

Step by Step  
**AGISOFT - METASHAPE**

Prof. Dr. Murat YAKAR  
Assoc. Prof. Dr. Ali ULVI  
Res. Assistant. Abdurahman Yasin YIĞİT  
Msc. Seda Nur Gamze HAMAL

2022

# Step by Step AGISOFT - METASHAPE

ISBN: 978-625-8101-09-6

© 1. Printing, May, 2022

© Copyright 2022, ATLAS AKADEMİ

All rights of this edition belong to Atlas Akademi.  
without the written permission of the publisher, the entire book or  
printing of a part of it by electronic, mechanical or photocopying,  
may not be published, reproduced or distributed.

CERTIFICATE NO: 49704

Cover & Composition  
**Atlas Akademi**

Print and Volume  
**Dizgi Ofset**  
Yeni Matbaacılar St. Konya/TÜRKİYE  
Tel: 0332 342 07 42

## LIBRARY INFORMATION CARD

---

YAKAR, Murat – Ulvi, Ali – YİĞİT, Abdurahman Yasin – HAMAL, Seda Nur Gamze  
Unmanned Aerial Vehicles, Photogrammetry, Meteshape, Photogrammetric Processing Software,  
Coordinate System, Measurement, Data Analysis, Editing, Mining, Sattalite Images, Panorama, Agisoft

---



Akademi Mah. Yeni İstanbul Cad.  
No: 22 Selçuklu / KONYA  
Tel: 0332 241 30 59

**Step by Step  
AGISOFT - METASHAPE**

*You can download each application in the "Step by step Agisoft-Metashape"  
Book from the link below. You can also reach the download link  
by reading the QR code below.*

<https://publish.mersin.edu.tr/index.php/data/agisoftdata>



**Prof. Dr. Murat YAKAR  
Assoc. Prof. Dr. Ali ULVI  
Res. Assistant. Abdurahman Yasin YiĐIT  
Msc. Seda Nur Gamze HAMAL**



## PREFACE

The number of changing and developing sensor systems and the amount of software in which the data obtained through these systems are processed and interpreted is increasing day by day with the development of technology. Agisoft Meteshape is an advanced 3D modeling software based on image data processing developed by Agisoft company. Software: It can generate Digital Surface Model (DSM), Digital Elevation Model (DEM), Solid Model, and 3D model from multiple images, which can process any picture taken by a non-metric camera, from small sculptures to big data from an Unmanned Aerial Vehicle (UAV). Mapping has a wide range of applications in many fields, including preservation of cultural heritage, industry, archaeology, architecture, environment, medicine, civil, and military.

Within the scope of this book, the "Agisoft Meteshape" software, which is frequently used by engineering branches working on earth sciences, is explained in detail according to its different usage areas. The book will help those who want to learn the "Agisoft Meteshape" program and seek resources in other technical fields. Today, it is not possible to implement a project on the land without a map in rural and urban areas. It is used in many important areas such as maps, city plans, construction works, rural and urban area regulations, infrastructure, country defense, and many more. Mapping is a discipline that uses technology and in parallel with this, the need for fast data processing is growing day by day. It has become a necessity for surveyors to use computer programs. Especially with technology, the ways of accessing data and making data meaningful have also changed. In this sense, map production, especially from photographs taken by Unmanned Aerial Vehicles, has recently been developed and started to be used as a base for different disciplines.

The book has been prepared by combining the experiences of our professional life. However, it is possible that there are shortcomings. It is thought that it will be developed further in the process. To Mersin University for their software support; we would like to thank the company "Agisoft" and those who contributed. We hope that the book will be useful to our profession, users, and students.

**Murat YAKAR - Ali ULVI  
Abdurahman Yasin YİĞİT  
Seda Nur Gamze HAMAL  
Mersin - 2022**



# CONTENTS

<b>PREFACE .....</b>	<b>v</b>
<b>INTRODUCTION .....</b>	<b>1</b>
<b>1. MODELING of SMALL OBJECT 1. APLICATIONS .....</b>	<b>2</b>
1.1. Add Photos .....	2
1.2. Align Photos.....	3
1.3. Camera Calibration.....	5
1.4. Estimate Image Quality .....	8
1.5. Reference Setting .....	10
1.6. Point Cloud Deletion.....	11
1.7. Build Dense Cloud Obtaining.....	12
1.8. Build Mesh .....	13
1.9. Calibrate Color.....	17
1.10. Build Texture.....	18
1.11. Improving Texture Quality .....	22
1.12. Build Tiled Model .....	24
<b>2. MODELING of SMALL OBJECT 2. APLICATIONS .....</b>	<b>28</b>
2.1. Add Photos .....	28
2.2. Align Photos.....	29
2.3. Camera Calibration.....	30
2.4. Reference Setting .....	31
2.5. Delete point clouds.....	32
2.6. Build Dense Cloud.....	32
2.7. Build Mesh .....	34
2.8. Build Texture.....	35
2.9. Build Tiled Model .....	36
<b>3. DOCUMENTATION of CULTURAL HERITAGE (ÇİMCİME TOMB) .....</b>	<b>39</b>
3.1. Add Photos .....	39
3.2. Align Photos.....	40
3.3. Camera Calibraiton.....	43

3.4. Photo Quality Setting.....	46
3.5. Reference Setting .....	48
3.6. Delete Point Clouds.....	48
3.7. Build Dense Cloud.....	49
3.8. Build Mesh .....	51
3.9. Calibrate Color.....	54
3.10. Build Texture.....	55
3.11. Improving Texture Quality .....	59
3.12. Building Tiled Model.....	61
<b>4. DOCUMENTATION of CULTURAL HERITAGE (SELIME SULTAN TOMB) .....</b>	<b>65</b>
4.1. Add Photos .....	65
4.2. Align Photos.....	66
4.3. Camera Calibration.....	67
4.4. Reference Setting .....	69
4.5. Point Cloud Deletion.....	69
4.6. Build Dense Cloud.....	69
4.7. Build Mesh .....	70
4.8. Build Texture Model .....	72
4.9. Build Tiled Model .....	73
<b>5. CULTURAL HERITAGE DOCUMENTATION (YAKUTİYE MADRASA) .....</b>	<b>75</b>
5.1. Add Photos .....	75
5.2. Align Photos.....	76
5.3. Camera Calibration.....	77
5.4. Reference Setting .....	78
5.5. Point Cloud Deletion.....	79
5.6. Build Dense Cloud.....	79
5.7. Build Mesh .....	80
5.8. Build Texture Model .....	82
5.9. Build Tiled Model .....	83
<b>6. ORTHOMOSAIC and DIGITAL ELEVATION MODEL (DEM) GENERATION (1. APPLICATION).....</b>	<b>85</b>
6.1. Add Photos .....	85

---

6.2. Align Photos.....	87
6.3. Adding GCP (Marker) .....	90
6.4. Optimize Cameras.....	96
6.5. Build Dense Cloud.....	97
6.6. Build DEM .....	98
6.7. Build Orthomosaic.....	100
6.8. Export Orthomosaic/DEM .....	101
<b>7. ORTHOMOSAIC and DIGITAL ELEVATION MODEL (DEM) GENERATION (2. APPLICATION).....</b>	<b>103</b>
7.1. Add Photos .....	103
7.2. Align Photos.....	105
7.3. Add GCP .....	106
7.4. Build Dense Cloud.....	111
7.5. Build DEM .....	112
7.6. Build Orthomosaic.....	113
7.7. Export Orthomosaic/DEM .....	114
<b>8. MULTISPEKTRAL (MS) UAV IMAGES APPLICATIONS 1 .....</b>	<b>115</b>
8.1. Add Photos .....	115
8.2. Calibrate Reflectance.....	118
8.3. Align Photos.....	121
8.4. Optimize Cameras.....	122
8.5. Build Dense Cloud.....	123
8.6. Selecting the Primary Channel.....	126
8.7. Build DEM .....	127
8.8. Build Orthomosaic.....	129
8.9. Set Raster Transform .....	130
8.10. Export Orthomosaic .....	132
<b>9. MULTISPEKTRAL (MS) UAV IMAGES APPLICATION 2.....</b>	<b>135</b>
9.1. Add Photos .....	135
9.2. Calibrate Reflectance.....	136
9.3. Align Photos.....	139
9.4. Optimize Cameras.....	140

9.5. Build Dense Cloud.....	141
9.6. Set Primary Channel.....	143
9.7. Build DEM (DEM Oluşturma).....	144
9.8. Build Orthomosaic.....	146
9.9. Set Raster Transform .....	147
9.10. Orthomosaic Export.....	149
<b>10. CALCULATION of VOLUME and AREA: MINING SITE EXAMPLE with GCPs.....</b>	<b>151</b>
10.1. Add Photos.....	151
10.2. Align Photos.....	153
10.3. GCP (marker) Adding.....	154
10.4. Optimize Cameras.....	158
10.5. Build Dense Cloud.....	159
10.6. Build DEM.....	160
10.7. Build Orthomosaic.....	162
10.8. Cross Sections, Volume and Area Measurement.....	163
<b>11. CALCULATION of VOLUME and AREA Application 2: MINING SITE EXAMPLE without GCPs.....</b>	<b>167</b>
11.1. Add Photos.....	167
11.2. Align Photos.....	169
11.4. Optimize Cameras.....	170
11.5. Build Dense Cloud.....	171
11.6. Build DEM.....	173
11.7. Build Orthomosaic.....	174
11.8. Cross Sections, Volume and Area Measurement.....	176
<b>12. CREATING DEM and ORTHOMOSAIC MODEL from SATELLITE IMAGES.....</b>	<b>179</b>
12.1. Add Photos.....	179
12.2. Align Photos.....	182
12.3. Optimize Cameras.....	184
12.4. Build Dense Cloud.....	185
12.5. Build DEM.....	186
12.6. Build Orthomosaic.....	187

---

<b>13. SPHERICAL PANORAMAS GENERATION from UAV IMAGES.....</b>	<b>189</b>
13.1. Add Photos.....	189
13.2. Setting Camera Station.....	190
13.3. Align Cameras.....	191
13.4. Build Panorama and Export Panorama.....	192
<b>REFERENCES .....</b>	<b>195</b>