

Corrections (4/25/2018)

Asteroids: Astronomical and Geological Bodies

QB651.B86 2017

Page xiii:

2nd paragraph: However, scientists and the ~~general~~-public generally ...

Page xix:

1st full paragraph: RIS4E should be RIS⁴E

Page 6:

2nd full paragraph: The emissivity (ϵ) ... [space between emissivity and (ϵ)]

Page 7:

1st full paragraph: The exceptions are dark near- Earth asteroids, ...

Page 9:

Last paragraph: However, as the size of the lens increases ..

Page 10:

1st paragraph: ... to the same point. Reflecting telescopes ...

2nd paragraph: However, unless corrected for, ...

Page 12:

1st full paragraph: A fixing agent is then used to removed ...

Last paragraph: ... using a series of positively charged electrodes ...

Page 15:

Last paragraph: ... which results in less distorted images.

Page 19:

2nd paragraph, 3rd to last line: ... is the reference magnitude,

Page 21:

1st full paragraph: However, when observing astronomical objects, ...

Page 22:

3rd to last paragraph: However, because asteroids orbit so far from the Sun, ...

Page 23:

Period after Equation 1.22.

Page 25:

Period after Equation 1.25.

Period after Equation 1.27.

Page 26:

Period after Equation 1.28.

Period after Equation 1.29.

Page 28:

Question 7 : +17

Page 30.

Period after Equation 2.2

Page 34:

Period after Equation 2.7.

Page 36:

1st paragraph: ... ~~contrary~~ to the depiction ...

Page 39:

1st full paragraph: Kirkwood gaps can be used to ~~used to~~ break up

2nd full paragraph: ... (5:2 **resonance**) ...

2nd full paragraph: ... (2:1 **resonance**) ...

Page 45:

Figure 2.5 caption: The body has prograde rotation. ~~But~~**However**, due to thermal inertia, ...

Page 47:

2nd full paragraph: ... to slow down: (e.g., Emery et al., 2015).

Page 50:

1st full paragraph: **However**, after Uranus' ...

Page 51:

1st paragraph: **However**, for an unknown ...

2nd paragraph: **However**, his ~20 observations of ...

Page 52:

3rd paragraph: ... about possible **names** for ...

Page 54:

1st paragraph: **However**, as more fainter ...

Page 60:

Table 2.8:

trans-Neptunian ~~not~~ in a 2:3 resonance mythological names associated with the underworld

Table 2.8:

trans-Neptunian **not** in a 2:3 resonance mythological names associated with creation
2nd full paragraph: ... object [(617) Patroclus] ... [space between object and [(617)]]

Page 64:

Question 1) a) An asteroid has a semi-major axis of 3.2 AU[?].

Question 3) ... with Jupiter[?].

Page 68:

1st full paragraph: Meteorites are identified as either falls ~~or~~ finds.

Last paragraph: **An** iron dagger blade found ...

Last paragraph: ... tomb was ~~found~~ **determined** to be ...

Page 69:

1st paragraph: ... (~161 km) away. A ... (add space between away. and A)

Page 72:

1st paragraph: Many different minerals appear differently when viewed using polarized ~~and~~ polarized-light (Nesse, 2012).

Page 74:

1st paragraph: However, because of this Antiquities Act, a ...

Page 75:

1st paragraph: ... approximately ~5000 known minerals ...

Page 78:

3rd paragraph: ... saponite [Ca_{0.1}.... (space between saponite and [)

Page 79: 1st paragraph:

1st paragraph: ... more resistant to the etching ~~the~~ **than** kamacite ...

Page 80:

2nd full paragraph: ... and sylvite (KCl), but ...

Last paragraph: Carboxylic acids ~~and~~ (Martins, 2011) ...

Page 81:

1st paragraph: ... (e.g., ~~Elisa~~ **Elsila** et al., 2005).

2nd to last paragraph: ... using more elaborate models have ~~the~~ roughly the ...

Page 83:

1st paragraph: AOAs are fine-grained irregularly-shaped ...

Page 85:

1st full paragraph: ... for forming chondrules ~~are~~ **is** through rapid ...

Page 86:

Last paragraph: The term “subgroup”...

Page 88:

Last paragraph: An isotopic standard ~~is also measured~~ with known isotopic ratios ...

Page 90:

Last paragraph: ... before our Sun formed and ~~is~~are durable ...

Page 92:

1st full paragraph: ... to fall to Earth;~~;~~ hence, they ...

Page 104:

2nd to last paragraph: The name “ataxite” ...

2nd to last paragraph: The name “octahedrites” ...

Page 108:

3rd paragraph: ... near Coloma, California; were ...

Page 111:

2nd full paragraph: Radiogenic isotopes are those that ~~are~~ produced during ...

Page 115:

1st full paragraph: ... in these minerals ~~since it~~because Rb can replace ...

Page 116:

2nd full paragraph: Zircons also contain ~~high~~relatively high concentrations ...

Page 118:

Figure 3.19 caption: ... (MWSD) is a ~~measured~~ of the ...

Page 119:

2nd paragraph: ... is the total decay constant, ~~and~~ $^{40}\text{Ar}_0$ is the ...

2nd paragraph: ~~The isochron equation is~~

Page 120:

1st full paragraph: (in order of easiest ~~to~~ **hardest** to reset by shock heating due to impact)

Page 122:

Figure 3.20 caption: ... (MWSD) is a ~~measured~~ of the ...

Page 124:

Last paragraph: ... the ~~water-ice~~ content ...

Page 125:

2nd paragraph: If core formation takes ~~s~~ place ...

Page 128:

1st full paragraph: Drift due to the Yarkovsky effect ~~drift~~ is much ...

Last paragraph: However, when a meteorite lands on Earth, ...

Page 130:

2nd full paragraph: ~~Over 80 meteorites have been identified as being from Mars. (Paired samples are counted as one meteorite.)~~

Page 131:

Question 3: Why are iron meteorites the ~~commonest~~ most common type ...

Page 132:

Question 8: ... beginning of the Solar System's history?

Page 133:

4th paragraph: However, for a reflectance spectrum measured out ...

Page 134:

Figure 4.2 caption: Note the thermal tail longward of 2 μm .

1st paragraph: However, for telescopes on the surface of the Earth, ...

Page 135:

2nd full paragraph: Charge-transfer transitions are due to the movement of electrons from one ion to another, which transfers charge.

Page 136:

2nd full paragraph: The most prominent ~~absorption~~ bands in the visible and near-infrared are primarily due to ~~transitions~~ absorptions due to transition metals in different minerals.

Last paragraph: However, in a crystal structure, ...

Page 139:

1st full paragraph: by a material (e.g., Clark, 1999) according to Beer's law ~~where~~...

Page 141:

1st paragraph: However, as expected, the ...

Page 143:

1st paragraph: This reflectance term is ~~the~~ pretty much the ...

1st full paragraph: However, for simplicity, ...

Page 145:

Last full paragraph: ... as Fe^{2+} substitutes for Mg^{2+} .

Page 149:

1st paragraph: ... and **an** absorption band at ~1.9– 2.0 μm ...

1st full paragraph: ... transition ~~in~~ in phyllosilicates.

Page 156:

1st full paragraph: Originally, micrometeorite impacts were proposed to produce these nanophase iron particles.

Page 157:

1st full paragraph: ... formulas for ~~determine~~ **determining** the pyroxene chemistry ...

Page 161:

Example 4.3: Last equation should be

$$ol / (ol + px)(\pm 0.03) = (0.242 \times 0.80) + 0.728 = 0.92. \quad (4.39)$$

Last sentence of Example 4.3: ... ol/ (ol + px) ratio will be 0.92~~±~~**±0.03**.

Page 163:

1st full paragraph: ... over a wide range of wavelengths have been ...

Page 165:

1st full paragraph: L- types had spectra with a very strong UV feature ~~and~~, a flat reflectance past 0.75 μm, and appear to ...

Page 166:

Last paragraph: The ~~commonest~~ **most common** asteroids in the ...

Page 170:

1st paragraph: ... that asteroid-sized impacts on ...

1st paragraph: ... H-chondrite Portales Valley meteorite ...

Page 171:

1st paragraph: The ~~commonest~~ **most common** asteroids in the outer main belt ...

Page 176:

Last paragraph: ... Cybele has a semi-~~i~~ major axis ...

Page 178:

2nd full paragraph: However, since Jupiter Trojan D-types ...

Page 180:

1st full paragraph: The Band II for an R- type is narrower ~~r~~ than a Q- type's band ...

Page 182:

1st paragraph: ... which has **also** been ~~also~~ seen in the spectra of HEDs ...

Page 184:

Question 5) ... spectrum of a ~~phyllosilicate~~ **CM chondrite** change ...

Page 185:

1st paragraph: Only a relatively few asteroids ...

2nd paragraph: The ~~commonest~~ most common and direct way to ...

Page 188:

1st paragraph: ... the temperature is assumed to be 0 Kelvin and ~~that~~ there is no thermal emission on the night side.

Page 189:

Equation 5.15 should be:

$$T_{ss} = \sqrt[4]{\frac{[1 - (0.393)(0.20)](1366)}{(0.756)(0.9)(5.67 \times 10^{-8})(2.5)^2}} K = 269 K. \quad (5.15)$$

Page 190:

1st paragraph: ... slowly, is observed at a small phase angle, ...

Page 191:

Last full paragraph: Diameters calculated from IRAS data varied from diameters calculated from occultations ~~had~~ with a root-mean-square (RMS) fractional difference ...

Page 192:

1st paragraph: ... (meaning “light” in Japanese) ...

Page 195:

Table 5.2: (243) Ida 2.862 0.0456 0.0364

Equation 5.25 should be:

$$na_p = \left(\frac{74.1^\circ}{yr} \right) \left(\frac{2\pi}{360^\circ} \right) \left(\frac{yr}{31540000 s} \right) (2.869 AU) \quad (5.25)$$

$$\left(\frac{149600000000 m}{AU} \right) = 17590 m/s.$$

Page 199:

2nd full paragraph: ... slopes of Koronis members tends to increase .. \

Last paragraph: ~~The Eos family is a large outer main-belt family composed primarily of K-types.~~

Page 200:

2nd full paragraph: ... and ~~found~~ saw that this age ...

Page 201:

1st full paragraph: However, if the period does not repeat, ...

Page 203:

Last paragraph: ~~So~~ **Therefore**, any change in the magnitude ...

Page 204:

Period after Equation 5.31.

Page 205:

Last paragraph: ... was dubbed a “Slivan state” ...

Page 206:

First full paragraph: Radar can be used ~~determining~~ **to determine** shapes and spin state, ~~finding~~ moons, ~~doing~~ astrometry, and ~~estimating~~ **estimate** metal contents.

Last paragraph: Since ~~the~~ radar waves travel at ...

Page 208:

1st full paragraph: ... are shifted towards **s** shorter wavelengths (blueshifted) and if part of the body is moving away from you, the radio waves are shifted towards **s** longer wavelengths.

Page 209:

1st full paragraph: ... Pluto (Charon, Nix, Hydra, Kerberos, ~~Hydra~~ **Styx**).

Page 210:

1st paragraph: ... of asteroids, **which** can affect the positions of ...

2nd full paragraph: The second most precise technique ~~is~~ **uses** the orbit of ~~the~~ **a** moon ...

Page 211:

Period after Equation 5.34.

Page 212:

2nd paragraph: ... different taxonomic classes ~~varied~~ **varies** with heliocentric distance.

3rd paragraph: However, to plot the “true” distribution ...

Page 213:

1st full paragraph: ... which ~~tend to~~ have the highest albedos, **have the** largest diameters, and/or **are the** closest to Earth.

1st full paragraph: ... that ~~that~~ S-complex objects ...

Page 215:

Last paragraph: Saturn is also migrating ~~too~~.

Last paragraph: The Grand Tack was proposed to solve the “Mars problem” where computer simulations in forming planets at Mars-like distances from the Sun ~~that are too massive compared to Mars~~ **produces too massive planets** (e.g., Raymond et al., 2009).

Last paragraph: ... while the Nice model occurs 500 Ma later.

Page 216:

Question 1) One body is the parent body of the aubrites while the other is the parent body of the CM chondrites?

Page 224:

Last paragraph: Shoemaker– Levy 9 passed within ~~the~~ Jupiter’s Roche limit, ...

Page 225:

1st paragraph: ... break apart, ~~of Jupiter~~.

2nd full paragraph: Alan Hale and Thomas Bopp (1949-2018) discovered ...

Page 226:

4th paragraph: ... and ~~an~~ aluminum foil ...

Page 228:

2nd paragraph: ... in the plume ~~in~~ included H₂O, ...

Page 233:

1st paragraph: ... Edgeworth had proposed **that** in 1943 a large number ...

1st paragraph: ... Solar System ~~that~~ sometimes travel ...

Page 240:

1st full paragraph: However, other regions on Pluto ...

Page 244:

Last full paragraph: However, because the mass of Vanth ...

Page 246:

3rd full paragraph: ... however, in the near-infrared ...

Page 248:

1st full paragraph: ... sky to be determined.

Page 249 :

1st paragraph: ... temperatures ~~at~~ **of** ~70 K ...

Page 251:

2nd paragraph : and an aphelion **distance** greater ...

2nd paragraph: ... 1.3 AU. Amors can ... (space between 1.3 AU. and Amors)

3rd paragraph: “Apohele” is the Hawaiian word for “orbit” ...

Page 252:

1st paragraph: ... due, presumably, to thermally ...

1st full paragraph: However, in the 1990s, David Morrison ...

2nd full paragraph: ... and ~~they~~ were joined by Carolyn Shoemaker ...

3rd full paragraph: ... Kitt Peak, Arizona, which was founded in 1980 ...

Page 253:

2nd paragraph: As of today, LINEAR ~~had~~has discovered

Page 255:

1st paragraph: Therefore, for the same size object, an ...

Last paragraph: ... three stages of crater formation (Melosh, 1989; French, 1998). ~~They are:~~ the contact/ compression stage, ...

Page 261:

1st paragraph: there ~~is~~are always more smaller craters than ...

4th full paragraph: ... or ~~have~~ reached equilibrium.

Page 262:

1st paragraph: The equation is not valid ~~for~~ ages greater than ...

1st full paragraph: However, the impacting flux on the Moon may ...

Page 270:

1st full paragraph: However, if the probability of the impact is ...

Page 271:

1st full paragraph: A nuclear standoff explosion also poses ...

Question 3) What will ~~be~~ the kinetic energy of a C-complex asteroid with an H magnitude of 16.0 and an impact velocity of 17 km/ s?

Page 273:

2nd paragraph: ... as it flies by ~~the body~~it.

2nd paragraph: A sample return mission ~~returns samples of the surface~~collects fragments of the ~~body to bring~~ back to Earth.

Page 277:

1st paragraph: ... the discoverer of Jupiter's moons ...

1st paragraph: ... geological bodies due ~~to~~ the observed surface features.

Page 280:

Last paragraph: ... are named after people ~~who~~ were part of the ...

Page 283:

1st paragraph: ... seismic waves ~~from~~ being easily transmitted, ...

Last paragraph: Eros ~~had~~has a density ...

Page 285:

Last full paragraph: ... flux. However, the XGRS was not able to detect ...

Page 289:

Last full paragraph: ... from ~~0.75~~0.85 to 2.1 μm ...

Page 290:

3rd paragraph: The only exception is the large, flat region, which is called ~~Muse-C~~**MUSES-C** Regio ...

Last paragraph: ... however, for craters less than 100 meters, ...

Page 291:

2nd full paragraph: However, during these two encounters, ...

3rd full paragraph: ... interpreted as indicating ~~that found~~ that the body became a rubble pile ...

Page 292 :

Last full paragraph: ... the “all-seeing eye” ...

Page 320:

~~Elisa~~**Elsila**, J. E., ...

Page 362:

meteor shower, 107,~~107~~