NOTES AND CORRESPONDENCE

Comments on "Scale Relations for Global Air–Sea Interaction"

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The model suggested by Monin and Zilitinkevich (1977) (henceforth referred to as MZ) for the global air–sea interaction, as noted by its authors, allows taking into account the equator's inclination to the plane of the orbit in conjunction with the albedo latitudinal variation of the earth–atmosphere system. According to Table 2 of the referenced paper, the observed dependence of albedo A_φ on latitude φ can be approximated by

$$1-A_\varphi=(1-A)(0.6+0.5\cos\varphi), \quad (1)$$

where A is the planetary albedo. Using (1), the vertical flux of assimilated solar radiation at the top of the atmosphere, $F^{\downarrow}$, averaged over time and longitude [in contrasts to Eqs. (33), (34) in MZ] can be written in the form

$$F^{\downarrow}=\frac{(1-A)q_*}{4}(0.6+0.5\cos\varphi)\left[\frac{4}{\pi}(1-a_1)\cos\varphi+a_1\right]. \quad (2)$$

We retain the other equations in MZ including relation (5) for the outgoing radiation flux $F^{\uparrow}$, averaged over the region $0<\varphi<\pi/4$, and estimate the net heat flux F_∞ at the top of the atmosphere, measured in W m^{-2} in contrast to Eqs. (11) or (11a), as

$$-F_\infty=95.6-0.726\,\delta T_0, \quad (3)$$

where δT_0 is the global temperature in kelvins. Application of this formula to the case of "moist atmosphere with insignificant ocean heat transport" for the same external parameters and empirical constants as in MZ yields the estimates

$$\delta T_0=44\text{ K},\quad T_E=299\text{ K},\quad T_P=255\text{ K}, \quad (4)$$

which are very close to those obtained for the case considered in MZ without taking into account the equatorial inclination to the plane of the orbit and the latitudinal variation of albedo. This confirms the mutual compensation of the two effects indicated in MZ.

We also consider the question of the stability of present-day glaciation. Following MZ we assume that in the absence of glaciation the ratio $(1-A_\varphi)/F^{\uparrow}$ would be constant up to the pole. It is not difficult to see that this is equivalent to

$$1-A_\varphi=(1-A_0)\left(1+b_0\frac{T_s-T_0}{\delta T_0}\right), \quad (1a)$$

where $A_0=0.28$ is the earth's planetary albedo without polar glaciation. Using (1a) in place of (1), we obtain the following relation for the value F_∞;

$$-F_\infty=52.0+0.1\,\delta T_0, \quad (3a)$$

which, in the framework of MZ, leads to the estimates

$$\delta T_0=42\text{ K},\quad T_E=302\text{ K},\quad T_P=260\text{ K}. \quad (4a)$$

It follows that, after allowing for latitudinal variations of albedo, changes in the albedo due to the disappearance of the polar ice caps are not so strongly felt in mean annual polar temperatures, which are reduced from −19°C or −18°C according to Eq. (4) to −13°C in our case. To a certain extent, this may verify the stability of present-day glaciation.

REFERENCES

Monin, A. S., and S. S. Zilitinkevich, 1977: Scale relations for global air–sea interaction. *J. Atmos. Sci.*, 34, 1214–1223.

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CORRIGENDUM

Authors W. P. Giddings and M. B. Baker have noted errors in their article "Sources and Effects of Monolayers on Atmospheric Water Droplets" (*J. Atmos. Sci.*, **34**, 1957–1967):

In Fig. 1 (p. 1961) the direction of the arrows for η_2 and ν_2 should be reversed. Also, the left-hand side of Eq. (A2) (p. 1962) should read dp_0/dt, not $\partial p_0/\partial t$.