Seeing Hubble’s Universe
Making Pictures from Data

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From This...
Pictures from Data

- Byproduct of science data.
- Combine exposures, scale data.
- Reconstruct color.
- Photography techniques make features in the data visible.
Opportunities | Challenges

- Available data
- Brightness range
- Spatial coverage
- Spectral coverage
- Cosmetics
Enhance Brightness & Contrast
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Spatial Dimension
Exposures
Luminosity Dimension
Color Dimension
“Natural” Color Composite

Red

Green

Blue
“Natural” Color Composite
Alternate Color Assignment

- [N II] is assigned Red
- H is assigned Red
- [O III] is assigned Cyan
Alternate Color Assignment

[N II] Red
H\textsc{ii} Red
[O III] Cyan
Alternate Color Assignment

[N II]  Red

H\(\text{i}\)  Red

[O III]  Cyan
Alternate Color Assignment

[N II] Red

H\(\beta\) Green

[O III] Blue

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Alternate Color Assignment

[N II] Red

H( Green

[O III] Blue

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Cosmetic Retouching

- Instrument artifacts
- Uneven background
- Noise
- Sharpening
Instrument Artifacts
Instrument Artifacts
Instrument Artifacts
Uneven Background
Uneven Background
Useful Art/Photography Principles

- Color, form, texture.
- Composition, perspective.
- Lighting, tonality.
Pictures from Data

- Byproduct of science data.
- Photography techniques make features in the data visible.
- Subjective choices informed by art principles make science images visually more appealing.
- Nature photography.