The Asian summer monsoon is organized into distinct convection centers, but the mechanism for this organization has not been well understood. Analyses of TRMM satellite observations by IPRC researchers and their colleague at JPL reveal a surprisingly simple organizing principal for monsoon rainfall: all of the major convection centers are anchored by narrow coastal mountains, a geographical feature poorly represented in models and hardly mentioned in conceptual depictions of the monsoon. As a result of this convection principal, the region of southern India that faces the Bay of Bengal is dry savanna, whereas the region on the other side of the bay is rainforest, flourishing with the heavy rainfall on the slopes of the coastal mountains of Myanmar. Local “orographic rain” is commonly observed elsewhere. The strong interaction between atmospheric convection and circulation, however, allows the narrow mountains of Asia to exert far-reaching effects on the continental-scale monsoon. TRMM observations offer a new perspective for Asian monsoon dynamics and a benchmark for the super-high resolution (Dx~10 km) modeling that is being undertaken by NASA, Japan’s Earth Simulator and elsewhere.