanced" and press OK.

The download of the sample will start automatically. Once the download is completed (a message box informs you about this) your current workspace is closed and the download example is opened automatically. Your window should now look like the one indicated next.



•		Tagus Sample_v_2016_05 - MOHID Studio - MOHID Studio Professional		- a x
Home Project Map XY Graph Risk Manageme	ent Operational Modelling Oil Mapping Coastal Risk Administrat	tion		?
Solution Dor	ties Remove Manage main New Properties Delete Copy Compa Simulation			
Map Explorer Project Tree	Modules		File Editor 이 관 성 효 !• !	- 11 10 10 10 - 11 10 10 10
Tagus Sample_v_2016_05	Data Files	/		
Tagus Sample	Name	▲ Size Time		
General Data				
Sim #1 2D Tide				
Sim #2 3D Tide + River				
Sim #3 3D Tide + River + Sediment Tr				
Sim #4 3D Tide + River + Sed. + WWT				
 Sim #5 3D Tide + River + Sed + WWT Spin up 2D 	P + NutnentCyc			
P 🔊 Spin up 2D				
	HDF Files			
	Name	▲ Size Time		
	Time Series Files	 		
	Name	size Time		
		A Vice Inne		
Model Controller	*			
C:\MOHID Water Quick Start Guide\Projects\Tagus Advan	nced\Tagus Sa			
HID Studio Version 3.0.0.1835 License: MOHID Studio Profe	essional Memory Usage: 249Mb Processor Time: 92s			

Inside this example you will find a set of simulations, showing different features of MOHID Water. We recommend that you run and explorer these examples.

The first 5 simulations are the same which were already in Exercise 1. Please check the following observations.

Name	Objective	Observations
Sim #1	Simple 2D simulation. Forcing the model with tide.	Data files very similar to Exercise 2.
Sim #2	Simple 3D simulation, using 3 layers. Forcing the model with tide and a river discharge. Added heat and salinity transport.	Data files show how to implement some more advanced features in MOHID Water. Transport of properties (Waterproperties_2), vertical layers (Geometry_2), full vertical turbulence model (Turbulence_v2 & GOTM_v2) and discharges from rivers (Discharges_v2 & Hydrodynamic.dat)
Sim #3	Same as previous, but added wind forcing and other atmospheric fluxes and also sediment transport	Data files show how to implement some even more advanced features in MOHID Water. Atmospheric boundary conditions for wind and heat transfer (Atmosphere_v3 and InterfaceWaterAir_v3) and transport of sediments (FreeVerticalMovement_v3, Waterproperties_3 and InterfaceSedimentWater_v3) and
Sim #4	Same as previous, but added discharges from a WWTP to simulate fecal coliforms	Data files show how to activate the lagrangian model (Lagrangian_v4 and Model_v4)
Sim #5	Same as previous, but added water quality simulation (phosphorus and nitrogen)	Data files show how to activate the water quality module in MOHID Water using a Eulerian approach (Waterproperties_v5 and Waterquality_v5)



Besides the simulation listed in the table above, the example contains a set of simulations nested in the "Spin up 2D" simulations.

Whenever you want to setup a MOHID Water model in your site, you can use these examples as guidance. Basic steps are:

- Create a new domain, including computational grid and bathymetry, as shown in step 2;
- 2. Copy data files from the examples the new created domain;
- 3. Adopt the data files where needed.

There are 2 features in MOHID Studio which you might find particularly interesting: the option to compare data files between simulations (Project -> Simulations -> Compare) and to copy data files from one Project/Simulation to another (Project -> Simulation -> Copy).

Home Project Map XY Graph Rikk Management Operational Modeling Old Marging Casual Risk Administration Image: Image: Image Image: Image Image: Image Image: Image: Image Image: Image: Image Image: Ima

Please check MOHID Studio's User Guide for further information.

6 Final Remarks

This quick start-guide to implement MOHID Water intends to help first time users to quickly get the model running but may also be a starting point for every new implementation. The implementation of MOHID Water in these terms, with increasing complexity and processes added in cumulative way, gives user the sensibility to the major factors affecting circulation and water quality for each implementation site.

Any difficulties or need for more developed information should be addressed in the MOHID channels mentioned at the start of this document.

We appreciate all feed-back that you may give us on the implementation of MOHID Water projects with MOHID Studio so that this guide can improve with time.