Sony GM Wide Angle lenses

by Massimo Franzese

Rectilinear lenses are frequently associated with problems within the underwater photographer community. Many times fisheye lenses that are not mainstream success become cult lenses underwater, like the Tokina 10-17mm for cropped sensor. We ask ourselves would it get any better if I get a really good topside lens? Is it worth housing it?

Unfortunately this is not that simple and it is due to water. The water glass interface makes things complicated and many people, even respectable photographers, don't get their head around the physics of dome ports and the drawbacks.

It is probably helpful to have a recap of few key features of dome ports:

1. Preserve field of view of the lens
2. Do not introduce distortion
3. Cause the camera to focus much closer than in air
4. Increase depth of field
5. Introduce spherical aberrations and field of curvature

The first two points require your dome to be properly sized and positioned. Unfortunately I have not located a comprehensive system to determine the parameters so I had to write it myself you can find it here. There are also empirical methods but are hard to replicate without a good set up.

Now assuming that your dome system is correctly set up we want to understand the value of spending considerable money on top quality lenses.

Caribbean Blue 14mm f/16 1/125 500

Sponge Up 14mm f/16 1/200 500

The average underwater photographer does not engage in lots of topside photography and therefore will look for more affordable options, however some have some good topside lenses and want to know if they will get good results housing them.

I happen to do a lot more topside photography than underwater and therefore I own two lenses that have a solid reputation in the Sony E-Mount system. One is the 14/1.8 GM well known by low light photographers and the other is the 16-35/2.8 GMII recently released and one of the best wide angle zoom ever made for e-mount.

I also own a Zen DP230 and a Nauticam Wide angle port 180mm and in a recent family holiday to Grenada I took the Zen, that is able to host the 14mm field of view, on the trip and shot both lenses underwater. Using my own method I calculated the required extensions. For the 14mm, it did not

coincide with manufacturer recommendations.

First of all let me start with an assessment of the lenses on their own merits.

The 14mm GM is a compact lens with a price of £1,399 and can be found on offer at certain times of the year. The lens' most important feature is that it is relatively small and fast, this also means that the smallest aperture is f/16 which is a clear limitation underwater. My interest in this lens was mainly for split shots and I got some decent results with my daughter modelling. Obviously I do not have a rich coral reef to check all the edge details however I would say this lens is going to work if you already have it.

I also took the lens on an open water dive to see how it worked and due to the wide field of view the lens presents the typical issues of rectilinear lenses even stopped down. Due to the shape of the optics the lens has no filter thread, solutions like the sea and sea corrector will not work (assuming that they have a real benefit) and you are limited to f/16 which means there are situations where this is a problem. The lens performed better on super close shots than it did on mid range shots. I believe this is due to the field of curvature increasing as you focus further away. Few shots to provide context support this view. In the future I believe a split shot at f/16 is the only situation I would consider this lens. I would even go and say that unless you have a low light use case this is a lens not to be invested in for sole underwater use because the use case is fairly small.

Moving on to the 16-35GMII the situation is different. First of all this lens is very consistent centre to edge sharpness and this benefit is apparent in water. Shooting the lens at f/11 provides decent quality photos even at close range and I did not feel the need to stop down. I believe this is due

Guide 16-35mm f/11 1/80 500

to the fact that the field of view being wide but not extremely wide contains the field of curvature issue and therefore you get many good images.

The lens is £2,299 at time of writing and unless you have a strong topside use case this will not be something you will fancy and most likely opt for the Tamron 17-28 that I have tested extensively and recently sold to Alex Mustard.

Turtle Bay 16-35mm f/11 1/80 500

If instead you have a strong topside use case, the lens is just a killer and works totally fine with the 180 wide angle port providing a more compact set up than the Zen 230.

I took several shots with the purpose of purely testing the optics underwater after having done many pool assessments, the results were consistent across the field.

Swarm 15mm fisheye f/16 1/80 500

Purple Rain 14mm f/13 1/200 500

Now all been said the performance of rectilinear lenses underwater can never match what that same lens would do on land. Is there anything else that can be done?

As a compendium to this article I want to include some post processing tips that may address concerns of certain people that want that edge to edge sharpness but of course this comes at a price.

If you are interested in your rectilinear lens to be truly rectilinear this means you will use a lens profile which will give you very straight lines but also bring out the field of curvature issues mentioned at the beginning of this article. However if you are more worried about better edges, perhaps because you have reef scenes and the edges are just a distraction, there are a number of things you can do.

Starting from the Sony 14 GM this lens uncorrected has a modest -2.25% distortion, the minus indicates barrel distortion. Your first step is to disable lens correction, bearing in mind that this will also eliminate the vignette correction so perhaps you just want to set distortion correction to zero and adjust the vignette to a value you like. This will give you an improvement because barrel distortion compensates for blurry edges. The second step, which would do if you were not shooting a wreck interior, would be to add barrel distortion. I found that -25% brings good results and can be applied if straight lines are not essential, this will be still much more straight than a fisheye lens and mostly occur at the edges.

When it comes to the 16-35GII this lens exhibits what is referred to as moustache distortion and therefore you need to consider what you are doing more carefully. You have 3 options: one is to just apply the correction if straight lines are to be totally perfect, the second is to disable corrections which will improve matters but affect the centre, the third is to introduce barrel distortion after correction which will only alter the edges. I did not find the 16-35 to really need the added distortion but at the end is your preference. What I can say is that unless you shoot a pool wall you won't be able to tell things apart and edges are at the end ok even compared to a fisheye.

I want to close on a note on fisheyes and here provide some images from the same trip. Contrary to common belief the reason why fisheye shots looks good underwater is the barrel distortion itself that compresses

Trumpet 16-35mm f/11 1/125 500

Sponges and diver 15mm fisheye f/16 1/50 500

the edges supported by the increased depth of field of the dome port. Ultimately I do not see how a 15mm fisheye edge is really better than the 16-35mm images and for me that is in essence the badge of approval for the 16-35GMII.

Other reasons why the 16-35GMII performs so well is that it focuses close allowing you to get identical results with the smaller wide angle port which is a big benefit for portability.

In summary spending money on a top of the range wide angle lens is not a guarantee of results underwater, and the parameters to get optimal performance from a rectilinear lens remain the following:

1. Get a lens that is sharp across the frame to start with as things do not get better underwater
2. Make sure your lens focuses close and does not have drop of sharpness at close range as your focus distance behind a dome will be around the 30 cm mark
3. Check the physical design to ensure the lens can focus inside the dome so that it has the maximum range of focus underwater, this is important if you shoot splits to have a sharp water line
4. Evaluate yourself the extension required and do not follow blindly manufacturers port charts if you want to squeeze the maximum out of your set up
5. If possible check that the lens has limited field of curvature at close range as in water this will get worse

On a final note I want to add that if you are truly obsessed by edge sharpness you should consider a cropped format for example micro four thirds. Due to the additional depth of field your rectilinear shot at the edges will look better however you will loose in centre performance and resolution compared to a high megapixel full frame camera.

Massimo Franzese
www.interceptor121.com