What is a slab window and how does it form?

- Slab windows form when an oceanic spreading ridge reaches a subduction trench and is subsequently subducted.
- The spreading at the ridge continues as it is subducted, but because the spreading center is beneath warmer continental crust and does not have cold ocean water to cool it, molten material produced at the center can no longer form new lithosphere, resulting in a slab-free zone, or slab window.
Interaction between East Pacific Rise and North America

After the occurrence of ridge-trench intersection, the Farallon Plate continued to plunge beneath North America, leaving the Pacific Plate at the continental margin.

An ever-widening gap—a slab window—thereby developed between the two separating oceanic plates.

Simultaneously, upwelling asthenospheric mantle filled the window.

The slab that was subducted beneath North America is thought to have been relatively long and shallow (not short and steep), reaching as far inland as Colorado.

In the Cordillera...
What evidence suggests a slab window is located south of the Mendocino Triple Junction?
Schematic of Gorda slab and some seismic lines

How did Thorkelson and Taylor construct this time line? (in other words: What is the evidence for slab window formation and migration?)
How is the Kula slab window different than the Gorda slab window? (what is actually forming the gap?)

What are the implications of slab window formation for the Basin & Range?
Is it a slab window or a slab gap? Or both?

- What formed as a result of ridge subduction has also been referred to as a slab gap.
- The duration of slab material depends on the age of the material at the time of subduction; the eastern part of the Farallon Plate was young and hot, and even fragmented before the ridge arrived at the trench.
- Therefore, a slab gap formed (region of no slab with coherent slabs bordering to the north and south).

Use of terminology

- Dickinson and Snyder, 1979a and b call it a slab window.
- Severinghaus and Atwater, 1990, call it a slab gap.
- Thorkelson, 1996 and Thorkelson and Taylor, 1989, call it both. Their use was understood to mean that a slab window initially forms and over time becomes a gap. But then their definition of a gap differs from that of Severinghaus and Atwater, 1990??
References

- Beaudoin, Bruce C. et al., 1996, Transition from slab to slabless: Results from the 1993 Mendocino triple junction seismic experiment. Geology, v. 24, p. 195-199.

Other goodies:

What is necessary to subduct a ridge?

What influences the shape of the window?

Where might a new slab window be likely to form?