of carbonaceaous chondrites (including Allende) contain mixture with metal or magnetite. Low unblocking temperatures combined with high AF resistance of NRM may point toward pyrrhotite (or other sulfides) as the main NRM carrier in various published studies. A high-pressure transition to non-magnetic state has been pinpointed to 2.8 GPa (Rochette et al., 2003; GRL doi:10.1029/ 2003GL017359). Remanence measurements on well characterized nearly SD pyrrhotite confirm full demagnetization at this pressure, and 3/4 at 2 GPa. As the majority of meteorites (including all SNCs) has been shocked much above this pressure this implies that the pyrrhotite NRM is post-shock even in meteorites considered to be considered to be "unshocked". Indeed the threshold for petrographic shock evidence is 4-5 GPa. This shock demagnetization may also explain the lack of magnetization at several crater radii from the large impact basins on Mars (Hood et al., 2003; GRL doi10.1029/2002GL016657).

GP21C-0041 0830h POSTER

Shock and Anisotropy Related Magnetization in a Freshly Fallen LL Ordinary Chondrite

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We conducted a rock magnetic, magnetic anisotropy and paleomagnetic study of the brecciated LL6 bensour meteorite a few months after its fall on Earth. Magnetic properties, in particular hysteresis loops before and after heating, as well as high field anisotropy indicate that tetrataenite is the major magnetic mineral. A very strong coherent susceptibility and remanence anisotropy is evidenced and interpreted as due to the last large impact responsible for the post-metamorphic and post-brecciation compaction of this material. Demagnetization of mutually oriented sub-samples evidences three components of magnetization. Medium and high coercivity components carried by tetrataenite are randomly distributed down to a scale of 0.1 cc. They represent the magnetization acquired by tetrataenite during its formation by low-temperature atomic ordering of taenite, but the link with the original magnetization of taenite and kamacite grains, acquired during cooling of the parent body after metamorphism, is unknown. Alternatively this randomness may be due to a post-metamorphic thermoremanent magnetization subsequently randomized by brecciation. A non random low-coercivity component is also evidenced. We show that it clearly predates the fall of the meteorite on Earth and postdates the last major impact on the meteorite parent body. The coercivity spectrum of this component as well as the close relation with the impact-related petrofabric indicate that the low coercivity component is likely related to this major impact, possibly in quasi-absence of ambient magnetic field.

GP21C-0042 0830h POSTER

The Crustal Magnetic Signature of Hellas Planitia

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The Electron Reflectometer (ER) onboard Mars Global Surveyor (MGS) detected a plasma boundary between the ionosphere and the solar wind as the latter is diverted around and past the planet [Mitchell et al., GRL, 27, 1871, 2000; Mitchell et al., JGR, 106, 23419, 2001]. Above this boundary the 10-1000 eV electron population is dominated by solar wind electrons, while below the boundary it is dominated by ionospheric photoelectrons. This "photoelectron boundary", or PEB, is sensitive to pressure variations and moves vertically in response to changes in the ionospheric pressure from below and the solar wind pressure from above. The PEB is also sensitive to crustal magnetic fields, which locally increase the total ionospheric pressure and positively bias the PEB altitude. We have empirically modeled and removed systematic variations in the PEB altitude associated with the solar wind interaction, thus isolating perturbations caused by crustal magnetic fields. A map of the PEB altitude perturbations closely resembles maps of the horizontal component of the crustal magnetic field measured at 400 km by the MGS Magnetometer (MAG). We find a PEB altitude bias over the Hellas basin that is consistent with a horizontal magnetic field with an intensity of several nanotesla at 400 km altitude. This is compatible with upper limits to the horizontal crustal field strength set by MGS MAG measurements from the 400-km-altitude mapping orbit. If there are crustal sources within Hellas that give rise to a several-nanotesla horizontal field at 400 km altitude, then these same sources should give rise to crustal fields of at least several tens of nanotesla at 100 to 200 km aerobraking altitudes. Although low-altitude MAG measurements over Hellas are sparse [Acuna et al., Science, 284, 790, 1999], there was no evidence for crustal sources of this predicted field strength. Furthermore, electron reflection data (with more complete sampling) detected only a few isolated sources within Hellas [Lee et al., EGS-AGU-EUG Joint Assembly, Abstract EAE03-A-07938, 2003], which are far too weak to account for the observed PEB bias. We explore two possibilities for the observed PEB bias over Hellas: 1) horizontal fields over Hellas arise from magnetic sources around the basin perimeter, and 2) the solar wind flow is perturbed by crustal sources in the southern hemisphere such that the effective solar wind pressure over Hellas is systematically reduced. No detectable PEB or magnetic signature is observed over the younger Argyre and Isidis Basins.

GP21C-0043 0830h POSTER

Paleomagnetic and Rock-Magnetic Study of the Yaxcopoil-1 Impact Breccia Sequence, Chicxulub Impact Crater (Mexico)

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Results of a detailed paleomagnetic and rock-magnetic study of samples of the impact breccia sequence cored in the Yaxcopoil-1 borehole between about 800 m and 896 m are presented. The Yaxcopoil-1 breccia sequence occurs from 794.63 m to 894.94 m and consists of relatively complex melt-rich suevites. The low-field susceptibility ranges from -0.3 to 4018 10-5 SI. The NRM intensity ranges from 0.02 mA/m up to 37510 mA/m. In general, NRM intensity and magnetic susceptibility present wide ranges and their values are positively correlated, pointing to varying magnetic mineral contents and textures of the melt-rich breccia sequence. The vectorial composition and magnetic stability of NRM were investigated by both stepwise alternating field and thermal demagnetization. In most cases characteristic magnetizations with linear components going through the origin of vector plot are observed. Both upward and downward inclinations are observed in the breccia samples. We interpret the reverse magnetization as the primary component. The multivectorial composition of remanence may be explained by the heterogeneous nature of the breccias and effects of hydrothermal activity. Clasts and matrix forming the breccia appear to have been subjected to a wide range of temperature/pressure conditions and show distinct rock-magnetic properties. High temperature/pressure conditions during cratering resulted in melting, formation of metamorphic minerals, generation of shock features in quartz and plagioclases, crustal uplift, widespread fracturing and deformation and generation of a thermal anomaly. An extended interval of remanence acquisition and secondary partial or total remagnetization may explain the paleomagnetic results.

GP21C-0044 0830h POSTER

Evidence for Terrestrial Magnetic Contamination of the Chondritic Meteorites

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Ordinary chondrites represent primitive material of the Solar System. They provide essential information about the conditions in the early solar nebula. Part of this information can be extracted by analyzing the magnetic properties of meteorites. However, the magnetic record and associated rock magnetic properties are sensitive to the meteorite's numerous post-formation processes including various metamorphic events during planet formation period or terrestrial residence following the meteorite's fall. As shown by the Moravka (H 5-6) and Zebrak (H 5) samples, some ordinary chondrites do not carry stable magnetic remanent record. The loss of primary magnetic remanence (if any) can be associated with metamorphic events that may have taken place before the encounter with the Earth. The soft magnetic component may indicate a viscous terrestrial magnetic contamination. Another (EL 6) meteorite is an example o f a fresh fall. The magnetic material of this chondrite seems to be sensitive to low temperature (< 350 K) ambient magnetic field contamination. The meteorite (H 4) (from the El Baharya "strewn field" of the Libya desert) carries visible traces of terrestrial oxidation and weathering. The magnetic mineral assembly contains products of terrestrial oxidation and the magnetic record present was probably strongly influenced by terrestrial remagnetization. Therefore, numerous space and terrestrial processes reduce the chance of observing a primary magnetic record in ordinary chondrites.

URL: http://www.volny.cz/tomkohout/meteo/

GP21D MCC: 2000 Tuesday 1020h

Magnetic Interpretation: Continental to Planetary Scales II *(joint with OS, P)*

Presiding: **M E Purucker,** Raytheon ITSS at Geodynamics Branch**; J D Phillips,** U.S. Geological Survey

GP21D-01 1020h

Toward the World Digital Magnetic Anomaly Map (WDMAM)

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During the 2003 IUGG meeting in Sapporo, Japan, the IAGA working group on Geomagnetic Modeling rekindled the World Digital Magnetic Anomaly Map (WDMAM) project. Even though preparation of such a map may appear a daunting task, the bulk of it could be accomplished within a few years, taking advantage of many existing national to continent-scale and oceanic magnetic anomaly compilations. In addition, Project Magnet high altitude aeromagnetic surveys could be utilized where available and necessary to fill gaps. Similarly, the CHAMP satellite-derived magnetic anomaly field could be downward continued to provide wavelengths greater than 500 km in this magnetic anomaly map. There are a large number of data handling and processing issues that need to be addressed during the preparation of this map and we discuss some of them here: What should the data spacing be? Should the spacing be uneven according to the data availability? At what elevation should the fields be displayed? How to treat the areas of complete lack of near-surface (marine and airborne) magnetic field coverage? How should one treat the long-wavelength anomaly limitations of

the near-surface data? What should be the main field model? What should be the techniques for data processing? What should be the techniques for data merging? The ultimate utility of this first generation map is manifold: ranging from geologic interpretation of features of a few km width to recognizing individual geologic provinces in continental assemblages, developing regional models of the bottom of the magnetic layer and/or the Curie isotherm, and plate tectonic reconstructions using magnetic anomalies. The global view and the ability to move the inferred source magnetizations along with the continents and oceanic areas back in time will also significantly aid in deciphering the origin and evolution of geologic provinces presently appearing unrelated due to their vast intervening distances. We recognize the WDMAM as the legacy of the geomagnetists from all around the world and we invite them all to participate enthusiastically in its preparation. A preliminary world map is slated for the IAGA meeting in Toulouse (2005), leading to a first edition release at the IUGG assembly in Perugia (2007) as a contribution to IGY+50. We envisage that the map and dataset will take its place alongside, for example, global topography and seismicity maps and be used and improved by future generations of earth scientists for education, research and the wider societal benefit.

GP21D-02 1035h INVITED

Aeromagnetic and satellite magnetic data guide reconstructions of parts of Rodinia

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Numerous reconstructions of the 1100-750 Ma supercontinent of Rodinia have been proposed, but there is little agreement on any firm points of comparison (piercing points) between any two continental blocks between ages 1700 and 500 Ma. Reconstructions are also hampered by lack of reliable paleomagnetic poles for the late Proterozoic. Aeromagnetic data provide an additional method for Precambrian tectonic reconstructions in that they tie together isolated interpretations of geologic information through continuous data coverage, provide plate-scale views of geology and tectonics, and extend interpretations of units buried beneath cover. Recently released satellite magnetic and continental-scale aeromagnetic compilations can be used for plate-tectonic scale reconstructions as well as for defining Precambrian crystalline basement terranes. Our approach is to identify key piercing points in existing plate reconstruction models for western Laurentia, eastern Australia, East Antarctica and northern Siberia, and, where possible, determine the sources of magnetic anomalies in the region. We compare anomaly amplitude, wavelength and trend across continental boundaries. Of the tested reconstructions, the AUSWUS fit and the NE Siberia - SW Laurentia connection are not consistent with the aeromagnetic data. The SWEAT fit is consistent with the data, but cannot be fully tested due to the lack of critical magnetic data over piercing points in Antarctica. Because the AUSMEX reconstruction does not attempt to link pre-1100 Ma crystalline blocks and belts of western Laurentia and Australia, the aeromagnetic data are not useful for its evaluation.

GP21D-03 1050h INVITED

High-Altitude Magnetic Survey Over the United States

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The year 2004 offers an exciting and cost-effective opportunity to acquire a high-altitude magnetic data set over the U.S. A national mission is presently being planned to collect IFSAR imagery in addition to total and vector magnetic field data at an altitude of about 15 km. High-altitude magnetic data, needed as a reference field to properly level the U.S. low-altitude magnetic data set (0.3 km altitude), will also provide new insights on fundamental tectonic and thermal processes, thereby enabling a new view of the structural and lithologic framework of continental and offshore regions. A correctly merged, low-altitude magnetic database, using high-altitude magnetic data as a reference field, will be one of the most important legacies of a high-altitude magnetic mission, as it will greatly expand the utility of the invaluable U.S. magnetic data. However, the high-altitude data also have considerable independent scientific value. These unique data will bridge the spectral gap between the spectrums of the low-altitude aeromagnetic and satellite magnetic data. Based on our understanding of the magnetic properties of the lithosphere, the high-altitude data will clearly aid in the solution of a broad range of applied Earth science issues related to: the conundrum of long-wavelength magnetic anomalies; geologic and tectonic processes of crustal accretion and evolution; thermal and mechanical properties of the lithosphere; societal concerns including localization of favorable areas for mineral, energy, and thermal resources; and mitigation of earthquake and volcanic hazards. The wavelength band of a high-altitude survey will be particularly helpful in studying the lower crust–its composition, structure, and thermal regime–and large geologic/tectonic structures, such as basement terranes. In addition, these results will provide significant new constraints for geological interpretation of complementary regional topographic, seismic, electromagnetic, gravity, and heat flow data. The planned mission has led to many challenges. A commonly overlooked parameter in processing aeromagnetic data, namely magnetic effects caused by the electrically conductive Earth, has spawned mission studies related to base-station separation and magnetic induction effects. Induction effects have been observed over significant distances from large conductive structures within the Earth and at coastlines (due to the significant conductivity contrast between the seawater and the landmass). Another problem to overcome is the need to estimate the time-varying ionospheric and magnetospheric magnetic variations in the high-altitude survey data, as they will have wavelengths similar to those of crustal magnetic anomalies. These external fields must be identified and removed from the data to accurately recover the crustal anomaly fields.

GP21D-04 1105h INVITED

Improving the Resolution of the Lithospheric Magnetic Field From CHAMP and Upcoming SWARM Satellite Measurements

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Continental scale magnetic anomalies contain unique information on the structure and composition of the largely inaccessible lower crust. The new satellite magnetic missions provide the opportunity to see these anomalies in unprecedented clarity. Current anomaly maps extend to spherical harmonic degree 80, corresponding to wavelengths of about 500 km. This leaves an uncovered waveband between satellite maps and aeromagnetic compilations, which become unreliable at wavelengths exceeding the dimensions of the individual surveys, typically of the order of 100 km. Revived efforts to combine satellite and aeromagnetic data to a world magnetic anomaly map require information in the intermediate waveband. Narrowing this gap is an important motivation for further improving the resolution of satellite magnetic anomaly maps. A comparison of individual CHAMP repeat tracks shows consistent crustal features with wavelengths smaller than 500 km. To map such features requires very clean data. Since mid latitude and polar data have very different behaviour, we treat them as separate (overlapping) data sets. Apart from the usual main and external field corrections, we fit and subtract internal and external dipoles to remove long wavelength magnetospheric and induced fields. Furthermore, we fit and subtract the far-ranging effect of polar electrojets from the mid-latitude data. In the polar caps we use only the most quiet tracks, rejecting 95 % of the data. Having once identified the magnetic signal of ocean tides, we now subtract model predictions of the major tidal constituents in order to further reduce noise levels. In particular, this improves the levelling of adjacent tracks which is essential for retrieving the East/West signal. Our immediate aim is to produce a reliable anomaly map to degree 90. A further boost in resolution and accuracy is expected from the upcoming multiple satellite SWARM mission. We currently investigate optimum orbit constellations in an end-to-end mission simulator.

URL: http://www.gfz-potsdam.de/pb2/pb23/SatMag/model.html

GP21D-05 1120h

Magnetic Crustal Thickness and Heat Flow in Antarctica

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The magnetic crustal thickness in Antarctica is determined through inversion of satellite magnetic data. From an initial model of the magnetic crust, the magnetic field at satellite altitude is calculated, and compared to the observations, taken to be the magnetic field models based on CHAMP and Oersted data. The difference between the modeled field and the observations is then inverted into a correction to the crustal model. By adding the correction to the initial model, an improved model for the magnetic crustal thickness is obtained. Connecting the magnetic crustal thickness to the Curie depth and the Curie temperature, we have attempted to extract information about the regional geothermal heat flux underneath the ice cap.

GP21D-06 1135h INVITED

Mars Magnetism

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The Mars Global Surveyor Magnetic Field Investigation (PI: Acuna) has mapped the crustal magnetic field with unprecedented signal fidelity and resolution from its 400 km altitude orbit. The crust is intensely magnetized, at least an order of magnitude more intensley magnetized than Earth's, and even from orbital altitude one recognizes order in the spatial variation of the magnetic field. We discuss models of the crustal field and implications for crustal evolution and the Mars dynamo. We also discuss how best to follow up on the early Mars discoveries, making magnetic field observations on a scale applicable to geological features on Mars, to greatly increase the interpretative power of magnetic field data.

GP

GP21D-07 1150h

Interpretation of a Spatially Continuous Magnetization map of Mars

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Utilizing the aerobraking, science phasing, and mapping orbit data set compiled by Cain et al. (2003) for their degree 90 spherical harmonic model, we derive a spatially continuous magnetization model of Mars in a 40 km thick layer. We solve for the magnetization direction and strength, while minimizing the RMS magnetization to ensure a unique model. While the strength is highly variable, and depends on the fit to the data, the directions are robust. The model preserves the resolution of the original data set, which is dominated by observations in two altitude ranges (100-150 km, and 400 km). We see several new features in our map, including additional detail in the highly magnetized southern hemisphere region. We will concentrate our structural and tectonic interpretation in the Cimmeria region, where a continuous channel of constant steep inclination is seen.

GP21D-08 1205h

A Polar Magnetic Paleopole on Mars?

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A global map of the Martian magnetic field is computed using MGS magnetic measurements and an equivalent source approach. Sources are located arbitrarily (i.e. with a constant spacing) near the surface of Mars. The magnetic field and the magnetization (from the equivalent source solution) present similar features: magnetic anomalies are mostly located South of the crustal dichotomy, the largest craters as well as the largest volcanoes of the North hemisphere do not seem to present any significant magnetic anomaly. In one case at least, a volcanic edifice, Apollinaris Patera, seems to be associated with a magnetic anomaly. This volcano is located at (9.3°S, 174.4°E), North of Terra Cimmeria and Terra Sirenum, where the largest magnetic anomalies were detected. It rises about 5 km above the surrounding terranes. Its shape is a 200-km wide dome, with a 75-km wide caldera on its summit. This is one of the largest volcanoes in the Southern Hemisphere. It is associated with a relatively high gravity anomaly. Crater counts and stratigraphic relations suggest a middle Hesperian age for its younger flow, but it presumably had a long history. We present the modeling of the magnetic anomaly located above this volcano. We use a single equivalent source, located below the volcano. The direction of the magnetization of the source leads to a polar position (70° latitude) for the paleopole. Assuming that the last eruptive stages occurred while the Martian dipolar dynamo was still active, then this paleopole position would indicate that the Martian magnetic field was almost aligned on the present day rotation axis of the planet.

GP22A MCC: 2000 Tuesday 1340h

Extraterrestrial Paleomagnetism: Role of Impact Related Shock II *(joint with P)*

Presiding: **B Lin,** University of California, Berkeley**; D Mitchell,** University of California, Berkeley**; M Fuller,** HIGP-SOEST, University of Hawaii

GP22A-01 1340h

Paleomagnetic Records of the Moon and Mars

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The Moon and Mars afford two examples of major evolved solar system bodies for which we have paleomagnetic records, but no evidence for a presently active dynamo. The records from the Moon and Mars include satellite, or sub-satellite magnetic survey data and the paleomagnetism of samples brought to earth as meteorites. In addition, for the moon we have the record of the Apollo samples. We interpret the lunar paleomagnetic record in terms of a strong magnetic field era from approximately 3.85 - 3.65 Ga, when the surface field was comparable with earth's field and that outside of this period the field cannot be convincingly distinguished from background noise. Mars may also have had a relatively short period of a strong dynamo field, if the interpretation of the demagnetization effects of Hellas and Argyre and the estimates of their age are correct. Evidence from ALH 84001, is consistent with a surface field about an order of magnitude smaller than the earth's field. In comparing these surface fields it is perhaps worth noting that if the efficiency of the various dynamos are similar, being for example dependent upon the linear dimension of the source region, the surface fields will necessarily be larger on smaller bodies.

GP22A-02 1355h INVITED

Magnetic Tests For Magnetosome Chains In Martian Meteorite ALH84001

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Transmission electron microscopy studies have been used to argue that magnetites in carbonates from Martian meteorite ALH84001 have a composition and morphology indistinguishable from that of magnetotactic bacteria and their magnetofossils (1). It has even been claimed from scanning electron microscopy imaging that some ALH84001 magnetites are aligned in chains (2). If true, this would provide dramatic support for the magnetofossil hypothesis because alignment in chains is perhaps the most distinctive of the six crystallographic properties thought to be collectively unique to magnetosomes. The leading alternative hypothesis is that the ALH84001 magnetites are the inorganic products of shock-heating of the carbonates (3, 4). Here we use three rock magnetic techniqueslow-temperature cycling, the Moskowitz test (5), and ferromagnetic resonance (FMR)to demonstrate that most or all of the magnetites in ALH84001 are unusually pure and fine-grained but are not arranged in magnetosome chains.

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GP22A-03 1410h

Magnetite Under Pressure: Direct Magnetic Measurements and Consequences for Meteorite Impacts

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New diamond anvil cell technology now makes it possible to directly measure magnetic properties of extremely small sample volumes under high pressures. Specifically, we have developed a "non-magnetic" beryllium-copper, membrane-type diamond cell that houses a system designed to measure the reversible magnetic susceptibility of micron-sized samples under pressures in excess of 30 GPa. By placing the cell in the confines of an electromagnet, we can measure reversible susceptibility as a function of applied field, with H varying from -1.2 T to +1.2 T. Because the integral of Xrev(H)dH is proportional to the magnetic moment (of the reversible part of the remanence, or Mrev), we can measure the reversible hysteresis parameters of ferromagnetic materials as a function of pressure. We find that magnetite reversible hysteresis parameters vary little below 1.0 GPa, while at higher pressures significant increases occur in bulk coercivity (Hc) and the ratio of saturation remanent magnetization (Mrs) to saturation magnetization (Ms). The magnetic properties of magnetite are not reversible upon pressure release. Moreover, the magnetic properties of magnetite under pressure and after pressure release are highly dependent on both domain state and the presence or absence of an external magnetic field. These factors should be taken into account when studying the magnetic signatures of meteorite impacts.

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Magnetic Effects of Impacts on the Moon

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Lunar Prospector (LP) electron reflectometer data indicate a variety of magnetic signatures associated with lunar impact sites, ranging from nearly complete demagnetization signatures to central magnetic anomalies. Smaller impact craters (D <∼150 km) of all ages show evidence of demagnetization, with a higher percentage of younger craters displaying clear symmetric demagnetization signatures. Among larger impact structures, those of Imbrian and younger age still tend to show demagnetization, while older impact sites of Nectarian and Pre-Nectarian age often have central magnetic anomalies (sometimes superimposed upon a larger demagnetized region) with peak fields ranging from a few nanotesla to ∼100 nT. Most demagnetization signatures extend beyond the main rim of the visible impact structure, sometimes to a distance of several main rim radii. Consideration of the peak shock pressures produced by impacts indicates that most of the demagnetized region should not be heated above the Curie point, therefore indicating the importance of shock demagnetization in producing the observed demagnetization signatures. Central magnetic anomalies, on the other hand, tend to lie inside the transient cavity region of larger impact structures, suggesting that these features could be produced by thermal remanence in impact melt rocks, shock remanence in the highly shocked central uplift regions, or a combination thereof. Careful analyses of magnetic features associated with lunar impact sites, and comparison with terrestrial data from both laboratory experiments and field work, can be used to constrain the age history and physical characteristics of lunar remanent magnetism.

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Origin of Lunar Crustal Magnetic Anomalies: Role of Impact Processes

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A combination of orbital, surface, and returned sample measurements shows that impact processes have exerted an important influence on the production and distribution of crustal magnetic field sources on the Moon. Unlike the Earth and Mars, where oxidizing conditions have predominated, the main ferromagnetic carriers in lunar materials are reduced metallic iron particles. These ferromagnetic carriers are sparse in igneous materials such as mare basalt but are concentrated in impact-generated breccias and fines through reduction of pre-existing iron silicates by shock and/or heat. Consistent with these laboratory results, surface magnetometer measurements at the Apollo landing sites yielded the largest surface fields (exceeding 300 nT) in a region dominated by the Cayley Formation and the Descartes highlands, both considered by planetary geologists to represent impact basin ejecta materials. Orbital studies such as those conducted by Lunar Prospector have provided additional evidence that impact basin ejecta (as opposed to smaller crater ejecta) are the main sources of the orbital anomalies. On the geologically less complex near side, correlations of orbital anomalies have been found with visible exposures of the Cayley, Descartes highlands, and Fra Mauro Formations, all interpreted as primary and/or secondary basin ejecta materials. On a larger scale, a general inverse relationship between large impact basin locations and crustal magnetic field strength is obtained such that fields are weak over the basins but are strong near their antipodes. A model for explaining the stronger fields near basin antipodes has been partially developed theoretically and involves the interaction of impact-produced plasmas with an ambient large-scale magnetic field. Since the basins in question are all older than 3.8 Gyr, the data can be interpreted as indicating an early lunar core dynamo. More definitive tests of this hypothesis are possible using existing data and will be described.

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A Mantle Dynamics Perspective on Generating an Early Lunar Dynamo

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