

BUSTING EARTH TWINS

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WHY THIS MATTERS

- Earth twins weaken many science fiction settings
- Fantasy often assumes Earth-like conditions
- Difference makes settings feel memorable fast



WHY LISTEN TO ME



- Doctor of Philosophy in Physics and Astronomy (2028)
- Taught astronomy and planetary science at the undergraduate level
- Active SFF author

THE FRAMEWORK

Step One

Change an
astronomical lever

Step Two

Trace the
consequences

Step Three

Create story
conflicts

THE LEVERS

Sun



Seasons

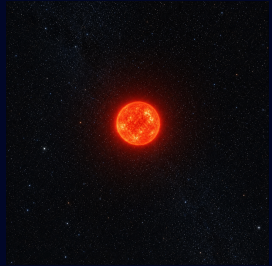


Moon



SUN

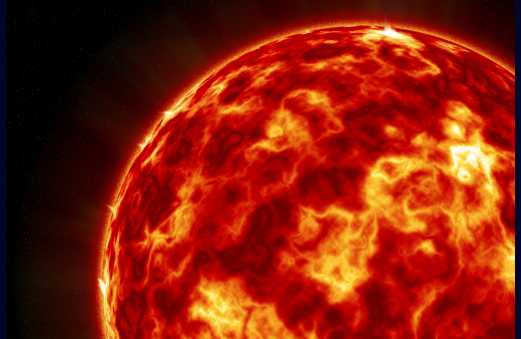
COLOR & TEMPERATURE



When it comes to stars, blue = hot and red = cold
Hot stars push out their habitable zones while cool stars pull them in

COLOR & TEMPERATURE

- Size of the star on the sky
- Changes in plant color
 - Red sun, dark plants
 - Blue sun, lighter plants
- **No** changes in sky color
 - Atmosphere composition determines sky color
- Different year length
- Hotter or cooler global temperatures



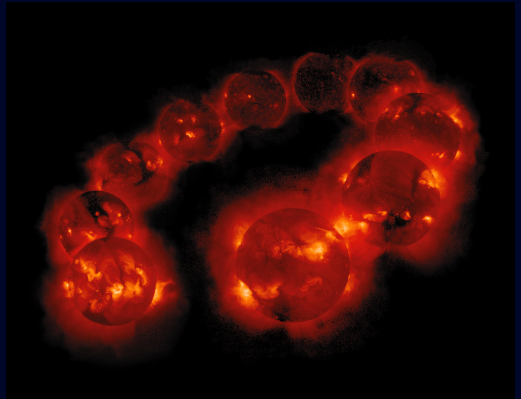
COLOR & TEMPERATURE



- Change in star color means major global shifts
- Plants from different stars may not be compatible with new planet
- Hotter planets might have more diseases and pests
- Colder planets may have less arable land

STELLAR ACTIVITY

- Stars are made of plasma
- Moving plasma generates magnetic fields
- Tangled magnetic fields → flares
- Flares: highly energetic light
- May be accompanied by charged particles
- Note: red stars tend to be more active



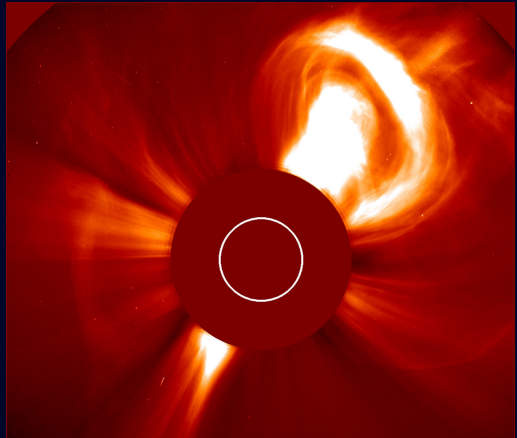
STELLAR ACTIVITY



- Flares and associated charged particles can ionize the atmosphere
 - Drag satellites
 - Disrupt radio
- Geomagnetic storms
 - Destroy electrical equipment
- Increased cancer risk in orbit or high altitude
- Aurorae

STELLAR ACTIVITY

- Flare might force a crash landing on a hostile planet
- Maybe aurorae are linked to magic
- Lost colony from increase in stellar activity
- Maybe animals lose their navigation ability



MINI-LAB: SUN

- Groups of 2-3
- Choose one sun mechanism
- Trace impacts
- Come up with one plot hook
- Share with the room

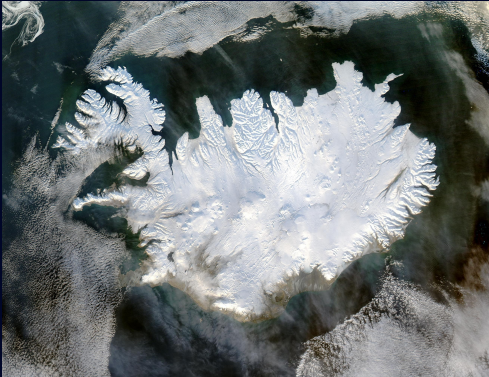
SEASONS

AXIAL TILT

- How tilted is the rotation of the planet
- Strength of seasonal change
- Size of polar region
 - Periods where sun doesn't rise/set
- Latitude dependent
- Roughly equal season length



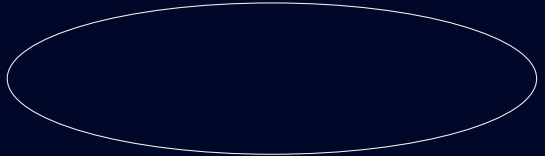
AXIAL TILT



- How does life change when there's no night/day?
- Poleward regions may be inaccessible during certain times of the year → time pressure
 - Perhaps the MacGuffin is hidden there
- Yearly migration chasing the sun on a highly tilted planet

ECCENTRICITY

- How "squashed" the orbit is
- Variable distance to star
- Size of star on the sky
- Global temperature impact
- Summers shorter than winters



ECCENTRICITY



- Authoritarian government structures to maximize output of the harvest and ration during the long winter
- Period of the year where it is too hot or too cold to work

MINI-LAB: SEASONS

- Groups of 2-3
- Choose one season mechanism
- Trace impacts
- Come up with one plot hook
- Share with the room

MOON

NUMBER OF MOONS

No Moons

- Nights are darker
- Tides wholly solar
- How to split up the year?
- Wobbling tilt
- More extreme weather

Two Moons

- Nights are brighter
- Lined up moons → super tide
- Crossed moons → weak tide
- More cycles for calendar
- More eclipses

NUMBER OF MOONS

- No Moons
 - Frequent natural disasters make it hard to build
 - Ancient civilizations experienced different seasons
- Two Moons
 - Increased watches on the night of the twin full moons to prevent crime
 - Rare shipping opportunities with good alignment



FULL LAB

- Two Levers
- Trace impacts
- Come up with one story-level plot hook

FINAL WORDS

HOW WEIRD IS TOO WEIRD?

- In SFF, similarity to Earth is a choice
- Consider what will serve your story
- Differing genre conventions
 - SF: Anything goes
 - Fantasy: Aurorae, multiple moons, season changes





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