KEY - Air-Sea Interaction, Project Atmosphere Module

Elaborate | Ekman Transport and Implications for SSTs

1. According to the cardinal direction arrows in the upper left-hand corner of the top Model Ocean Basin diagram, the west boundary of any ocean basin is the land's _____ coast, and the east boundary is the land's _____ coast.
    - Answer: (b) eastern … western
2. In the Northern Hemisphere, the near-surface flow is about 90 degrees to the _____ of the wind direction.
    - Answer: (a) right
3. In the Northern Hemisphere, if the prevailing wind direction is reversed, the near-surface flow is about 90 degrees to the _____ of the wind direction.
    - Answer: (a) right
4. In the Southern Hemisphere, the near-surface flow is about 90 degrees to the _____ of the wind direction.
    - Answer: (b) left
5. In the Southern Hemisphere, if the prevailing wind direction is reversed, the near-surface flow is about 90 degrees to the _____ of the wind direction.
    - Answer: (b) left
6. This combination (Southern Hemisphere, north to south wind) will produce upwelling along the land's _____ coast.
    - Answer: (a) eastern
7. Upwelling of colder ocean water would tend to produce relatively _____ sea-surface temperatures compared to regions unaffected by upwelling. Warmer air moving over this ocean surface would be _____ from below.
    - Answer: (c) low … chilled
8. Chilling of air by a relatively cold ocean surface would likely _____ the development of clouds, showers, and thunderstorms. Also, sea fog _____ form.
    - Answer: (c) inhibit … would likely
9. This combination (Northern Hemisphere, south to north wind) will produce downwelling along the land's _____ coast.
    - Answer: (b) western

10. The season of warm water movement toward the coast and downwelling for California is _____. The season for cold-water upwelling and frequent fog is _____.
    - Answer: (b) winter … summer
11. Along the land's eastern coast in the Northern Hemisphere with north-to-south wind, this combination will produce _____ and relatively _____ surface waters.
    - Answer: (b) downwelling … warm
12. This surface temperature pattern would tend to _____ cloud formation.
    - Answer: (a) enhance
13. In view of the latent heat requirements of tropical storms and hurricanes, those weather systems are not likely to develop over a(n) _____ zone. A hurricane that moves over an upwelling area is likely to _____.
    - Answer: (d) upwelling … weaken

Real World Applications

14. At 21Z 6 May and 21Z 7 May (2 PM local times), winds along and offshore of the California coast are from the _____.
    - Answer: (c) north and northwest
15. This persistent wind flow would lead to Ekman Transport _____ the coast, leading to _____.
    - Answer: (b) away from … upwelling
16. Persistent winds from a northerly direction along the West Coast lead to upwelling, thus _____ chlorophyll concentrations and _____ biological productivity.
    - Answer: (d) increasing … increasing

Evaluate | Summary of Air-Sea Interactions

17. What type of heat is involved in the phase changes of water?
    - Answer: (a) latent heat
18. A marine layer forms along the California coast when there is _____ in the lower level of the troposphere.
    - Answer: (a) a strong inversion
19. Due to Ekman Transport, a surface wind blowing from north to south along the U.S. West Coast leads to transport of surface waters toward the _____.

- Answer: (d) west

20. A surface wind blowing from north to south along the U.S. East Coast leads to _____ of surface waters.
    - Answer: (a) downwelling
21. Coastal upwelling _____ primary production in ocean surface waters.
    - Answer: (a) stimulates

Acknowledgment: The author(s) used ChatGPT to pull the correct answers from the module document and then double-checked this with the module questions