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Cover: Comet West, the most brilliant comet to streak by Earth in more than a decade, displays a prominent, white dust tail and a fainter, blue gas tail in this March 1976 photograph. To learn more about the structure and origin of the solar system, astronomers seek to identify comets farther out in space, whose trajectories remain unaltered by solar heating and Jupiter's gravitational pull. (Photo: Dennis di Cicco/SKY AND TELESCOPE)

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Letters

Calculation clarified

Bernhardt Saini-Eidukat (Letters, SN: 1/27/90, p.58) states that "one should estimate the seismic energy E released by calculating: $\log E = 11.8 + 1.5M_S$, where M_S is the surface wave magnitude."

This implies that without any surface wave (i.e., for $M_S = 0$), a substantial amount of seismic energy remains:

$$\log E = 11.8 + 0.$$

A clarification of what this energy represents would be greatly appreciated.

Christian A. Alm
Wallingford, Conn.

Because the magnitude scale is logarithmic, earthquakes can have magnitudes equal to zero or negative numbers. A quake with a magnitude of -2 would release roughly the same energy as dropping a 10-kilogram block from a height of 1 meter. — R. Monastersky

Evidence and enigma

"Rattling the Northwest" (SN: 2/17/90, p.104) is an excellent summary of the subduction earthquake problem facing the Pacific Northwest. However, the statement attributed to me is misleading. I am quoted as saying, "I tend to be a little bit skeptical of the evidence as it stands now."

I am not skeptical of geologic evidence uncovered in recent years for episodic subsidence along the coast. This evidence is abundant and hard to explain by mechanisms other than periods of rapid coastal subsidence. Furthermore, we know from observations at other subduction zones (e.g., Japan) that sudden coastal subsidence can occur during subduction earthquakes. We do not have good evidence for mechanisms other than earthquakes that could accomplish this rapid subsidence.

However, there are many other types of geological and geophysical observations that must be explained, and the difficulty we face is building a tectonic model for Cascadia that is consistent with all, or even most, of these observations. Among the observations that seem most difficult to reconcile with large subduction earthquakes are: the complete lack of subduction earthquakes for the entire Cascadia zone down to very small magnitude levels; contemporary background subsidence near Grays Harbor (uplift would be consistent with the earthquake hypothesis); very low levels of horizontal strain measured near Puget Sound; earthquake focal mechanisms indicating regional stress that is not controlled by locked subduction; paucity of evidence for strong ground shaking in the geologic record; and high temperatures and fluid pressures at shallow depths in the megathrust (from offshore geophysical measurements).

Subduction earthquakes may indeed occur, but we have only weak grounds at this point for estimating their size. We are still far from a comprehensive understanding of this region.

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