

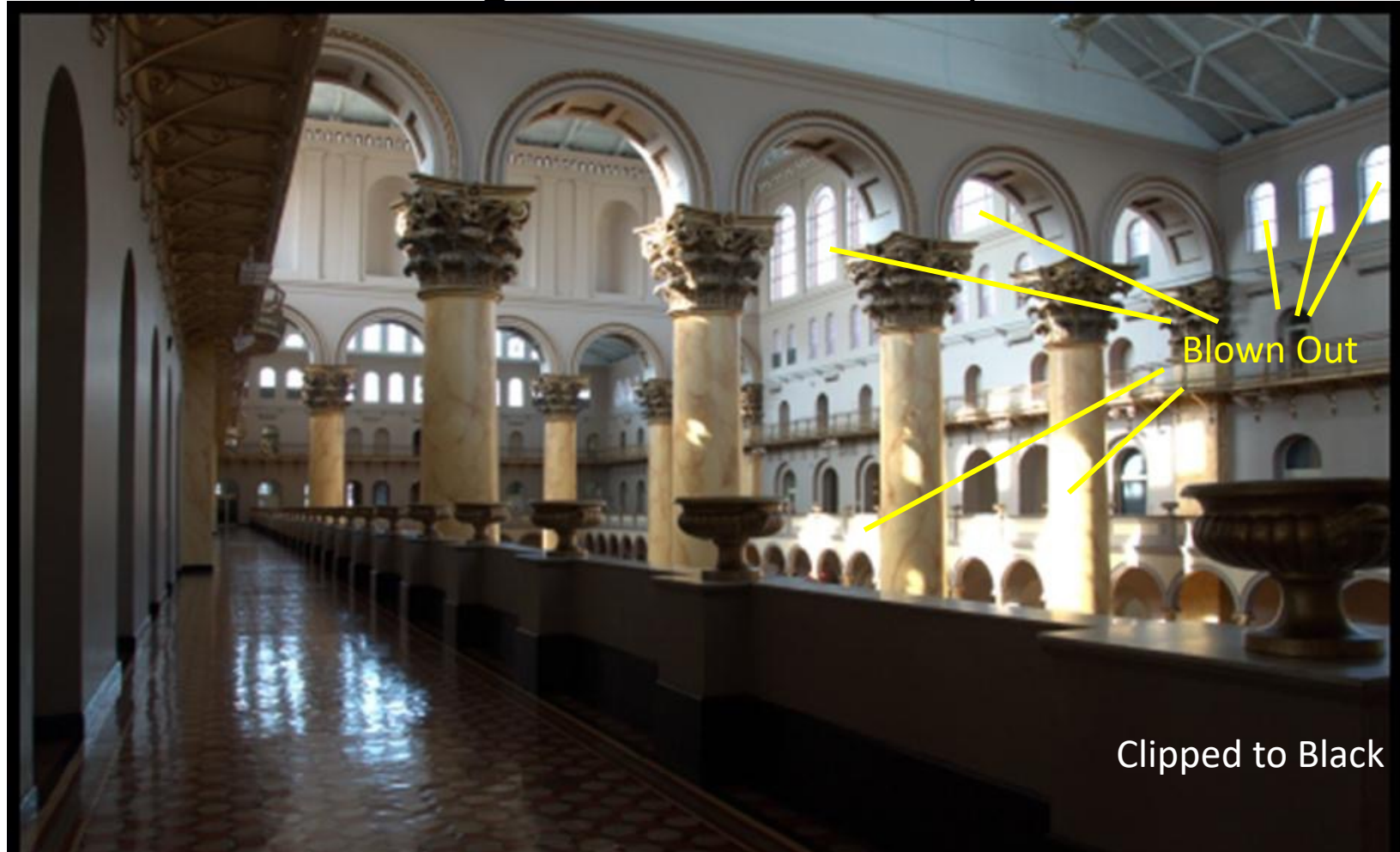
Intro to High Dynamic Range (HDR) Photography

Dennis Freeman

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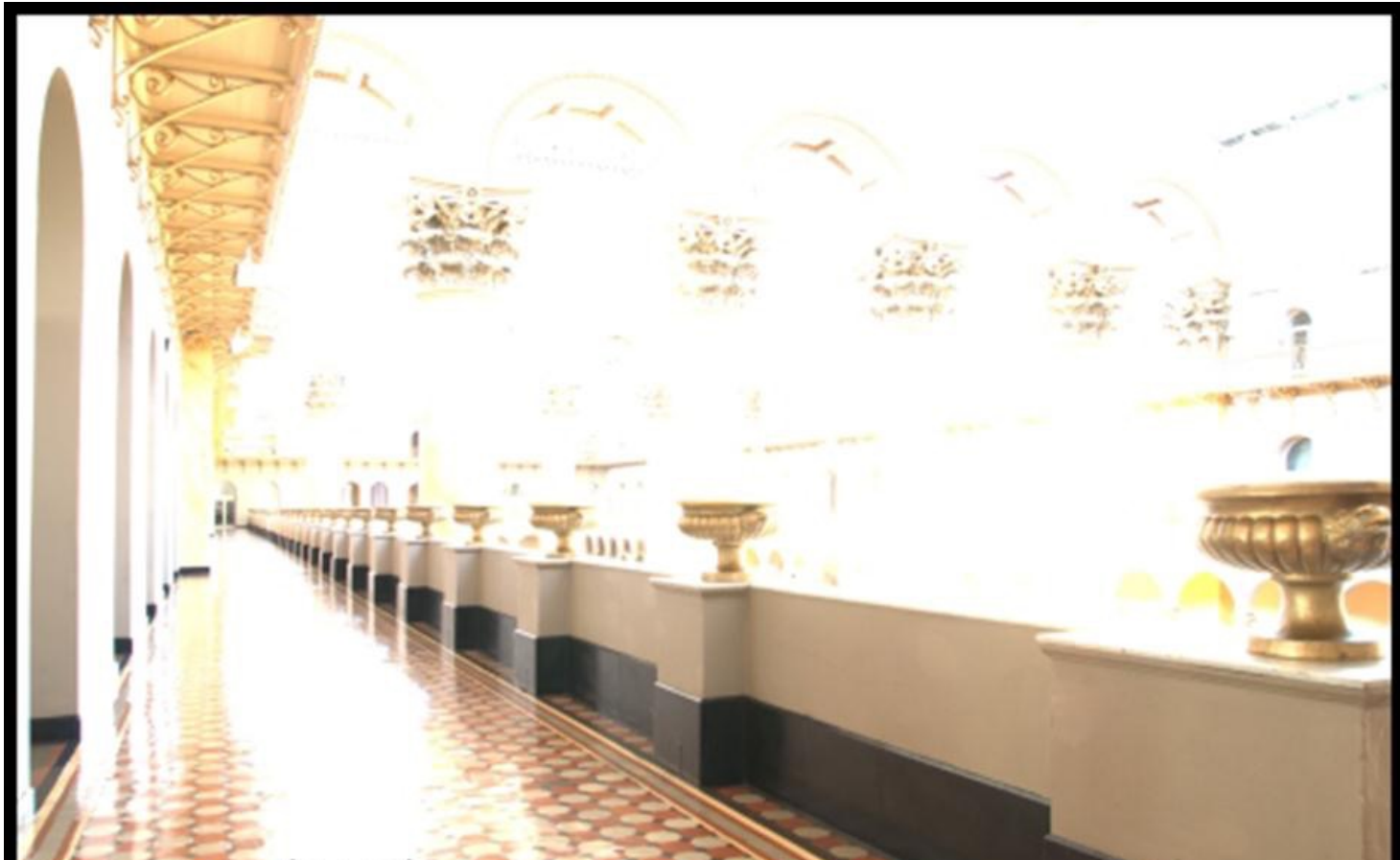
When do we Need HDR?

National Building Museum Example:



If we expose for the columns (a middle tone) in between the bright areas and the dark areas, we blow out the windows/right wall and clip the floor/wall.

Expose the darker areas



If we expose the dark wall base that meets the floor properly, then the windows and walls all get blown out.

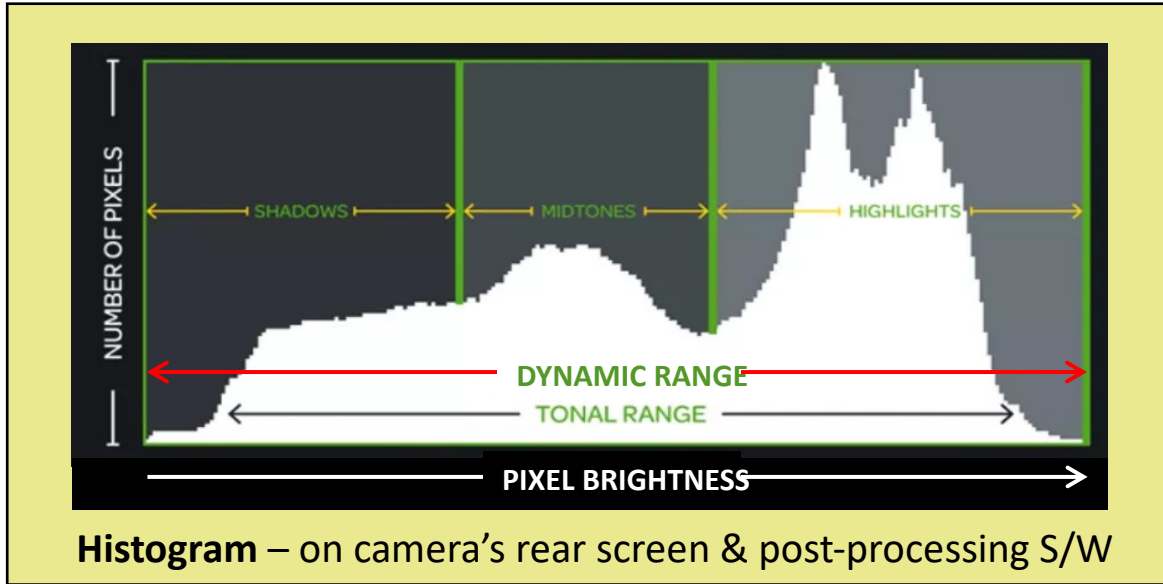
Expose the brighter areas



If we expose for the window light properly (the brightest tones), then most everything else is clipped to black.

Why did this happen?

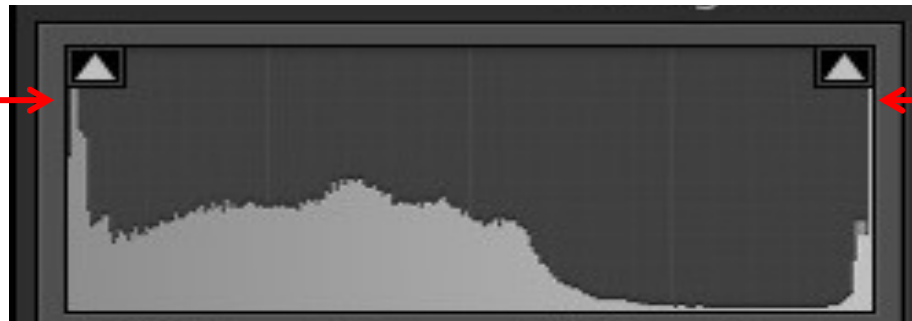
- *Dynamic range* is the difference between the lightest light and darkest dark your camera can capture in an image.



Modern digital cameras have 12-15 stops dynamic range. That's a factor of 8 difference in brightness ranges between cameras.

When Scene's Tonal Range > Dynamic Range:

Clipped black pixels



Blown out white pixels

What to do? HDR!

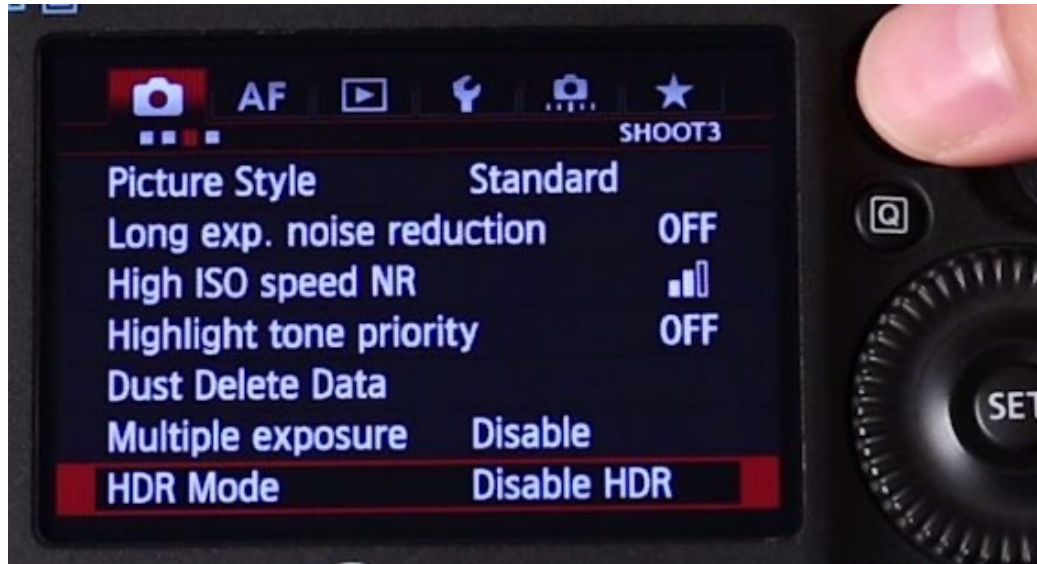
- Capture several images over a range of exposures
- Combine them with HDR processing – Nice!



When and How to use HDR

- Stationary subject and background scene
- Tripod
- Low ISO setting (maximizes camera dynamic range)
- Shoot in RAW
- Check your Histogram
- Look in the settings (Menu) and turn on the HDR mode. Can't find HDR? Check the instructions, as the setting could be called BKT, auto exposure bracketing, or AEB.

In-Camera HDR Mode



If your camera has HDR Mode, it is likely in the Menu.

In-camera HDR not nearly as good as post-processing HDR. Need to save all the source exposure images for post-processing.



Usually can adjust the dynamic range steps between frames, the number of frames, and other parameters.

Save the source images! If camera only saves the HDR result, don't use HDR Mode – use AEB.

HDR with Auto Exposure Bracketting



Nikon



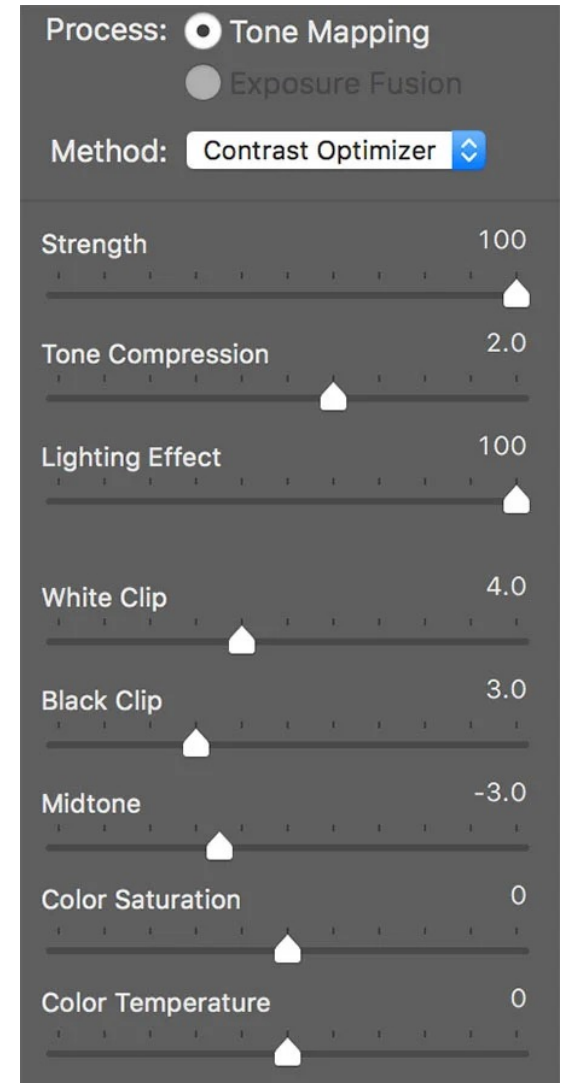
Canon

Optimal Settings for HDR Source Images (Frames)

- The camera controls the *shutter speed* to produce the median, darker, and brighter exposures.
- **2 Stop or 3 Stop Difference per Frame? (A stop = EV in camera)**
 - **3 Frames at 3 Stop Step per Frame:**
 - Median Frame: 1/1000 sec
 - Dark Frame = 1/1000 sec -3 stops = 1/8000 sec (camera limit)
 - Bright Frame = 1/1000 sec + 3 stops = 1/125 sec (motion blur...)
 - **3 Frames at 2 Stop Step per Frame is Usually Best:**
 - Median Frame: 1/2000 sec
 - Dark Frame = 1/2000 sec -2 stops = 1/8000 sec (camera limit)
 - Bright Frame = 1/2000 sec + 2 stops = 1/500 sec (no motion blur)

HDR Post-Processing

- When creating an HDR image, you are compressing from a very high dynamic range into a normal dynamic range, lowering the contrast of the image, and turning it into a not-so-attractive “flat” photo.
- “Tone mapping” helps bring back the mid tone contrast and re-map the histogram, improving flat-looking HDR images.



HDR Issues

- **Image Alignment**

- Mis-alignment of frames is an issue. Tripod, a still scene, remote release, etc to align them perfectly when shooting, software can help with small adjustments.

- **Ghost Removal**

- If something has moved between the raw files, there may be a ghost in the final image. You can enable a ghost removal function in the combining process.

- **Noise Reduction**

- By combining different files, random noise can be eliminated by HDR software. This will result in a cleaner image.

- **What You Should Expect from HDR Software**

- The output file will be flat before any tone mapping
- HDR images require some adjustment and tuning
- You need to focus on composition and timing

- **What You Should NOT Expect**

- Stunning results from one attempt
- Tone mapping with zero noise
- Ghost removal and image alignment to work perfectly every time

Bad HDR – ah, the good old days.

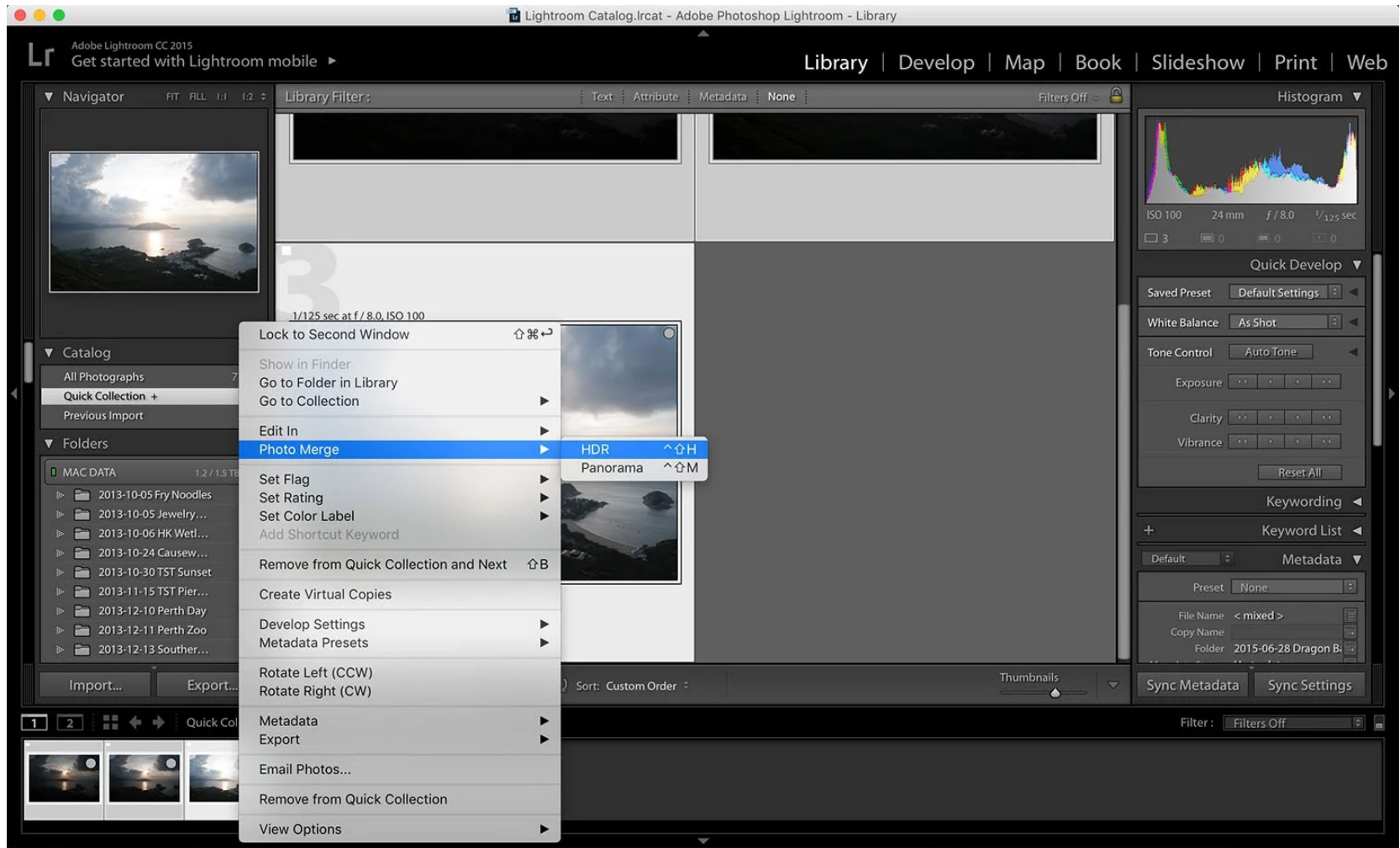


- In the early days HDR got a bad reputation when people started sharing results like these. Yikes!
- <https://fotographee.com/hdr-mistakes/>

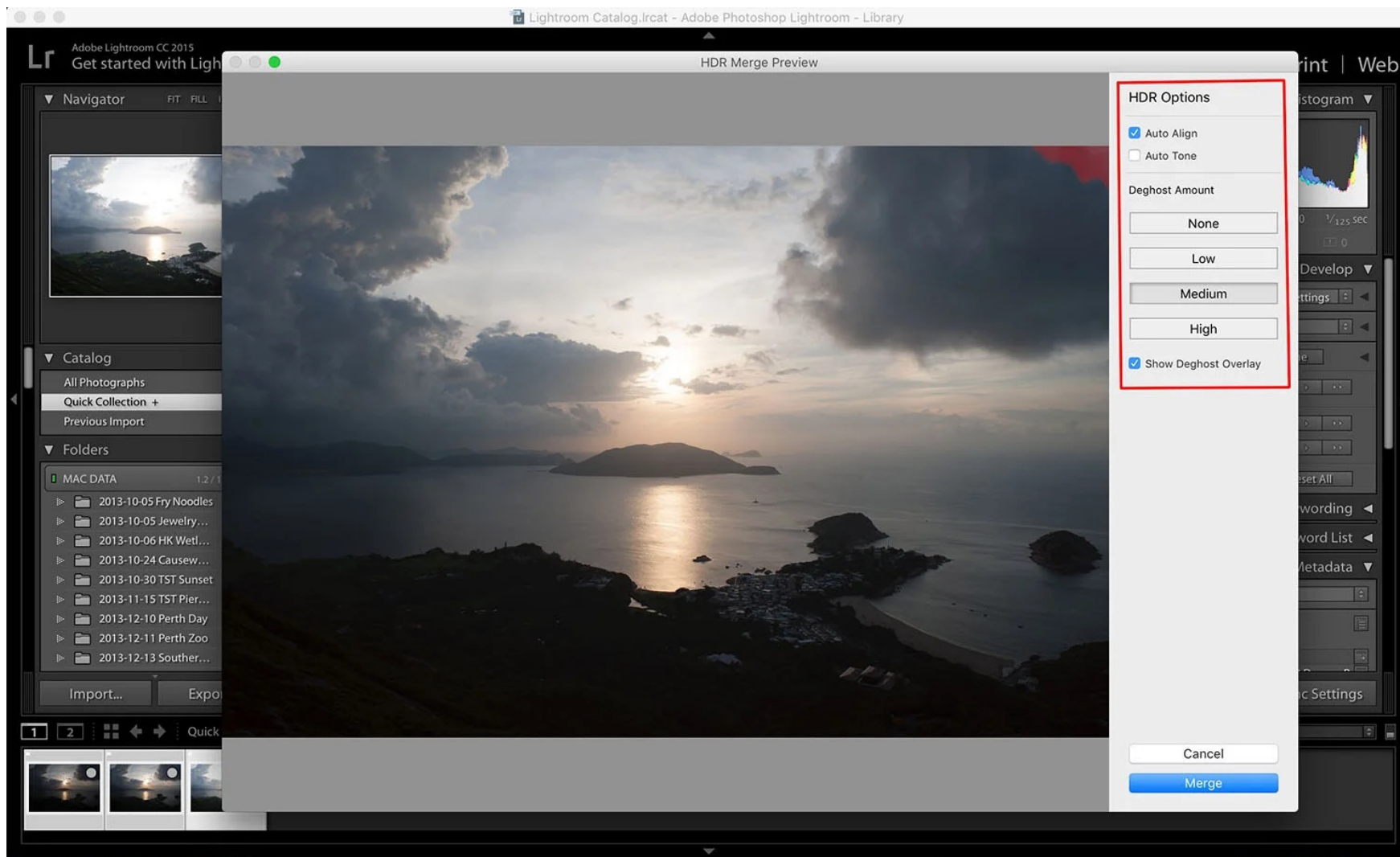
Some HDR Software Options

	Lightroom	Photoshop	Photomatrix Pro
Price	\$9.99/month combo plan		\$99-\$119 options
Pros	<ul style="list-style-type: none"> - can output DNG raw file - can seamlessly group together with other images - very natural looking output 	<ul style="list-style-type: none"> - super accurate images alignment and powerful ghost removal - can edit final image with all Photoshop tools - lots of plug-ins for styling and toning 	<ul style="list-style-type: none"> - designated tone mapping tools available - can create ultra realistic images easily - batch processing which is great for HDR timelapse
Cons	<ul style="list-style-type: none"> - no batch processing - no designated tone mapping tools 	<ul style="list-style-type: none"> - no batch processing - no raw file output 	<ul style="list-style-type: none"> - "Bad HDR look" if you are not careful - no raw file output
Suitable for	Natural looking HDR photography, landscape photographers	Perfectionist photographers who want to be able to do lots of retouching options	Artistic photographers, timelapse photographers

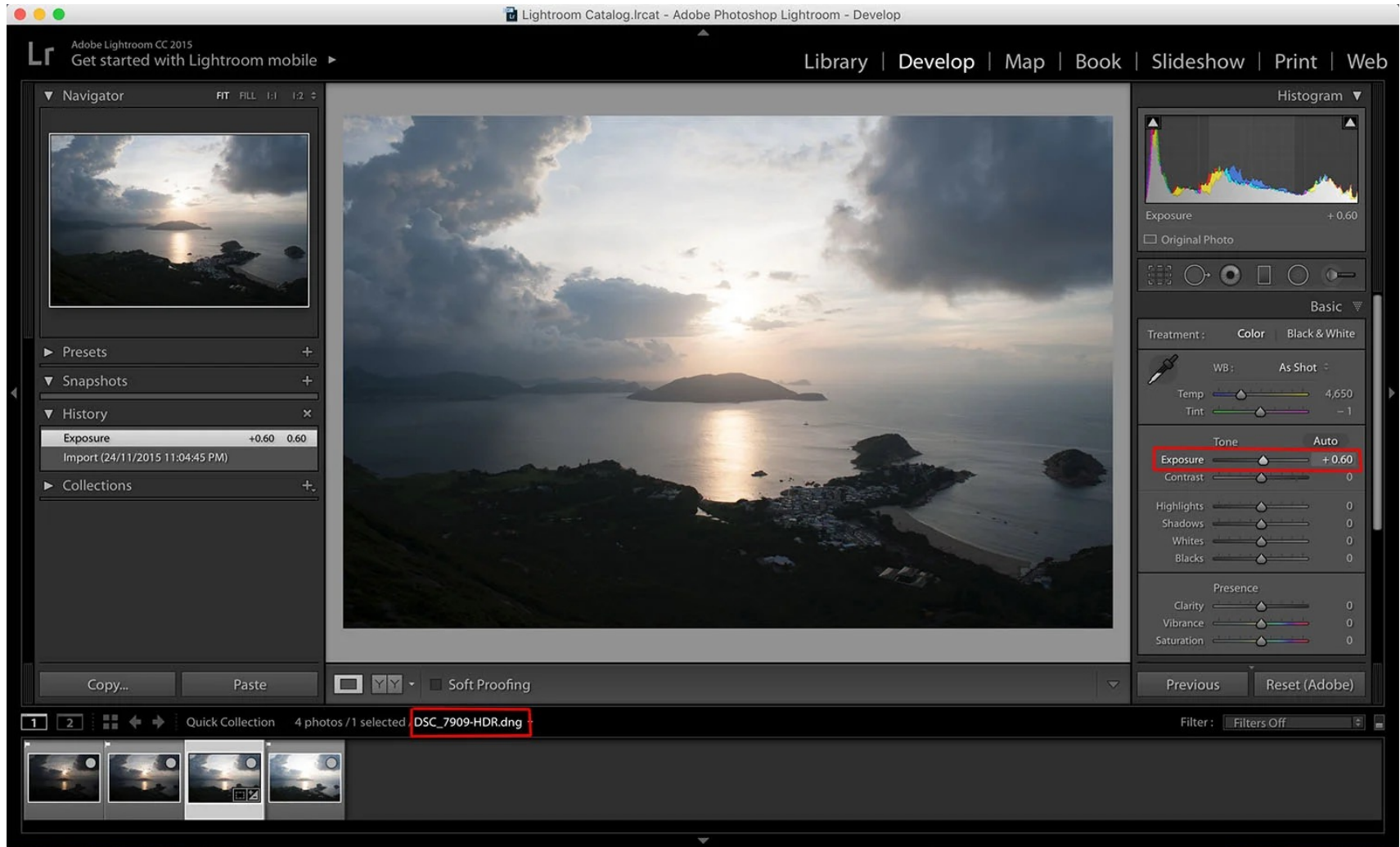
Adobe Lightroom



Lr – Auto-Align/deGhost Images



Lr Adjustments to New HDR Image



HDR Software Reviews

- <https://captainkimo.com/hdr-software-review-comparison/>
- <https://expertphotography.com/whats-the-best-hdr-software-lightroom-vs-photoshop-vs-photomatix-pro/>
- <https://expertphotography.com/free-hdr-software/>

The End

Backup

Camera Dynamic Range

Modern cameras have maximum dynamic ranges between 12 – 15 stops

- Nikon D850 – 14.8 stops at ISO 64
- Sony α7R IV – 14.7 stops at ISO 50
- Nikon Z7 – 14.6 stops at ISO 64
- Canon R5 – 14.6 stops at ISO 100
- Canon R – 14.1 stops at ISO 800
- Canon 5D Mark IV – 13.6 stops at ISO 100
- Panasonic Lumix DC-GH5 – 13 stops at ISO 200
- Olympus E-M1 Mark II – 12.8 stops at ISO 200

