ABSTRACT FINAL ID: V53G-02;

TITLE: The Hawaii-Emperor Bend: Plate motion, plume motion, or both? *(Invited)*

SESSION TYPE: Oral

SESSION TITLE: V53G. Seamount Trails: Implications for Global Plate and Hotspot Motion, Mantle Flow, and the Geochemical Evolution of Mantle Plumes II

AUTHORS (FIRST NAME, LAST NAME): Paul Wessel[1]

INSTITUTIONS (ALL): 1. Sch Ocean Earth Sci & Tech, Univ Hawaii, Honolulu, HI, United States.

Title of Team:

ABSTRACT BODY: The Hawaii-Emperor Bend (HEB) has become a lightening rod for studies of absolute plate motion (APM). Initially seen as the clearest evidence for an APM change over an approximately stationary hotspot, recent studies have suggested that the HEB represents no change in APM motion at all. Instead, it has been proposed that there was a rapid retardation of the southward motion of the underlying Hawaii plume at ~ 50 Ma while the Pacific plate continued its otherwise undisturbed westward motion. Some even see this development as further evidence that the hotspot hypothesis is fundamentally flawed and that no plumes exist. Although several lines of inquiry have lead to the revised interpretations of the HEB signature, there are in particular two principal observations that have prompted this proposed major revision: (a) Paleolatitudes inferred from basalt samples recovered from drill cores at several sites along the Emperor chain systematically imply a volcanic origin much further north than the present latitude of the Hawaiian hotspot, and (b) the age progressions along the Emperor and Louisville chains inferred from dated rock samples appear to diverge for ages older than ~55 Ma when a fixed hotspot reference frame is used to relate the two age progressions. While the latter discrepancy can be modeled with relative minor changes in the inter-hotspot distance between Hawaii and Louisville or by appealing to limited hotspot-ridge interactions, the paleolatitude anomaly at 78 Ma is almost 15 degrees. Unless this anomaly only partially reflects plume motion, its sheer magnitude may require a significant revision of Pacific tectonic history and could ultimately drive a stake through the heart of the hotspot hypothesis; critical new data on Louisville seamount paleolatitudes are required to resolve this puzzle. The HEB itself is constrained to have formed around 50-47 Ma, i.e., approximately Chron 21, which is a known period of significant and global plate reorganizations. Thus, it continues to be my view that a change in plate motion must have played some role in the HEB formation. Given existing paleolatitude, age, and seamount chain geometry data I will examine reasonable bounds on the likely roles that plate and plume motion may have played in the formation of the Hawaii-Emperor and Louisville chains.

KEYWORDS: [3040] MARINE GEOLOGY AND GEOPHYSICS / Plate tectonics, [3037] MARINE GEOLOGY AND GEOPHYSICS / Oceanic hotspots and intraplate volcanism.

(No Image Selected)

(No Table Selected)

SPONSOR NAME: Paul Wessel

Additional Details

Previously Presented Material: 30% in GSA FragileEarth Sept. 2011, Munich, Germany

Contact Details

CONTACT (NAME ONLY): Paul Wessel

CONTACT (E-MAIL ONLY): pwessel@hawaii.edu
