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Preface to the Jim Papike special issue

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Everyone has a Jim Papike story. Okay, this is a slight exaggeration—but only slight. In the course of his career Jim has been a major presence at six institutions and has influenced the research community through participation and leadership in over 40 national committees spanning everything from Apollo Site Selection and Continental Scientific Drilling to DOE working groups on geologic disposal of nuclear waste. He is active in and has been an officer or councilor in the Mineralogical Society of America (president), the American Geophysical Union, the Geochemical Society (president), the Society of Economic Geologists, the National Academy of Sciences, the Universities Space Research Association, and numerous other professional organizations. In sum, he has been a presence at institutions of amazing diversity across the breadth and depth of this country and overseas. More than this, Jim has a prominent physical and intellectual presence that leaves an impression not just on the scientists he interacts with, but also the public. In his travels, Jim is famous for escapades as well as research. If you don't have a Jim Papike story and want to know what one might be like, read some of his papers but then rent the movie *Big Fish* and picture the protagonist as a cowboy/geologist. So, everyone (just about) does have a Jim Papike story.

Depending on who is telling the story, Jim is a mineralogist, a petrologist, a geochemist, a geological engineer, a specialist in planetary regoliths, a meteoriticist, a hockey player, an ice fisherman extraordinaire, or a ranger to name a few. Take your pick, or take them all. It therefore seems appropriate that the theme of this issue of American Mineralogist is "Planetary Materials, from the Earth to the Moon and Beyond." There are 21 papers in this volume by people whose careers, and lives, have been profoundly influenced by their interactions with Jim Papike.

For much of his career, the Black Hills of South Dakota has remained a special place to Jim. He received his undergraduate degree from the South Dakota School of Mines and Technology and returned to this alma mater as director of the Institute for the Study of Mineral Deposits. Jim and his wife Pauline (and often accompanied these days kids and grandkids) still frequent Rapid City and the Black Hills. In this issue are two papers that focus upon the geology of the Black Hills. In the first paper, former student Peter Nabelek, former post-doc Ted Labotka, and co-workers further define the metamorphism associated with the Proterozoic collision of Archean Wyoming and Superior provinces recorded in the Black Hills. In the second paper, Fang-Zhen Teng, former student Rich Walker and colleagues examine Li isotopic systematics in granites and pegmatites related to the Harney Peak granite complex in the Black Hills.

This issue contains three other terrestrial mineralogical-geochemical studies as well. Long time friend Stephen Haggerty and co-author Agnus Fung examine orbicular oxides in carbonatitic kimberlites. Justin Hagerty and co-workers record the behavior of trace elements in minerals and glasses collected from the well-documented Makaopuhi lava lake. Glenn MacPherson and co-workers examine the tectonics of the Pacific northwest using igneous blocks in Franciscan mélange.

Figure 1. Jim on the Gunflint Trail with Ted Labotka, Neal White, and Dave Vaniman.

Figure 2. Jim during a scientific visit to Tskuba, Japan, with Chip Shearer.

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The Moon and pyroxene crystal chemistry have been the focus of much of Jim's energies throughout his career at the USGS, Stony Brook, South Dakota School of Mines, and the University of New Mexico. To highlight Jim's contribution to this theme, we have chosen to include six papers that pertain to the mineralogy, petrology, and geochemisty of the Moon. Clive Neal and Georgiana Kramer outline the petrogenesis of high-Al basalts collected from the Apollo 14 landing site to illustrate the usefulness of small planetary samples in reconstructing the early magmatic history of the Moon. Dwarzski et al. examine the crystal chemistry of high-titanium garnets that coexist under high P with high-Ti lunar basalts. John Hughes and co-authors conduct the first structural study of merrillite from the Moon, while in a companion paper, former student Brad Jolliff and co-authors discuss the crystal chemistry of lunar merrillite and compare it with other meteoritic and planetary occurrences of whitlockite and merrillite. Johnny Chaklader et al. examine the behavior of light lithophile elements in pyroxene from "dry" lunar basalts to better understand the relative roles of crystal chemistry and fluid loss in the behavior of Li and B in martian basalts. Finally, Chip Shearer and co-workers define the effects of pyroxene composition, melt composition, and crystallization kinetics on the pyroxene Eu-valence oxybarometer.

Another three papers focus on the crystal chemistry of pyroxene in a variety of planetary settings. Former student Jim Karner and others compare pyroxenes from many planetary environments (Earth, Moon, Mars, 4 Vesta) to better elucidate differences and similarities among the terrestrial planets. Gary Lofgren, along with Gary Huss and Gerry Wasserburg, examine the equilibrium and kinetic effects on trace-element partitioning between clinopyroxene and melt. Former student Craig Schwandt and Gordon McKay contribute an experimental study concerning minor and trace element partitioning in sector zoned enstatite. These three papers illustrate the usefulness of understanding the trace element crystal chemistry of pyroxene and build on the large body of literature that can be attributed to Jim.

During his tenure at University of New York at Stony Brook, Jim became involved in the mineralogy of anchondrites (HEDs, SNCs). This work expanded to include research into the evolution of Mars, martian surface processes, and sample return from Mars. Two papers in this special issue focus upon the surface and the interior of Mars. Former post-doc Dave Vaniman and co-author Steve Chipera present results of an experimental study of Mg- and Ca-sulfate hydrates and implications for the martian regolith. Former student Chris Herd deciphers the redox history of a martian basalt represented by meteorites NWA1068 and NWA1110.

Although pyroxene may be Jim's favorite mineral, vanadium is Jim's favorite element. Jim has had a keen interest in valence state partitioning between rock-forming minerals and melt, and because of its multiple valence states, V (V^{5+},V^{4+},V^{3+},V^{2+}) has been a target of Jim's research interests. Two papers in this issue are devoted to V behavior in magmatic systems. First, Kevin Righter and co-workers show the results of an experimental study of the oxidation state of V in spinel and basaltic melt. In the second paper, Chip Shearer et al. illustrate the usefulness of V partitioning between olivine and basaltic melt to determine the oxygen fugacity of the martian mantle.

As director of the Institute of Meteoitics at the University of New Mexico, Jim's interests included the use of minerals as recorders of early solar system processes. With this in mind, we have included three papers that are concerned with solar system processes. Rhian Jones and Rae Carey examine relict forsterite grains in chondrules from CV3 carbonaceous chondrite Mokoia. Former student and colleague Steve Simon and co-authors examine CM2 carbonaceous chondrites to better understand the formation of spinel- and hibonite-rich inclusions. Frans Rietmeijer and co-authors, including former student Aurora Pun and former student and post-doc Jim Karner, examine metastable eutectic condensation in Al-Fe-SiO–H_2–O_2 vapor. This system has the potential to place better constraints on the formation of Fe–Al silicates in stellar atmospheres, in the early solar system, and during large impacts.

The variety of papers included within this special issue is only a sampling of Jim's influence on mineralogy and geochemistry. There is much more to Jim than you will find between these covers. Thanks Jim, for everything.

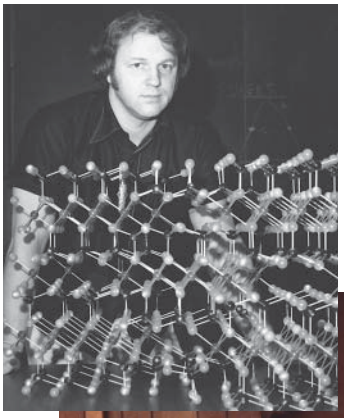

FIGURE 3. Jim during his early days at Stony Brook.

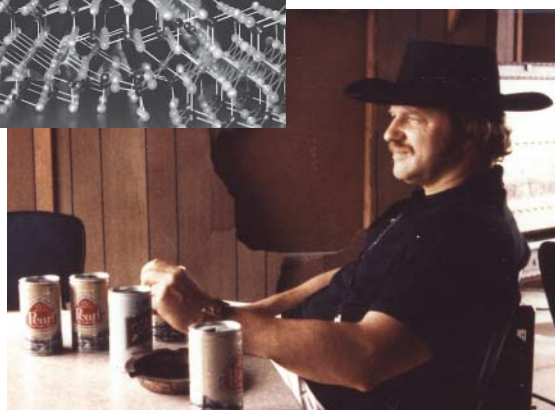

FIGURE 4. Jim in Houston with his first cowboy hat contemplates the role of crystallization kinetics on pyroxene chemistry.

FIGURE 5. Jim and Pauline on the Oregon Coast.