

FLIGHT OF THE CONDOR



Vexcel Imaging CEO
Alexander Wiechert

AS THE LATEST ADDITION TO VEXCEL'S PORTFOLIO OF FOURTH GENERATION CAMERA SYSTEMS MAKES ITS DEBUT AT THIS YEAR'S INTERGEO EXPO, GEOCONNECTION TALKS TO VEXCEL IMAGING CEO, **ALEXANDER WIECHERT**, ABOUT A DEVELOPMENT THAT TAKES WIDE AREA MAPPING TO NEW HEIGHTS

GEO: The UltraCam Condor multi-cone camera system was introduced in 2016 for high altitude, wide area mapping at high resolution. You are now launching the Condor 4.1. Is this a complementary model? Or, as with the Osprey 4.1, a fourth-generation replacement for the Condor Mk1?

ALEXANDER WIECHERT (AW): The UltraCam Condor 4.1, the next addition of Vexcel Imaging's 4th camera generation, is the successor to the Condor M1 and sets a new standard for wide-area and high-altitude mapping. Specifically designed and optimized for nationwide mapping, the UltraCam Condor 4.1 boasts an impressive image footprint of more than 48,400 pixels across the flight strip. Combining a



high-resolution RGB strip and lower resolution rectangular PAN and NIR images, the UltraCam Condor 4.1 delivers imagery of the utmost quality for wide area mapping.

GEO: What were the business/technical drivers for this new model and what are its key features?

AW: The UltraCam Condor 4.1 addresses a very specific application: high-altitude ortho image generation with superior image quality. Technically, the time was right to utilize latest CMOS technology for this sensor to move flying efficiency to the next level. That also drives the business cases for this camera. If you want to map a state or a continent, it's all about flying efficiency. The unique camera design of the Condor 4.1 consists of a very wide, high-resolution RGB array that delivers the highest resolution and flying efficiency due to its impressive across track footprint of 48,460 pixels. The system also features a lower resolution rectangular NIR for classification projects and a lower resolution rectangular PAN for producing highly accurate DSMs and DTMs through dense matching. Due to the rectangular image footprint, frontlap of 85% is obtained for maximum dense matching quality. This breadth of functionality eliminates the need for additional flights by other sensors given that all necessary data sets can be derived from a single Condor 4.1 flight.

To sum up, the wide-area mapping system enables the recording of entire continents from great heights at astonishing speed and efficiency with photogrammetric accuracy.

GEO: Did TU Graz contribute to its development? And if so, over what timescale?

AW: The camera was solely developed by Vexcel in co-operation with its suppliers. Having said this, we have an on-going strong connection to the Technical University of Graz when it comes to master thesis, for example. Also, more than one student or researcher found his first job at Vexcel.

GEO: In 2019, Vexcel began its Blue Sky country-wide imaging programme in Europe using the Condor M1. Can you say how this is progressing and what Condor-acquired imagery is now available from the Vexcel aerial image library?

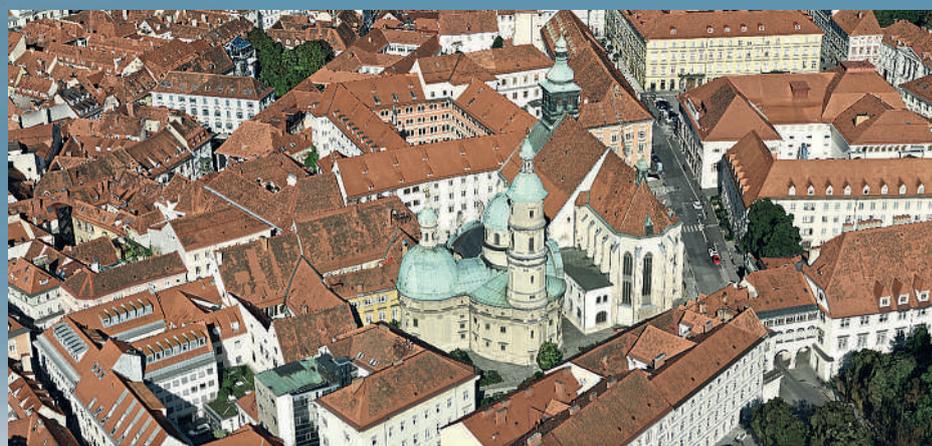
AW: In 2019 the collection in Europe began with a focus on Germany, thanks to customer prioritization. That continued in 2020 and full coverage across Germany has since been available. We continue flying the Condor and Osprey systems across Europe in 2021 and are adding important cities and additional coverage day by day.

GEO: Has last year's acquisition of the 100-strong fleet of survey planes from Verisk contributed to this programme?

AW: Yes, absolutely. The US collection for the Vexcel Data Program (VDP) is now based on our own planes whilst in other parts of the world we continue co-operating with our customer base. Also, we have standardized the whole image pipeline on UltraCam collection and UltraMap production and have



The UltraCam Condor 4.1



UltraMap 3D model (top) and UltraMap Ortho/DTM/DSM (below)



Comparison AMC/no AMC

rolled this out across all processing sites.

GEO: Will the new model be backward-compatible with UltraMap photogrammetry software?

AW: In addition to the hardware and electronics improvements incorporated into the UltraCam Condor 4.1, significant changes were made in the UltraMap processing software to better accommodate high altitude data. Benefitting from improvements in the latest UltraMap V5, the Condor 4.1 is a highly efficient and super precise measurement instrument that allows for the generation of downstream data products such as point clouds, DSMS, DTMS and 3D TINS. So, like all other UltraCam models, the Condor 4.1 is fully integrated into the UltraMap workflow. Clearly, a new version of UltraMap is required to process the imagery of this new sensor.

GEO: Earlier this year, the Osprey 4.1 was the first to be equipped with Vexcel's game-changing Adaptive Motion Compensation (AMC) software to counter motion blur. Will this also be on offer with the Condor 4.1?

AW: Yes, the Adaptive Motion Compensation is a special feature to all 4th generation UltraCam aerial sensors, and the Condor 4.1 will also feature AMC on all camera cones. Compensating the motion blur of an aerial platform while capturing aerial imagery is a challenge that has been addressed by different implementations throughout the history and we are very proud to offer a unique software-based approach to compensate for multi-directional and multi-scale motion blur.

GEO: How does AMC differ from Forward Motion Compensation?

AW: AMC is an innovative motion compensation approach that, in addition to correcting image blur in the direction of flight (the so-called Forward Motion Compensation or FMC), also addresses blur caused by multi-directional camera movements during the flight. Additionally, AMC compensates for ground sampling distance variations in oblique imagery with fantastic results. The operating principle is based on using high frequency inertial measurement Unit (IMU) data to record the camera movement during the exposure. This information is used in a non-blind deconvolution algorithm to calculate a filter kernel which removes the motion induced image blur, regardless of its direction. Compared to mechanical FMC implementations, a softwarebased approach also has the advantage that no moving parts are needed and thus no abrasion exists.

GEO: Will (or how is) the Condor 4.1 data contribute/contributing to the Vexcel Gray Sky disaster response programme?

AW: Yes, for sure. Depending on the scenario, the Condor 4.1 will also make a difference here. Turnaround time is essential when it comes to Gray Sky. For example, a few years ago Puerto Rico was captured by a Condor M1 in record time—just one day—to help the people on the ground as quickly as possible. The Condor 4.1 will further shorten that process.

GEO: Earlier this year, in a presentation to the Austrian Business Agency's Open Day 2021, you suggested Vexcel had a 50% share

of the global market for large format aerial cameras. Do you expect this to increase with this latest addition to the product portfolio?

AW: This is clearly the expectation. The new 4th generation cameras are setting the standard in each segment and combined with UltraMap, one gets an unmatched powerful solution. The market has always reacted very positively to our constant innovations. We worked a lot on our production capacity but nevertheless, the annual production of the Osprey 4.1 in 2021 was sold out in just a few weeks following the product announcement. We are confident, that the Condor 4.1 will be similarly successful.

GEO: Can we expect to see further Fourth Generation cameras being introduced by Vexcel, a Falcon or Eagle 4.1 perhaps?

AW: Vexcel Imaging is well-known for its ongoing improvements and constant updates. So yes, the entire range of UltraCam aerial cameras will benefit from the new design of the 4th generation, with an expected gain in efficiency between 15-40% depending on the camera model. Next in line will be the new version of the UltraCam Eagle, which is planned to be launched in fall 2022.

GEO: Where can readers find out more about the Condor 4.1?

AW: We are launching the Condor 4.1 at this year's Intergeo in September. So, whoever happens to be there, we are happy to introduce the special Condor features live in Hannover. Of course, all relevant information can also be found on our website at www.vexcel-imaging.com.



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