

2020 MGPV Division Distinguished Geological Career Award to Cathy Busby: Citation

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First, thank you to the GSA officers that allowed us to postpone this celebration of Cathy's career so that it could happen in person. I also thank Ray Ingersoll, Elizabeth Miller, Jason Saleeby and John Wakabayashi for writing letters in support of this nomination.

It is a very happy occasion to introduce Cathy Busby for the MGPV Distinguished Career Award. She is a great scientist and a good friend – and with one of my daughters now living in Sacramento, she is extended family. We are here to celebrate her scientific achievements – and I'll get to those. But I think it's also worth noting her many other talents and interests. She has a life-long fluency in Spanish and knows the culture very well. She is especially accomplished in Flamenco and knowledgeable of the music. She's an aesthete of wine, and an excellent cook. She is a devotee of Burning Man. And at her gorgeous home in Davis, she is head gardener and lead curator of a beautiful garden with an especially excellent display of roses. And finally, but not least, she is a loving and dedicated mother to her three daughters, Claire, Marian and Sophie.

As to her science... I would require Vin Scully's gift for words and the expertise in a half-dozen other subdisciplines to do fair justice; lacking these, I focus on petrology.

Five decades ago Peter Lipman and Bob Christiansen proposed that plate tectonic patterns could explain subduction-related magmatism and Basin-and-Range style volcanism in the North American Cordillera. Those papers influenced many people, including myself, to study petrology, and to wonder about the precise relationships between magmatism and tectonics. Cathy's work translates their temporal associations into causal forces. Essential reading would include Busby (2013) and Busby et al. (2008; 2019; 2022). Cathy is the first to clearly document how transtensional faults of the Walker Lane are the northward propagating tip of the Gulf of California, and how this migrating system will eventually calve off much of California from North America, illustrating to use her words "the birth of a plate boundary". Busby et al. (2016), further show that the birth of the Sierra microplate and the collapse of the Nevadaplano were simultaneous events. These larger tectonic issues are important but I'd like to bring emphasis to what happens within this tectonic system. Cathy shows how the related migrating stresses in the Walker Lane have controlled volcanism at Long Valley, the Little Walker, and Ebbetts Pass Calderas and the Lassen Volcanic Center. What is especially fascinating is her recognition that all these large silicic systems are habitually sited within transtensional basins, which form at the tip, or in the wake of the propagating Walker Lane system. Cathy's contributions to arc systems have a longer history than this. She has spent several decades conducting research on the Baja Peninsula, where she has discovered near-complete arc sections that provide a time-integrated

view of how volcanic arcs form and evolve. Essential reading here would include Fackler-Adams and Busby (1998), Busby (2004) and Busby and Centeno-Garcia (2022). Her ability to establish causal connections between tectonics and volcanism start much earlier though. In Busby (1988) and Busby-Spera and Saleeby (1990) she shows the same causality in Mesozoic systems. In Busby-Spera and Saleeby (1990), Cathy and Jason show that right- lateral faults were highly active during the time that Cretaceous plutons were emplaced in the southern Sierra Nevada and in Busby (1988) she hypothesized that extension within arcs is a general feature and critical for explaining magmatic activity, noting also the value of studying ancient, well-exposed systems so as to shed light on modern volcanoes.

The siting of large silicic systems in transtensional basins, appears to solve or obviate two seemingly unsolved problems: the source of space, and the source of heat. The Busby-Spera and Saleeby (1990) paper was critical to the idea that transtensional systems could solve the so-called room problem for emplacing granitic plutons. In recent decades thermal modelers have struggled with a “heat problem” – the thermal energy needed to power a large volume silicic magma chamber – that could disappear if they shift their system from hydrostatic to transtensional. The subset of petrologists who remain apprised of advances in field studies will be the lone subset able to formulate and test useful hypotheses.

How has Cathy accomplished so much? It is in the genius of her approach: Cathy has a discerning taste in outcrops. She has often reminded me that to address the larger problems of tectono-magmatic relationships, we need outcrops that feature “datable stratigraphy”, and thorough stratigraphic sections of unaltered rocks so she can piece together a comprehensive evolutionary picture.

I’ll close by noting that, if it’s allowable to admire your friends (as it implies a distance that does not apply), I’ve admired Cathy as a scientist, a dedicated parent, and a model for how to face the vicissitudes of life. Anyone looking for a role model could not find one better than in our MGPV Distinguished Career Award winner, Cathy Busby.