Digital Infrared Photography

Presented by
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Discover the Light
PHOTOGRAPHY

Topics Covered

- Examples
- What is infrared light?
- How do you convert a DSLR to shoot IR?
- What are good camera choices for IR?
- Which IR conversion filter should you choose?
- How do you shoot digital infrared?
- What are the limitations and issues?
- What are good subjects for IR?
- Resources
- My IR Cameras
- Post Processing

Examples


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720 nm Canon G10
ISO 100, f/5.6, 1/100s

720 nm Canon G10
ISO 200, f/4.5, 1/80s

720 nm Canon G10
ISO 400, f/4.5, 1/30s

720 nm Canon G10
ISO 320, f/5.6, 1/60s

720 nm Canon G10
ISO 125, f/5.6, 1/100s

720 nm Canon G10
ISO 100, f/5.6, 1/40s

720 nm Canon G10
ISO 160, f/5.6, 1/100s

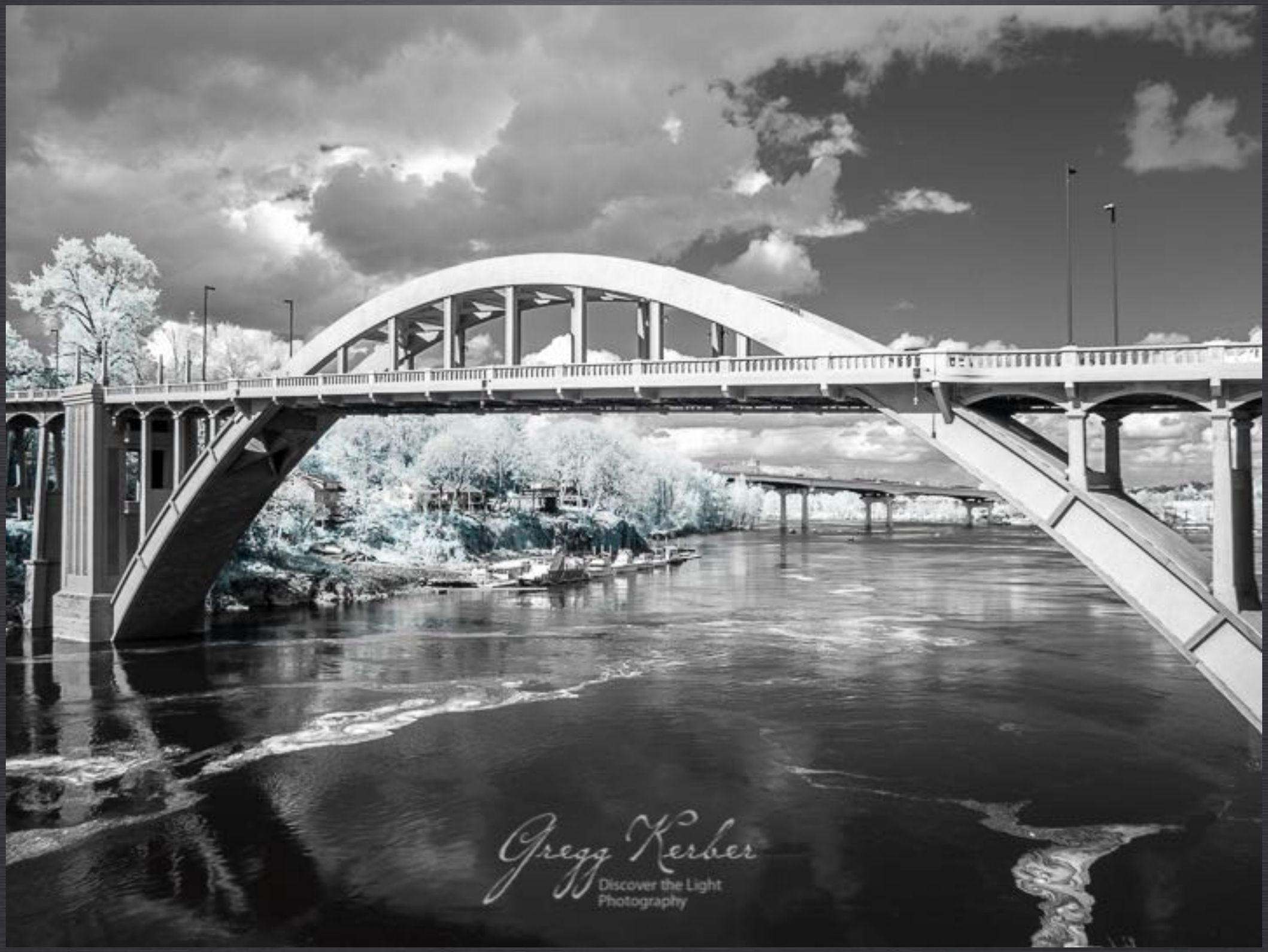
720 nm Canon G10
ISO 320, f/5.6, 1/250s

720 nm Canon G10
ISO 100, f/8, 1/125s

720 nm Canon G10
ISO 100, f/5.6, 1/125s

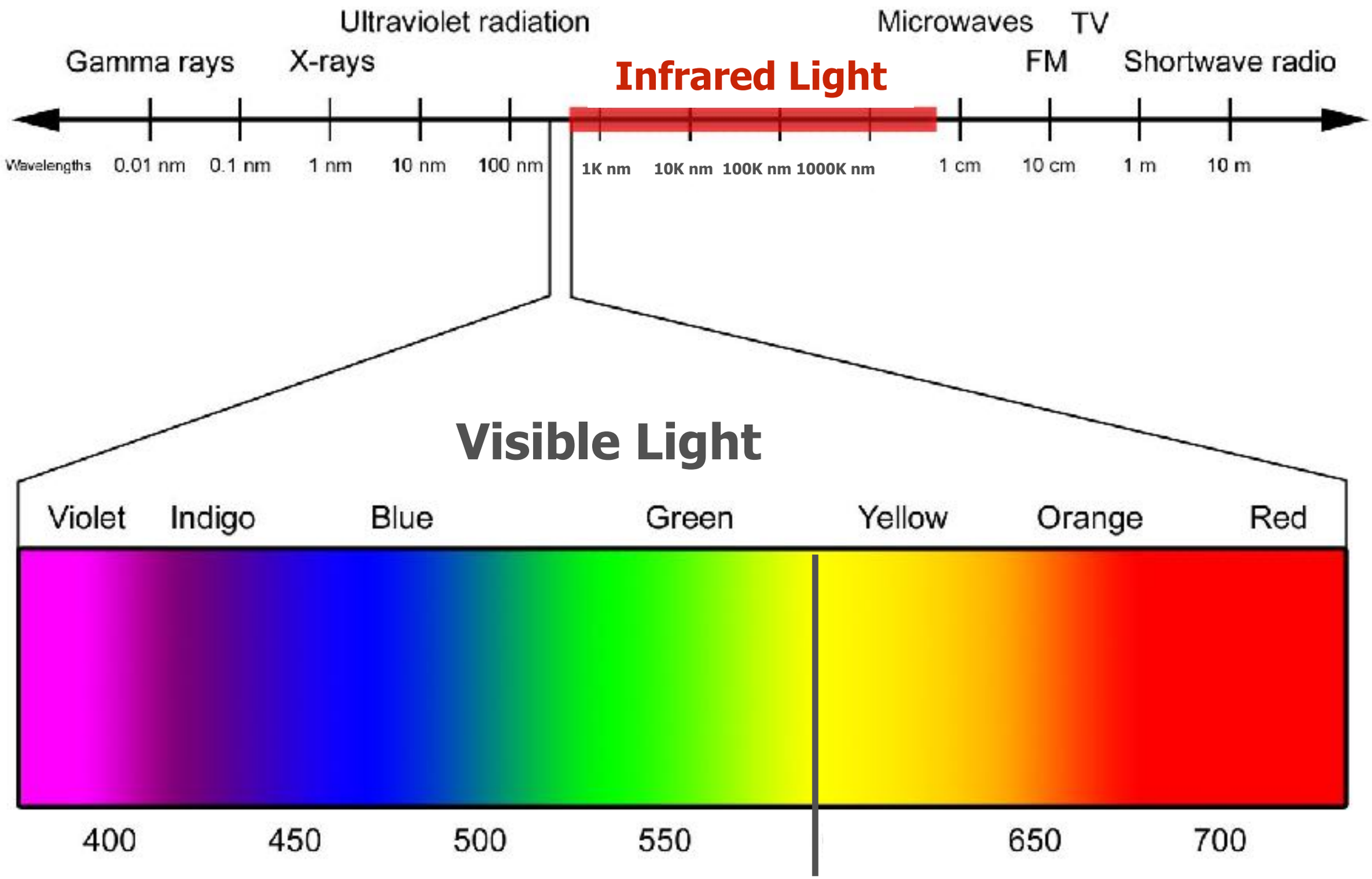
720 nm Canon G10
ISO 200, f/5.6, 1/13s

720 nm Canon G10
ISO 100, f/5.6, 1/100s



590 nm Olympus EPL5
ISO 200, f/8, 1/250s

What is infrared light?


Ultraviolet radiation
Microwaves
TV
Gamma rays
X-rays
Infrared Light
FM
Shortwave radio
Wavelengths
0.01 nm
0.1 nm
1 nm
10 nm
100 nm
1K nm
10K nm
100K nm
1000K nm
1 cm
10 cm
1 m
10 m
Visible Light
Violet
Indigo
Blue
Green
Yellow
Orange
Red
400
450
500
550
650
700
590
IR Photography
WAVELENGTH, nm

How do you convert a camera to shoot IR?

Screw-on IR Filter

- Lower cost than camera conversion ($30-$150 depending on filter size)
- Limited to VERY long exposures (about 14 stops of light reduction = > 20s exposures)
- Does not work well on certain cameras
- Impossible to get exposure, focus, and composition with filter attached
- Requires more post processing

Camera Conversion (internal IR filter)

- Low-pass filter in front of sensor is removed
- IR filter is installed
- Custom white balance installed
- Cost: Base price = $175 (P&S) to $275 (MFT, APS-C, FF)
- Camera will shoot IR only
- Long exposures not required

- You could do it yourself

But I wouldn't

What are good choices for IR cameras?

Camera Considerations

- Point & Shoot
- Mirrorless
- DSLR (one with Live View)
  - Consider a used camera or one that's been sitting around not being used anymore
  - Check with conversion company for compatible cameras

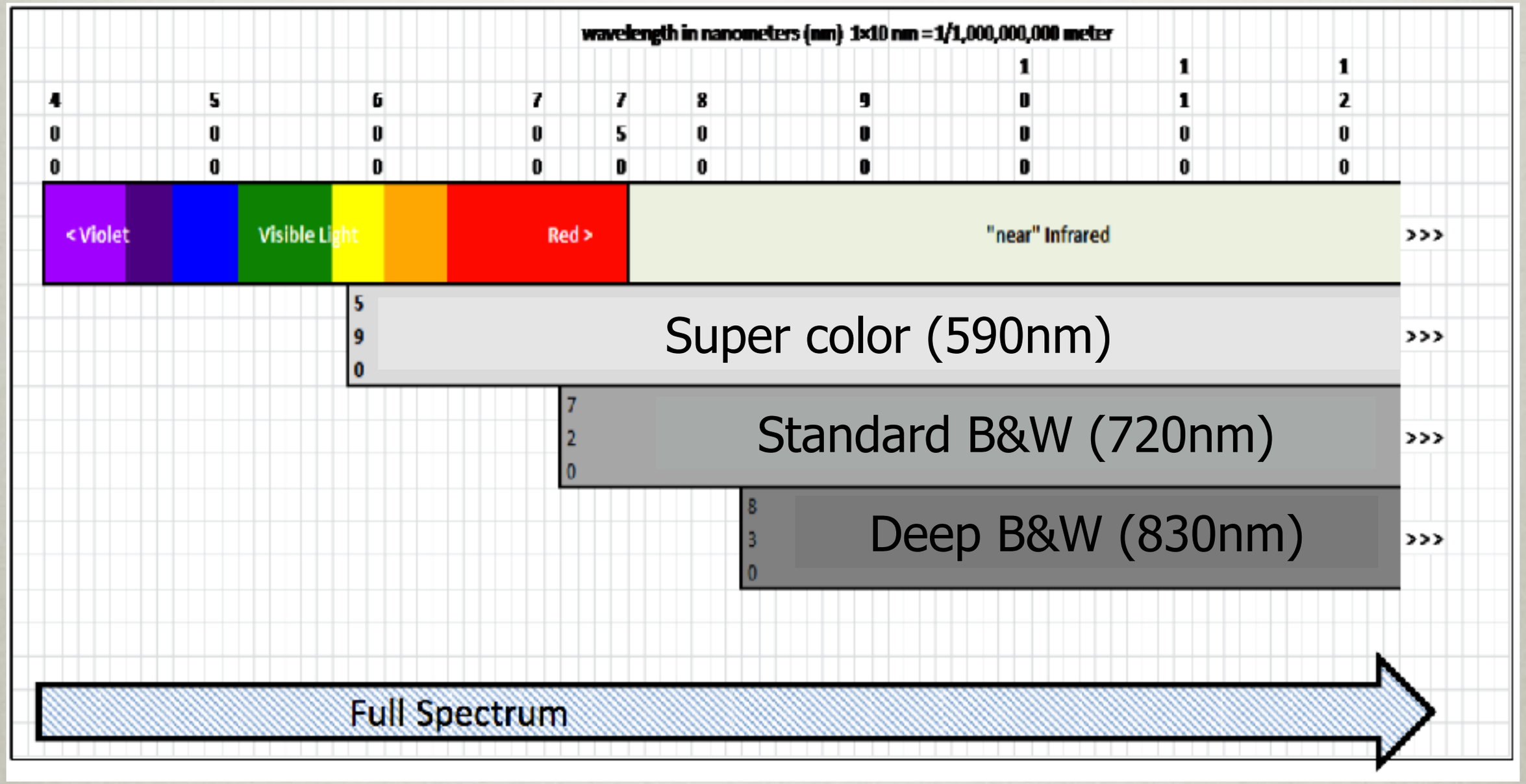
Which IR filter should you choose?

Conversion Filter Choices

- **Deep B&W (830nm)** - No colors
- **Standard B&W (720nm)** - Some red color information
- **Enhanced color (665nm)** - Orange and red

- **Super Color (590nm)** - Yellow, orange, and red
- **Full Spectrum (UV, visible, and IR)** - Use with external filters to block IR and UV wavelengths. Great for astro photography.

Filters vs. the Light Spectrum



What are the limitations and issues?

Auto Focus

- IR light is longer in wavelength than visible light and causes some cameras to focus differently.
- Photographic lenses are made for visible light without regard to what happens with IR light.
- Focal lengths within a zoom lens can focus IR light differently.
- Auto focus sensors are designed for visible light.
- Conversion usually includes focus calibration for a “standard” lens (Canon 50mm f/1.8, Nikon 18-70 DX, etc).
- To use a “non-standard” lens, send that lens in with the camera to be calibrated for auto focus.
- **Using manual focus avoids AF problems.**
- **Point & Shoot and Mirrorless cameras do not require focus calibration.**

Exposure

- Internal light meters are designed for visible light only.
- IR filters only pass a certain range of light frequencies and therefore a different quantity of total light. Some cameras will over-expose by ⅓ to ⅔ stops.
- Depending on conditions and camera, exposure compensation may be needed (or use Manual mode).

White Balance (WB)

- Raw images will be reddish and washed out.
- Use the custom WB installed by the conversion company or set a custom WB in your camera.
- Take a shot of something green to use a custom WB in-camera.
- Lightroom and Photoshop do not have enough temperature adjustment range to get WB right.
- Create a custom WB profile with ***Adobe DNG Profile Editor*** and use that profile in Lightroom or Photoshop (http://supportdownloads.adobe.com/detail.jsp?ftpID=5493).
  More on this later…

Common Issues

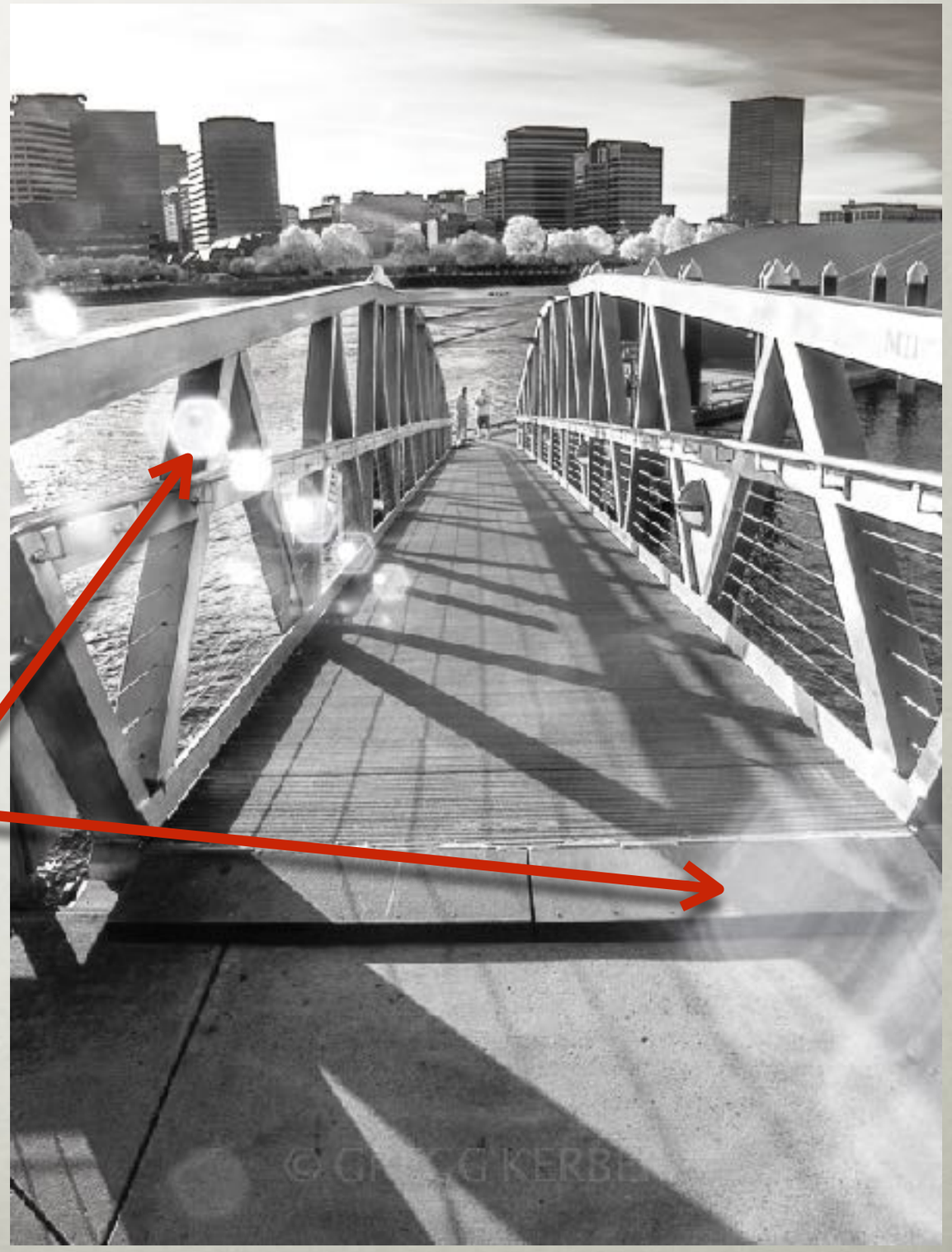
- **Live View** allows you to see what the sensor is seeing because there may not be any visible light coming through the viewfinder (DSLRs with screw-on IR filter).

- More **noise** due to camera using the red channel. Shoot at lowest possible ISO.

- **Shooting RAW** allows more latitude in post processing.

- **Lens flare and hotspots** are a result of lens coatings designed for visible light. Lens flare and center hot spots can result.

- More work in **post processing**. Converting to B&W (easiest). Creating color images (more difficult).



What are good subjects for IR?

Good Subjects for IR

- **Clouds and water** - Clouds pop against a clear sky and water turns black

- **Portraits** - IR penetrates skin, minimizing wrinkles and blemishes. Blood vessels may be visible

- **Plants and foliage** - Highly reflective of IR resulting in brilliant whites or bright colors (depending on the filter being used)

- **Reflective metals** - Chrome can be very interesting in IR

- **Bright mid day sun** - Now harsh light will be your friend

Resources

Resources

- lifepixel.com
- advancecamera.com
- spencerscamera.com
- kolarivision.com
- Facebook - Infrared photography Groups
- photographylife.com
- pamphotography.com
- jimchenphoto.com
- Mark Hilliard's Blog: infraredatelier.wordpress.com/

My IR Cameras

My IR Cameras

- **Canon G12 point & shoot** - converted to 720nm
- **Olympus Pen EPL-5 mirrorless** - converted to 590nm
- **Canon EOS 6D Mark II** - converted to full spectrum plus other astro modifications.

Post Processing (using Lightroom)

Adobe DNG Profile Editor

1. Download and install Adobe DNG Profile Editor (http://supportdownloads.adobe.com/detail.jsp?ftpID=5493).
2. In Lightroom, export an unprocessed RAW image as a DNG.
3. Open Adobe DNG Profile Editor.
4. File > Open DNG image…
5. Open DNG exported from Lightroom.
6. Open the Color Matrices tab
7. Move the White Balance Temperature slider to -100.
8. File > Export (name of camera at bottom of menu).
9. Name profile and save.
10. Restrart Lightroom.

Post Processing Goals

- Correct white balance
- Increase overall contrast
- Add some sharpness
- Reduce overall noise

NOTE: This example illustrates more processing than most IR images require.

Unprocessed RAW

After processing

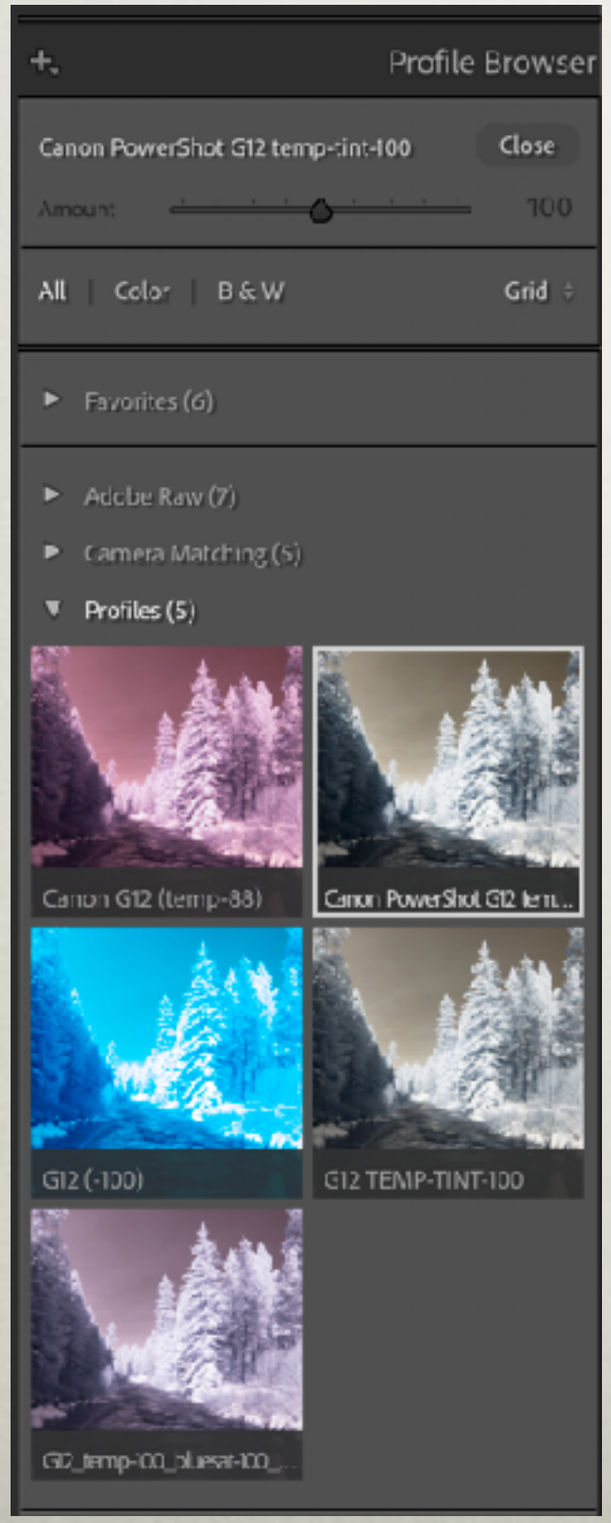
Custom Camera Profile

- Lightroom (and Photoshop) don't have enough white balance range to get white balance right without a custom profile.
- Download ***Adobe DNG Profile Editor*** (free)
- One time action per camera
- In Lightroom, export a photo from the IR camera as a DNG file
- Open the DNG file in ***Adobe DNG Profile Editor*** and go to the *Color Matrices* tab
- Set *White Balance Calibration* > *Temperature* to -100 (can also use other settings for other profiles)
- Save the profile with a custom name
- Profile automatically saved to the proper folder for Lightroom
- Access custom profiles in Lightroom via the Basic panel under 'Profile' (opens the Profile Browser)

Basic Panel

- Basic panel
- Increase Contrast
- Decrease Highlights
- Increase Whites
- Increase Shadows
- Decrease Blacks
- Increase Clarity

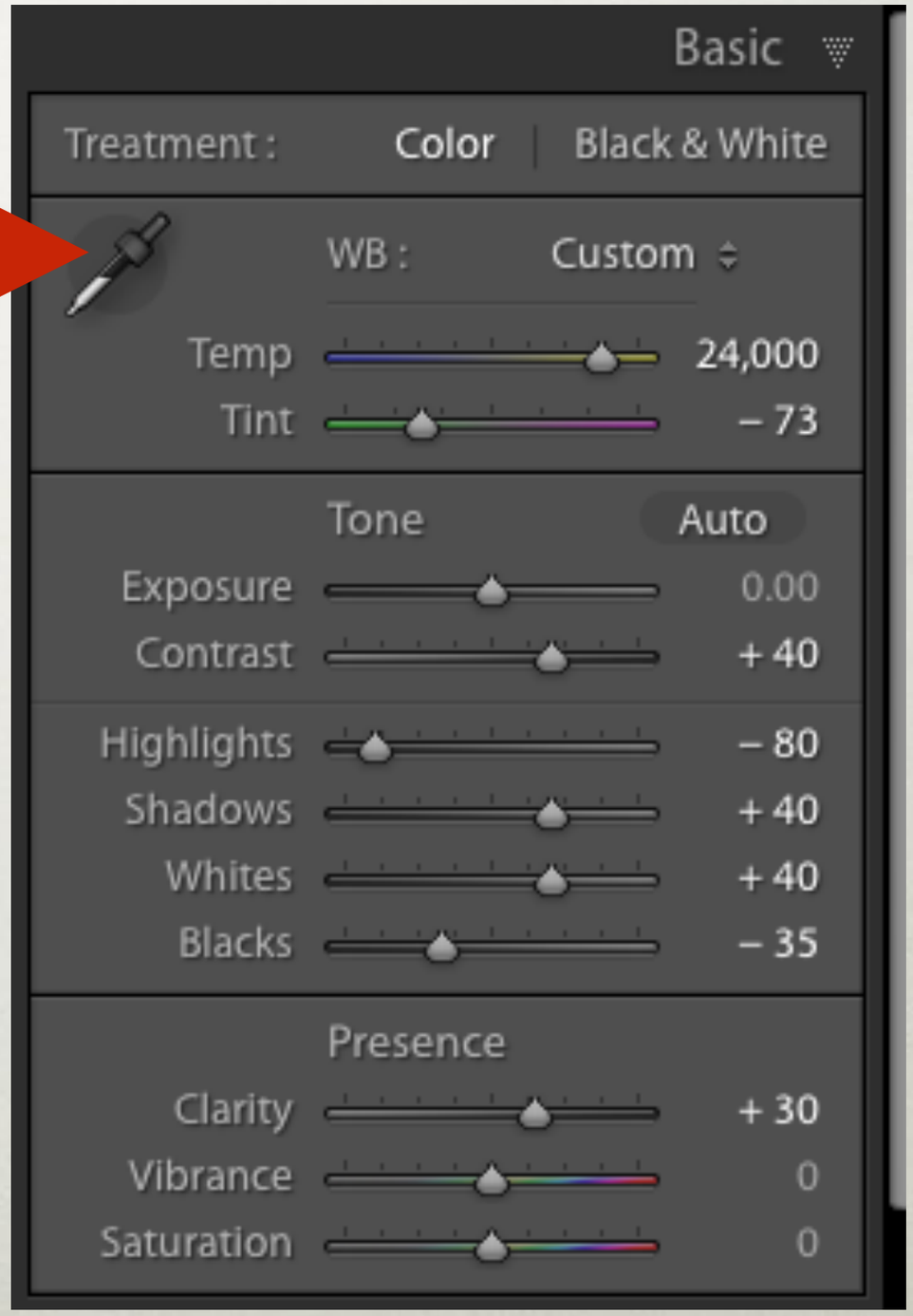
Profile Browser



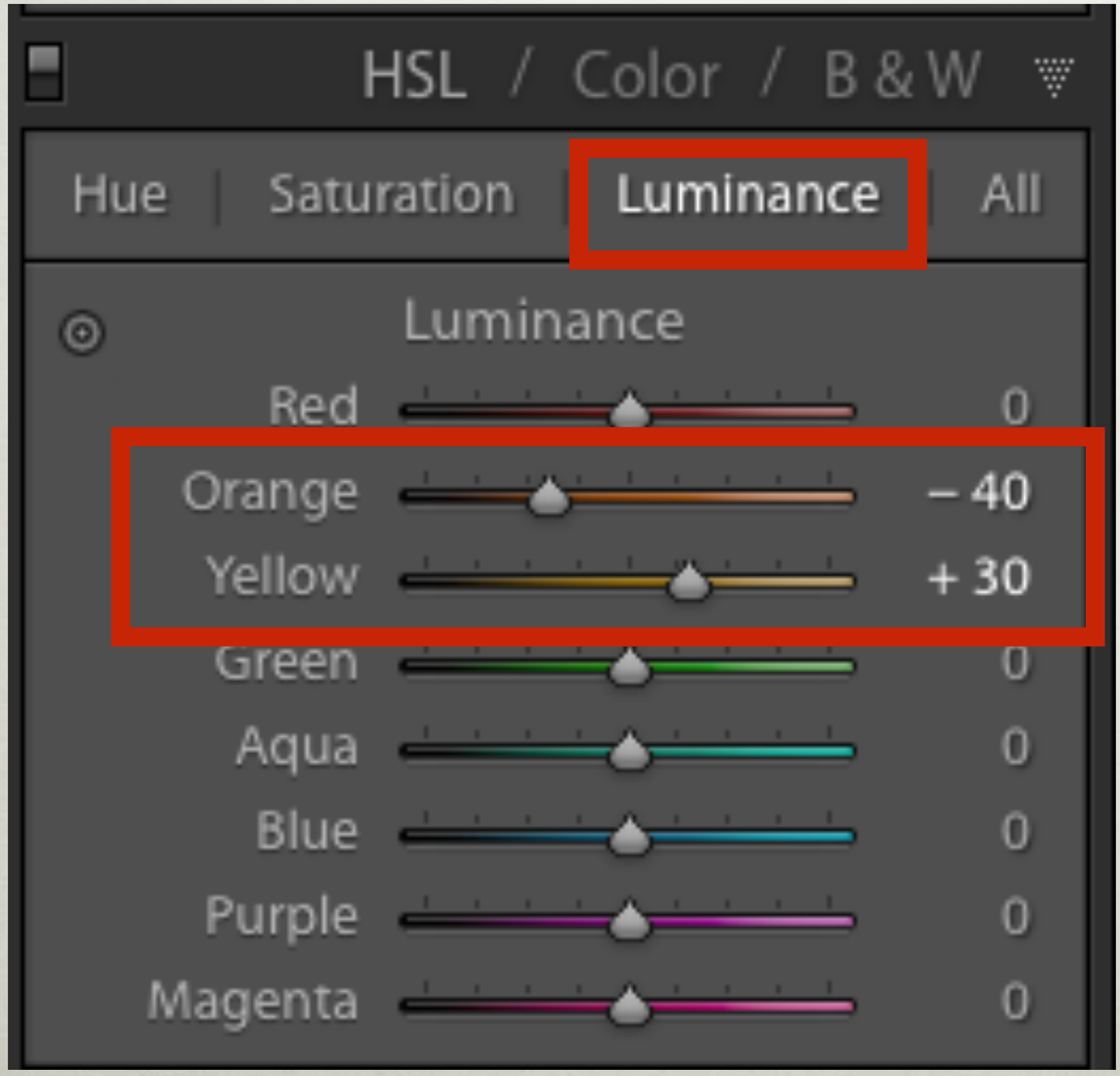
- Basic panel
- Select custom profile created with *Adobe DNG Profile Editor*
- Only profiles for specific camera are listed

Basic Panel

- Basic panel
- W/B eye dropper
- Select something green (foreground tree)

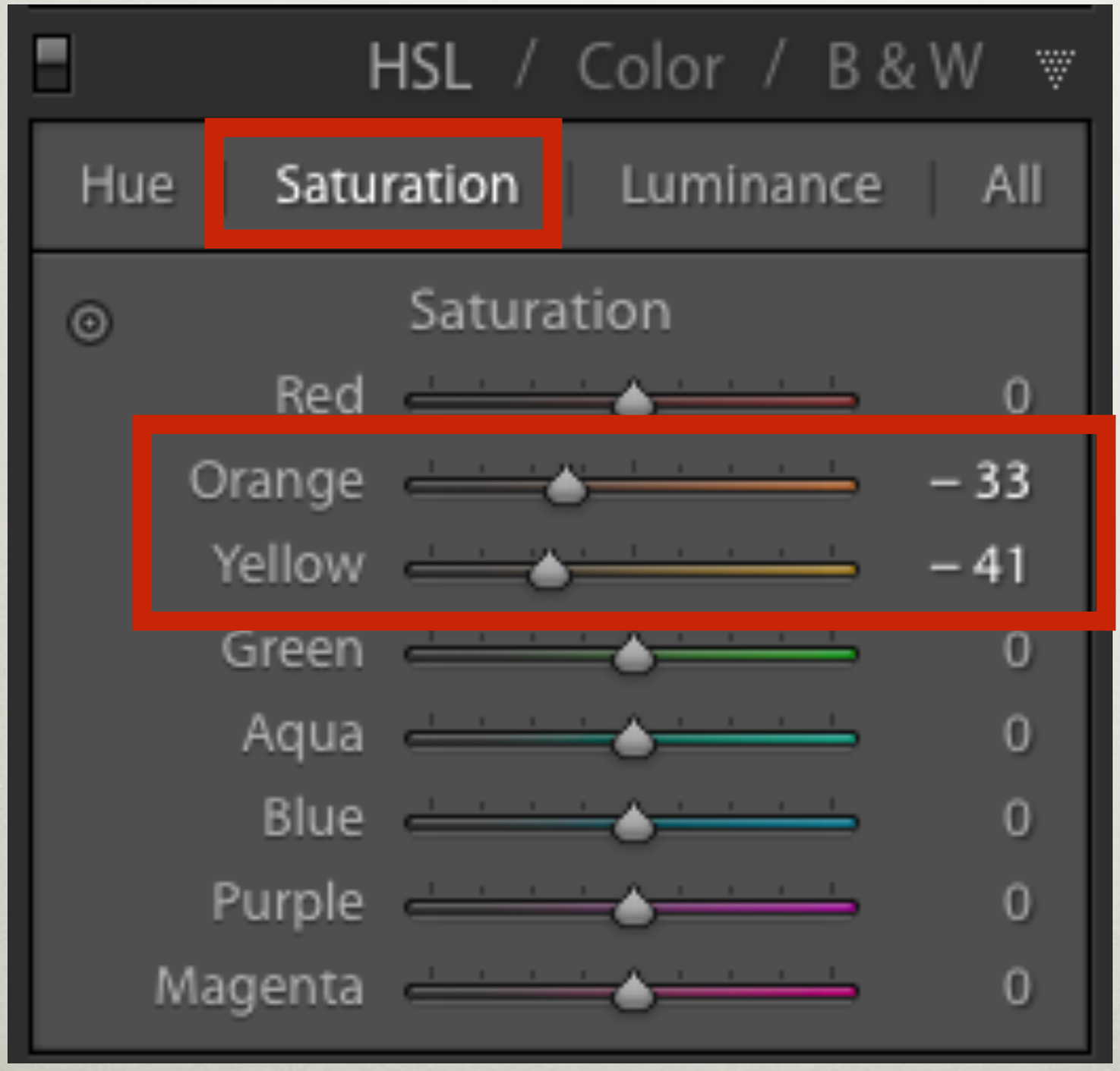


HSL Panel



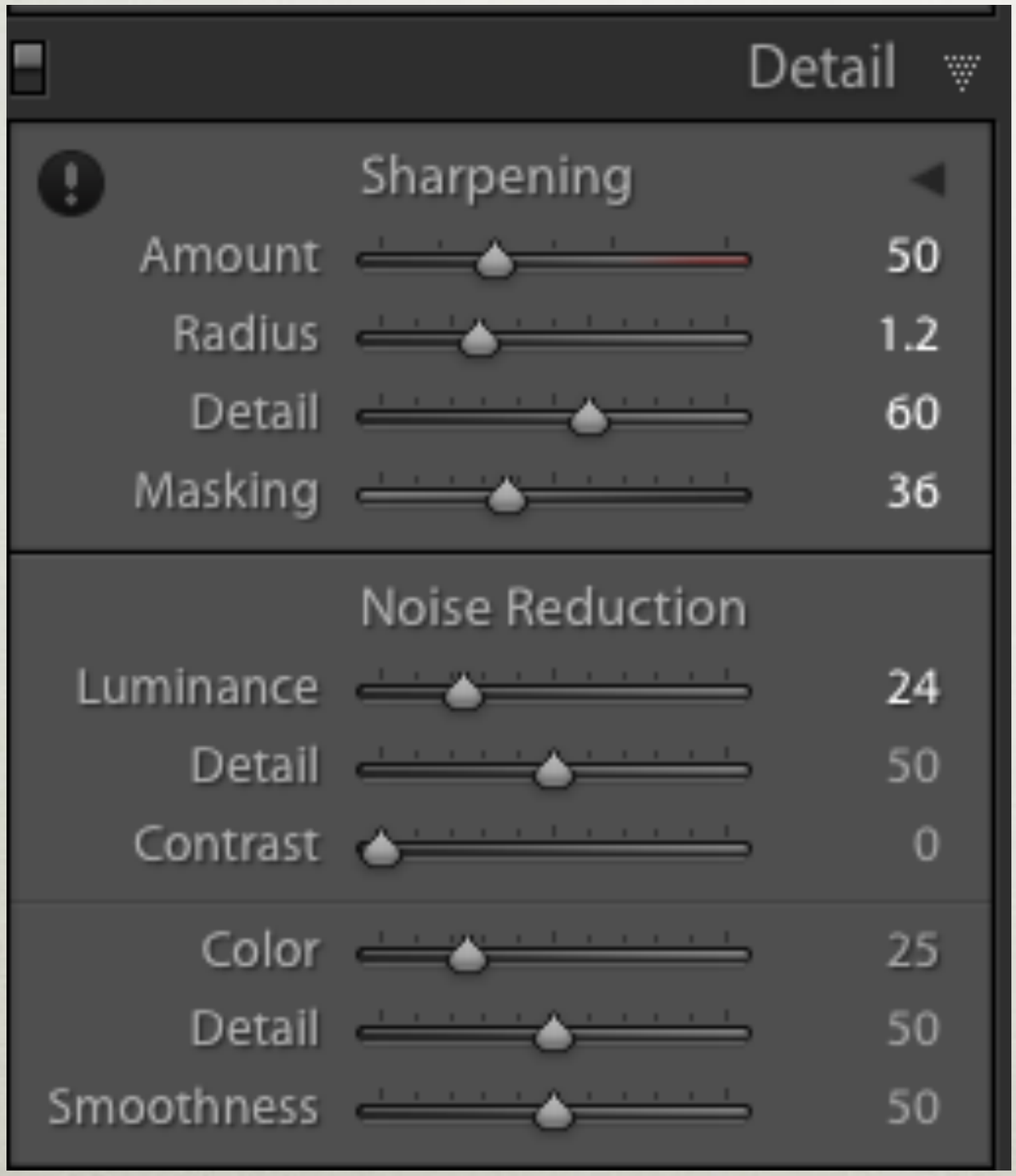
Add contrast in the sky

HSL Panel



Desaturate sky but leave a hint of color

Detail Panel



- Add some sharpening (watch for increased noise)
- Use Masking slider to mask out areas that don't need sharpening

- Add some noise reduction (remember - NR reduces sharpening)

Final Result

End