

William W. Sager

Professor

office: 713-893-0717

Date: 4 August 2013

To: Executive Director
USBGN
National Geospatial Intelligence Agency
7500 GEOINT Dr.
Springfield, VA 22150-7500
Mail Stop N-62

Re: Names for large volcanoes within Shatsky Rise, northwest Pacific

Dear Executive Director:


I am writing in regards to names that I would like to propose for large volcanoes beneath the ocean in the northwest Pacific Ocean. I have been studying these volcanoes for 20 years and I gave them names for reasons outlined below. Those names useful as place identifiers and are now being routinely used by other marine geologists who study the Shatsky Rise oceanic plateau.

The proposed names are Tamu Massif, Ori Massif, and Shirshov Massif, for three broad, dome-shaped volcanoes within Shatsky Rise (see map accompanying this letter). Shatsky Rise is a large feature with an area about the same as California or Japan. Its main bulk consists of these three volcanoes, but at present, all are collectively termed "Shatsky Rise". When we began to study Shatsky Rise, we had the problem of distinguishing among the different features. At first we just called them "south high", "central high", and "north high", but these names are not distinctive and led to awkward sentences like "on the southeast flank of the south high". During 1994, I was part of an international team of geophysicists who conducted an NSF-sponsored research cruise (TN037 – R/V Thomas G. Thompson) that intensively studied Shatsky Rise. I and one other scientists were working at Texas A&M University (acronym TAMU), another of us was from Ocean Research Institute (acronym ORI) of the University of Tokyo, and another was working at the P. P. Shirshov Institute of Oceanography in Russia. Thus, we named the big features Tamu, Ori, and Shirshov (Note: one could either use the acronym in all caps, but I prefer to write Tamu and Ori like a name with only the first letter capitalized). The question arose as to what type of feature to call them. Technically, they fit the definition of seamounts, but they are much larger, so this would be akin to calling Godzilla a lizard. We searched geologic feature definitions and there is no apt term for a low, broad dome submarine feature, so we borrowed a term from land geologists and called them "massifs". A massif is "*a large mountain mass or compact group of connected mountains forming an independent portion of a range.*" This seems to fit.

As stated above, we scientists on cruise TN037 began using these names. Probably the first publication of these names was in two 1999 articles in Journal of Geophysical Research (references given on the next page). These names were used occasionally during the first decade of the century, for example an article in Geology by Mahoney and others (reference next page). During 2009, I was co-chief scientist for a cruise of the Integrated Ocean Drilling Program (Expedition 324), which drilled 5 sites on Shatsky Rise to study its origin. Furthermore, in 2010 and 2012, I was co-chief scientist of a project on the R/V Marcus G. Langseth that collected seismic reflection data over the massifs of Shatsky Rise. As a result of these recent studies, the names are being used regularly in publications. Some of the publications using these names are listed on the next page.

We realize that these features already have a name with "Shatsky Rise". Shatsky Rise is a mountain range and like any mountain range there are names given to individual peaks within those ranges. Thus, one would be correct saying that a ship crossed Shatsky Rise, using the name generically. One might wish to be more specific by saying that the ship crossed Ori Massif of Shatsky Rise. Thus, I submit that these names are useful place identifiers.

Best regards,

A handwritten signature in black ink that reads "William W. Sager". The signature is written in a cursive style with a large, prominent 'W' and 'S'.

William W. Sager
Professor

Publications using the proposed names:

Probable first usage:

Sager, W. W., J. Kim, A. Klaus, M. Nakanishi, and L. M. Khankishieva, Bathymetry of Shatsky Rise, Northwest Pacific Ocean: Implications for Ocean Plateau Development at a Triple Junction, *J. Geophys. Res.*, *104*, 7557-7576, 1999.

Nakanishi, M., W. W. Sager, and A. Klaus, Magnetic lineations within Shatsky Rise, northwest Pacific Ocean: Implications for hot spot-triple junction interaction and oceanic plateau formation, *J. Geophys. Res.*, *104*, 7539-7556, 1999.

Others:

Mahoney, J. J., R.A. Duncan, M.L.G. Tejada, and W.W. Sager, Jurassic-Cretaceous boundary age and mid-ocean-ridge-type mantle source for Shatsky Rise, *Geology*, *33*, 185-188, 2005. (Uses all three)

Sager, W. W., What Built Shatsky Rise, a Mantle Plume or Ridge Tectonics? in *Plates, Plumes, and Paradigms*, Special Paper 388, G. R. Foulger, J. H. Natland, D. C. Presnall, and D. L. Anderson (Eds.), Geological Society of America, Boulder, CO, pp. 721-733, 2005.

Kang, M.-H., W. W. Sager, and Expedition 324 Scientists, Data report: Underway geophysics. In Sager, W. W., T. Sano, J. Geldmacher and the Expedition 324 Scientists, *Proceedings of the Integrated Ocean Drilling Program*, v. 324, 2010.

Sager, W. W., T. Sano, and J. Geldmacher, How do oceanic plateaus form? Clues from drilling Shatsky Rise, *EOS, Transactions of the American Geophysical Union*, *92*, 37-44, 2011. Scientists, Proc. IODP, 324, doi:10.2204/iodp.proc.324.108.2010, 19 pp.

Sager, W. W., T. Sano, J. Geldmacher, and Expedition 324 Scientists, *Proceedings of the Integrated Ocean Drilling Program*, v. 324, 2010.

Sager, W. W., T. Sano, J. Geldmacher, and Expedition 324 Scientists, IODP Expedition 324: Ocean drilling at Shatsky Rise gives clues about oceanic plateau formation, *Scientific Drilling*, *12*, 24-31, 2011; doi:10.2204/iodp.sd.12.03.2011, 2011.

Korenaga, J., and W. W. Sager, Seismic tomography of Shatsky Rise by adaptive importance sampling, *Journal of Geophysical Research*, *117*, doi:10.1029/2012JB009248, 2012.

Hein, J. R., T. A. Conrad, M. Frank, M. Christl, and W. W. Sager, Copper-nickel-rich, amalgamated ferromanganese crust-nodule deposits from Shatsky Rise, NW Pacific, *Geochemistry, Geophysics, Geosystems*, *13*, Q10022, doi:10.1029/2012GC004286, 2012.

Sano, T., K. Shimizu, A. Ishikawa, R. Senda, Q. Chang, J.-I. Kimura, M. Widdowson, and W. W. Sager, Variety and origin of magmas on Shatsky Rise, northwest Pacific Ocean, *Geochemistry, Geophysics, Geosystems*, *13*, 25 pp., doi:10.1029/2012GC004235.

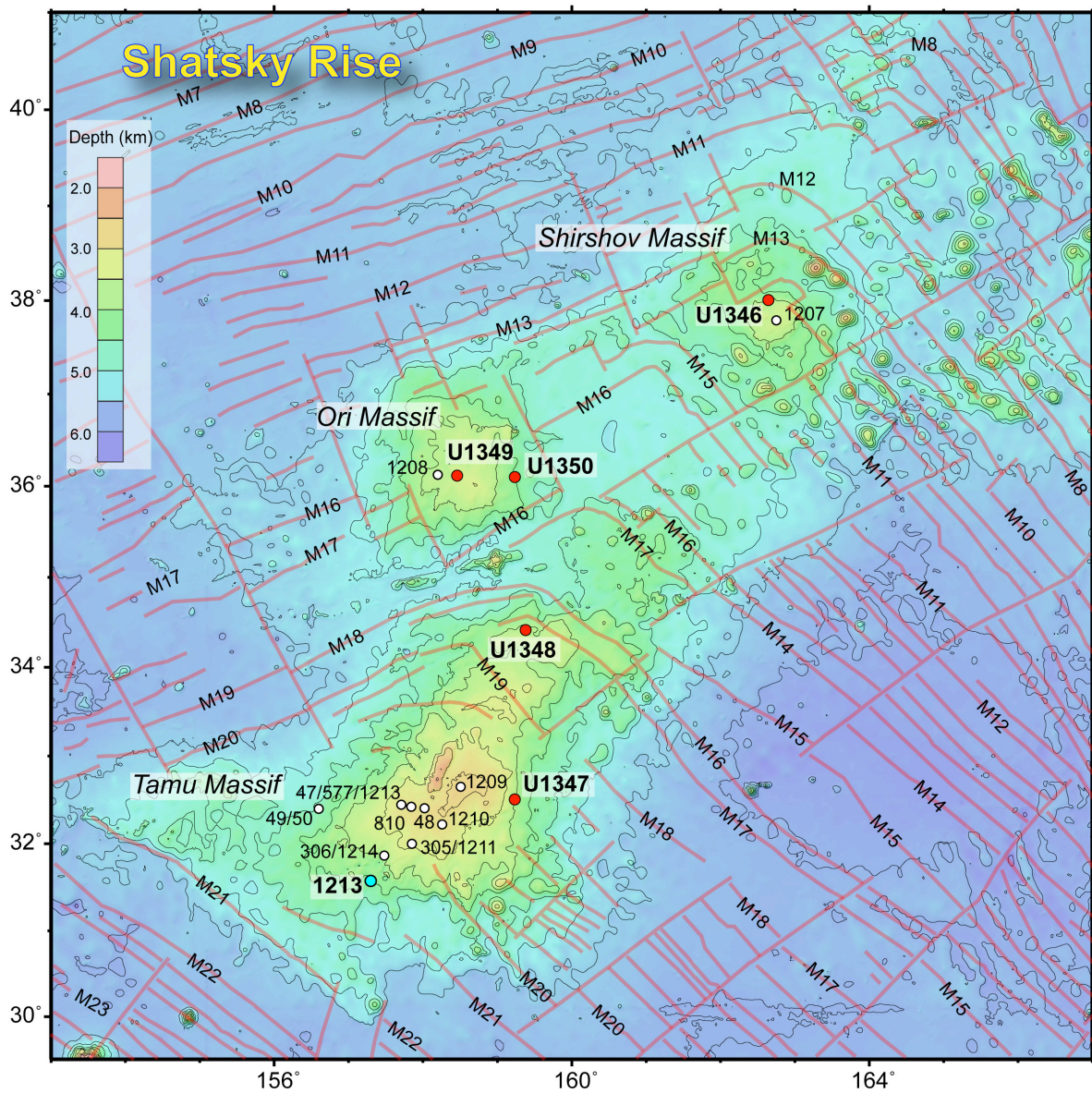
Sager, W. W., J. Zhang, J. Korenaga, T. Sano, A. A. P. Koppers, M. Widdowson, and J. J. Mahoney, An immense shield volcano within Shatsky Rise oceanic plateau, northwest Pacific Ocean, *Nature Geoscience*, in press.

Pueringer, M., W. W. Sager, M. Ooga, B. Housen, C. Carvallo, and M. Tominaga, Paleomagnetism of igneous rocks from Shatsky Rise and implications for oceanic plateau volcanism, Origin, Evolution, and Environmental Evolution of oceanic large igneous provinces, GSA Special Paper, submitted.

Natland, J. H., and R. R. Almeev, Processes of melting, differentiation, and magma mixing recorded by compositions of Cr-spinel in basalt from Shatsky Rise oceanic plateau, NW Pacific, *Journal of Petrology*, submitted. (uses only Ori and Shirshov)

Shimizu, K., N. Shimizu, T. Sano, N. Matsubara, and W. Sager, Paleo-elevation and subsidence of ~145 Ma Shatsky Rise inferred from CO₂ and H₂O in fresh glasses, *Earth and Planetary Science Letters*, submitted.

Zhang, J., W. W. Sager, and J. Korenaga, Shatsky Rise oceanic plateau structure from 2D multichannel seismic reflection profiles and implications for oceanic plateau formation, *Origin, Evolution, and Environmental Evolution of oceanic large igneous provinces*, GSA Special Paper, submitted.



Plot showing southern Shatsky Rise, massif names, and scientific drilling holes. Red lines are magnetic lineations and fracture zones.