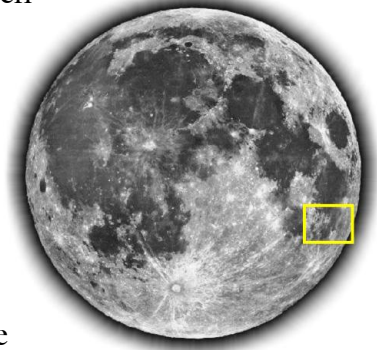


Before the Lunar Task Group of the Working Group for Planetary System Nomenclature,

A PROPOSAL FOR THE DESIGNATION OF LUNAR CRATERS TO HONOR THE ASTRONAUTS OF SPACE SHUTTLE COLUMBIA (STS-107)

BACKGROUND: On 1 February 2003, the crew of the Space Shuttle *Columbia* (STS-107) perished aboard their craft during re-entry into the Earth's atmosphere as their mission drew toward its conclusion. The purpose of this proposal is to respectfully request consideration by the Lunar Task Group of the Working Group for Planetary System Nomenclature for the designation of seven craters on Luna, Earth's Moon, to honor the crew.

PROPOSAL: This proposal calls for the re-designation of seven "lettered" craters in the vicinity of Crater Colombo (15.1° South, 45.8° East) in honor of *Columbia* crew members Rick D. Husband (mission commander), William C. McCool (pilot), Michael P. Anderson (payload commander), David M. Brown (mission specialist), Kalpana Chawla (mission specialist), Laurel Blair Salton Clark (mission specialist) and Ilan Ramon (payload specialist). The specific area under consideration is located near the southern lobe of Mare Fecunditatis, east of the Montes Pyranæus and Mare Nectaris.



Brief biographical sketches of the astronauts appear at the conclusion of this document; a photomap of the region, showing the location of the craters and other neighboring features, is included in a separate exhibit.

The craters proposed for re-designation are as follows:

CURRENT	PROPOSED	LATITUDE	LONGITUDE	DIA (KM)
COLOMBO E	HUSBAND	15.8° SOUTH	42.4° EAST	17
COLOMBO J	MCCOOL	14.3° SOUTH	43.5° EAST	7
COLOMBO M	M. ANDERSON	14.6° SOUTH	47.8° EAST	17
COLOMBO G	D. BROWN	13.9° SOUTH	43.9° EAST	10
COLOMBO K	CHAWLA	15.8° SOUTH	46.4° EAST	5
COLOMBO H	SALTON CLARK	17.4° SOUTH	44.1° EAST	14
COLOMBO B	RAMON	16.4° SOUTH	45.2° EAST	16

The new designations for craters Colombo M, G and H must include a first initial or, in the case of Dr. Clark, her maiden name, to differentiate them from craters already bearing the same name.

In addition, this proposal requests consideration for the designation of the region encompassing these craters as “Regio Columbia” to commemorate the mission and its crew.ⁱ

This proposal may contradict precedent established by the Working Group for Planetary System Nomenclature, under which craters in the vicinity of Crater Apollo (36.1° South, 151.8° West) on the lunar “far side” are named to honor deceased astronauts. While this proposal respects the intentions of the Working Group, it is hoped that consideration will be given based on the uniqueness and spirit that this memorial hopes to convey.



ARGUMENT PRO: The legacy of the *Columbia* crew members and the heritage of the Crater Colombo region intertwine well: the crater was named for the celebrated explorer Cristoforo Colombo (anglicized as Christopher Columbus), while the astronauts were borne into space, and ultimately perished, in a craft whose name was derived from his name.ⁱⁱ

Through this distinctive shared heritage, it is our considered opinion that the uniqueness of being able to honor the *Columbia* crew with near-side craters in this region would best preserve the legacy of these outstanding individuals.

ARGUMENT CON: As noted, the Working Group for Planetary System Nomenclature has previously established a position whereby craters on the Moon’s far side, in the Apollo Basin, are designated to honor deceased astronauts. Among those honored are the crews of the Space Shuttle *Challenger* (STS-51L), who died in a post-launch explosion, and the first *Apollo* crew, who were killed in a launch pad fire.

ⁱ — The term *regio* has not been approved for use with lunar features; however, it should be noted that the term was first utilized in planetary nomenclature by Hevelius in his *Selenographia* (1647), a pioneering work in lunar cartography.

ⁱⁱ — According to NASA, the Shuttle Orbiter *Columbia* (OV-102) was

...named after the Boston, Massachusetts, based sloop captained by American Robert Gray. On May 11, 1792, Gray and his crew maneuvered the *Columbia* past the dangerous sandbar at the mouth of a river extending more than 1,000 miles through what is today south-eastern British Columbia, Canada, and the Washington-Oregon border. The river was later named after the ship. Gray also led *Columbia* and its crew on the first American circumnavigation of the globe, carrying a cargo of otter skins to Canton, China, and then returning to Boston.

Other sailing ships have further enhanced the luster of the name *Columbia*. The first U.S. Navy ship to circle the globe bore that title, as did the command module for *Apollo 11*, the first lunar landing mission.

On a more directly patriotic note, “Columbia” is considered to be the feminine personification of the United States. The name is derived from that of another famous explorer, Christopher Columbus.

(Source: *Kennedy Space Center Spaceport Engineering & Technology*)

It should be noted that the full name of Capt. Gray’s first sloop was actually *Columbia Rediviva*.

This location is also considered favorable because of the availability of numerous large, unnamed craters in the region; the craters presented in this proposal range in size from five to seventeen kilometers in diameter. The smallest of the craters designated to honor the fallen *Challenger* crew is McAuliffe (33.0°South, 148.9° West) at nineteen kilometers in diameter.

It should be noted that despite the apparent “smallness” of the craters in this proposal, a crater that measures five kilometers from rim to rim is still a substantial formation, and numerous craters of this size and smaller have been designated to honor persons who have contributed greatly to the field of space research and exploration.

BIOGRAPHICAL SKETCHES: The crew of the Space Shuttle *Columbia* was a diverse collection of extraordinary personalities, each with a remarkable personal history, but each with a common desire: to further our knowledge of the Universe that surrounds us.

In brief, we present profiles of the diverse individuals who comprised the Columbia crew:

COLONEL RICK DOUGLAS HUSBAND, U.S.A.F., 45, served as commander of the *Columbia* shuttle mission. A native of Amarillo, Texas, he was as an Air Force test pilot before being selected as an astronaut in December 1994 (Group 15) on his fourth try, and reported to the Johnson Space Center in March 1995 to begin a year of training and evaluation.



Upon completion of training, he was named the Astronaut Office representative for Advanced Projects at Johnson Space Center, working on Space Shuttle Upgrades, the Crew Return Vehicle (CRV) and studies to return to the Moon and travel to Mars. He also served as Chief of Safety for the Astronaut Office.

STS-107 was his second space flight. On his first trip to space in 1999 as pilot of *Discovery* during STS-96, Col. Husband was part of the first shuttle mission to the International Space Station.

Col. Husband was married and had two children. A 1975 graduate of Amarillo High School, he received a Bachelor of Science degree in Mechanical Engineering from Texas Tech University in 1980 and a Master of Science degree in Mechanical Engineering from California State University, Fresno, in 1990. He is survived by his wife and two children. He enjoyed singing, water and snow skiing, cycling, and spending time with his family.

Among the honors he received during his military career were the Distinguished Graduate of AFROTC, Undergraduate Pilot Training, Squadron Officers School, F-4 Instructor School, and the USAF Test Pilot School; Outstanding Engineering Student Award, Texas Tech University (1980); F-4 Tactical Air Command Instructor Pilot of the Year (1987);

named a Distinguished Engineer of the College of Engineering, Texas Tech University (1997). Military decorations include the Meritorious Service Medal with two Oak Leaf Clusters; the Aerial Achievement Medal; the Air Force Commendation Medal; the National Defense Service Medal; and two NASA Group Achievement Awards for work on the X-38 Development Team and the Orbiter Upgrade Definition Team.

COMMANDER WILLIAM C. MCCOOL, U.S.N., 41, was born in San Diego, Calif., but considered Lubbock, Texas, his home. He served as a United States Navy test pilot and squadron commander before becoming an astronaut in April 1996 (Group 16). The *Columbia* mission, during which he served as shuttle pilot, was his first space flight.



After reporting to Johnson Space Center in August 1996, he completed two years of training and evaluation, and was qualified for flight assignment as a pilot. Initially assigned to the Computer Support Branch, Cmdr. McCool also served as Technical Assistant to the Director of Flight Crew Operations, and worked shuttle cockpit upgrade issues for the Astronaut Office.

Known to his friends as “Willie,” Cmdr. McCool was married and had three children. He enjoyed running, mountain biking, back-country hiking and camping, swimming, playing guitar, and chess. An Eagle Scout and 1979 graduate of Coronado Senior High School in Lubbock, he earned a Bachelor of Science degree in Applied Science from the U.S. Naval Academy at Annapolis in 1983, graduating second in a class of 1,083 students. He subsequently earned a Master of Science degree in Computer Science from the University of Maryland in 1985 and a Master of Science degree in Aeronautical Engineering from the U.S. Naval Postgraduate School in 1992.

He was presented with “Outstanding Student” and “Best DT-II Thesis” awards as a graduate of U.S. Naval Test Pilot School, Class 101. He was awarded two Navy Commendation Medals, two Navy Achievement Medals, and various other service awards. Cmdr. McCool logged over 2,800 hours flight experience in 24 aircraft and over 400 carrier arrestments during his career with the U.S. Navy.

LT. COLONEL MICHAEL P. ANDERSON, U.S.A.F., 43, served as an Air Force instructor pilot and tactical officer before joining NASA’s astronaut corps in 1994 (Group 15). He traveled to Russia’s *Mir* space station on his first and only other space flight, a nine-day mission aboard the shuttle *Endeavor* (STS-89) in January 1998. During STS-107, he was in charge of *Columbia*’s dozens of science experiments.

Born on Christmas Day, 1959, in Plattsburgh, N.Y., Lt. Col. Anderson — the son of a career Air Force officer — considered the Spokane, Wash., area his home. He was married and had two daughters. Graduated in 1977 from Cheney High School in Cheney, Wash., he

received a Bachelor of Science degree in Physics and Astronomy from the University of Washington in 1981, where he was a member of the Air Force ROTC. In 1990, he earned a Master of Science degree in Physics from Creighton University (Omaha, Neb.).

After completing a year of technical training at Keesler AFB in Mississippi, Lt. Col. Anderson was assigned to Randolph AFB, Texas, where he served as Chief of Communication Maintenance for the 2015th Communication Squadron and later as Director of Information System Maintenance for the 1920th Information System Group.



In 1986 he was selected to attend Undergraduate Pilot Training at Vance AFB, Oklahoma. Upon graduation he was assigned to the 2nd Airborne Command and Control Squadron at Offutt AFB, Nebraska, as an EC-135 pilot, flying the Strategic Air Command's prestigious airborne command post, code-named "Looking Glass."

From January 1991 to September 1992, Lt. Col. Anderson served as an aircraft commander and instructor pilot in the 920th Air Refueling Squadron, Wurtsmith AFB, Michigan. From September 1992 to February 1995 he was assigned as an instructor pilot and tactics officer in the 380th Air Refueling Wing, Plattsburgh AFB, New York, his birthplace. He logged over 3000 hours in various models of the KC-135 and the T-38A aircraft during his military career; during his interment ceremony at Arlington National Cemetery, a KC-135 Strato-tanker — refueling boom extended — overflowed the site in a tribute to Lt. Col. Anderson, the same model he piloted as an instructor before taking his NASA assignment.

KALPANA CHAWLA, PH.D., 41, immigrated to the United States from India in the 1980s and was selected to become an astronaut in 1994 (Group 15). Known as "KC" to her friends and family, Dr. Chawla was the first Indian-born woman to travel in space. She is survived by her husband, Jean-Pierre Harrison. She enjoyed flying, hiking, back-packing, and reading.



She reported to Johnson Space Center in March 1995 as an astronaut candidate and, after completing a year of training and evaluation, was assigned as crew representative to handle technical issues for the Astronaut Office EVA/Robotics and Computer Branches. Her assignments included work on the development of Robotic Situational Awareness Displays and testing space shuttle control software in the Shuttle Avionics Integration Laboratory.

Dr. Chawla made her first space flight in 1997, also aboard the shuttle *Columbia*, during STS-87 as mission specialist and prime robotic arm operator. STS-87 made 252 orbits of the Earth, traveling 6.5 million miles in 376 hours and 34 minutes. STS-107 was her second space flight.

Dr. Chawla was born in Karnal, India, about 80 miles north of New Delhi, and graduated from Tagore School, Karnal, in 1976. Dr. Chawla received a Bachelor of Science degree in Aeronautical Engineering from Punjab Engineering College, India, in 1982; a Master of Science degree in Aerospace Engineering from the University of Texas, Arlington, in 1984; and a Doctorate of Philosophy degree in Aerospace Engineering from the University of Colorado, Boulder, in 1988. She held Commercial Pilot's licenses for gliders and single- and multi-engine land and sea planes, and instrument rating for airplanes, and was an FAA Certified Flight Instructor with airplane and glider ratings. She enjoyed flying aerobatic and tail-wheel airplanes.

In 1988, Dr. Chawla started work at NASA Ames Research Center in the area of powered-lift computational fluid dynamics. Her research concentrated on the simulation of complex airflows encountered around aircraft, such as the Harrier "ground-effect." Following completion of this project, she supported research in the mapping of flow solvers to parallel computers, and the testing of these solvers by carrying out powered lift computations.

Dr. Chawla joined Overset Methods, Inc., at NASA Ames, as Vice President and Research Scientist in 1993 to form a team with other researchers specializing in the simulation of moving multiple-body problems. She was responsible for the development and implementation of efficient techniques to perform aerodynamic optimization. The results of various projects that Dr. Chawla participated in are published in numerous technical conference papers and journals.

CAPTAIN DAVID M. BROWN, M.D., U.S.N., 46, was an Arlington, Va., native and went on to become a Navy captain, pilot and doctor before joining NASA in 1996 (Group 16). The *Columbia* STS-107 mission was his first space flight.

A 1974 graduate of Yorktown High School in Arlington, Capt. Brown received a Bachelor of Science degree in Biology from the College of William & Mary in 1978, and a Doctorate degree in Medicine from Eastern Virginia Medical School in 1982.

He enjoyed flying and bicycle touring, and was a four-year varsity gymnast while at William & Mary. Also while in college, he performed with Circus Kingdom as an acrobat, seven-foot unicyclist and stilt walker. He is survived by his parents, Paul and Dorothy Brown.



Capt. Brown joined the United States Navy after completing his internship at the Medical University of South Carolina. Upon completion of flight surgeon training in 1984, he reported to the Navy Branch Hospital in Adak, Alaska, as Director of Medical Services. He was then assigned to Carrier Airwing Fifteen, which deployed aboard the USS *Carl Vinson* in the Western Pacific.

In 1988, he became the first flight surgeon in ten years to be chosen for pilot training. He was ultimately designated a Naval Aviator in 1990 in Beeville, Texas, ranking number one in his class. Capt. Brown was then sent for training and carrier qualification in the A-6E Intruder. In 1991, he reported to the Naval Strike Warfare Center in Fallon, Nev., where he served as a Strike Leader Attack Training Syllabus Instructor and a Contingency Cell Planning Officer. Additionally, he was qualified in the F-18 Hornet and deployed from Japan in 1992 aboard the USS *Independence*, flying the A-6E with the VA-115 Eagles. In 1995, he reported to the U.S. Naval Test Pilot School as their flight surgeon, where he also flew the T-38 Talon.

Selected by NASA in April 1996, Capt. Brown reported to Johnson Space Center in August 1996 for two years of astronaut training and evaluation, becoming eligible for flight assignment as a mission specialist. He was initially assigned to support payload development for the International Space Station, followed by assignment to the astronaut support team responsible for orbiter cockpit setup, crew strap-in, and landing recovery.

CAPTAIN LAUREL BLAIR SALTON CLARK, M.D., U.S.N., 41, was onboard *Columbia* for her first space flight. Dr. Clark was a graduate of University of Wisconsin, Madison, and trained in the Navy as an undersea medical officer and subsequently as a naval flight surgeon before joining NASA in 1996 (Group 16).



Dr. Clark was born in Ames, Iowa, and as a child lived in New York, New Mexico and Missouri before her family settled in Racine, Wis., which she would consider her hometown for the rest of her life. She graduated from Racine's William Horlick High School in 1979 and received her Bachelor of Science degree in Zoology from the University of Wisconsin, Madison, in 1983. She was subsequently awarded a Doctorate degree in Medicine from the same school in 1987.

While attending medical school, she was also on active duty in the United States Navy, training with the Diving Medicine Department at the Naval Experimental Diving Unit in March 1987. After completing medical school, Dr. Clark underwent postgraduate medical education in pediatrics from 1987-1988 at Naval Medical Education and Training Command, Bethesda, Md.

The following year she completed Navy Undersea Medical Officer training at the Naval Undersea Medical Institute in Groton, Conn., and Diving Medical Officer training at the Naval Diving and Salvage Training Center in Panama City, Fla., and was designated a Radiation Health Officer and Undersea Medical Officer. She was then assigned as the Submarine Squadron 14 Medical Department Head in Holy Loch, Scotland. During that assignment she dove with US Navy divers and Naval Special Warfare Unit Two SEALs, and performed numerous medical evacuations from US submarines.

After two years of operational experience, she was designated as a Naval Submarine Medical Officer and Diving Medical Officer. She underwent six months of aeromedical training at the Naval Aerospace Medical Institute in Pensacola, Fla., and was designated as a Naval Flight Surgeon.

She was later stationed at MCAS Yuma, Ariz., and assigned as Flight Surgeon for a Marine Corps AV-8B Night Attack Harrier Squadron. She made numerous deployments, including one overseas to the Western Pacific, practiced medicine in austere environments, and flew on multiple aircraft. Her squadron won Marine Attack Squadron of the Year honors for its successful deployment. She was then assigned as the Group Flight Surgeon for the Marine Aircraft Group. Prior to her selection as an astronaut candidate, she served as a Flight Surgeon for the Naval Flight Officer Advanced Training Squadron in Pensacola. She attained the rank of Commander in the Navy during her active service, and was promoted posthumously to Captain on 1 February 2003.

Dr. Clark reported to Johnson Space Center in August 1996 as an astronaut candidate. After completing two years of training and evaluation, she was qualified for flight assignment as a mission specialist. From July 1997 to August 2000, she worked in the Astronaut Office Payloads/Habitability Branch.

Dr. Clark is survived by her husband, Jonathan B. Clark, Captain USN (Retired), and their son. She enjoyed scuba diving, hiking, camping, biking, parachuting, flying, and travel.

COLONEL ILAN RAMON, I.A.F., 48, was the first Israeli citizen to travel in space. He served as a fighter pilot in the Israel Air Force and was chosen as Israel's first astronaut in 1997, moving to Houston the next year to train for shuttle flight. Ramon's mother and grandmother survived the Nazi death camp at Auschwitz. His father and grandfather fought for Israel's statehood.



Born in Tel Aviv, Col. Ramon graduated from high school there in 1972 and fought for Israel during the Yom Kippur War (1973). The next year, he graduated as a fighter pilot from the Israel Air Force (IAF) Flight School. From 1974-1976 he participated in A-4 Basic Training and Operations, and spent 1976-1980 in Mirage

III-C training and operations. In 1980, as a member of the IAF's establishment team of the first F-16 Squadron in Israel, he attended the F-16 Training Course at Hill AFB, Utah. From 1981-1983, he served as Deputy Squadron Commander B, F-16 Squadron.

In January 1981, Col. Ramon piloted an F-16 A/B fighter plane that destroyed Iraq's nuclear reactor. Ramon was the youngest member of the fleet. In 1982, during Operation Peace for Galilee (also known as the Lebanon War), he served as commander of the logistical and tactical instruction unit in the F-16 fleet and participated in eighteen flights.

In 1983, Col. Ramon enrolled in Tel Aviv University, earning his Bachelor of Science degree in Electronics and Computer Engineering in 1987. From 1988-1990, he served as Deputy Squadron Commander A, F-4 Phantom Squadron. During 1990, he attended the Squadron Commanders Course. From 1990-1992, he served as Squadron Commander, F-16 Squadron, and from 1992-1994, he was head of the Aircraft Branch in the Operations Requirement Department. In 1994, he was promoted to the rank of Colonel and assigned as head of the Department of Operational Requirement for Weapon Development and Acquisition, remaining at this post until July 1998 when he departed for astronaut training at Johnson Space Center.

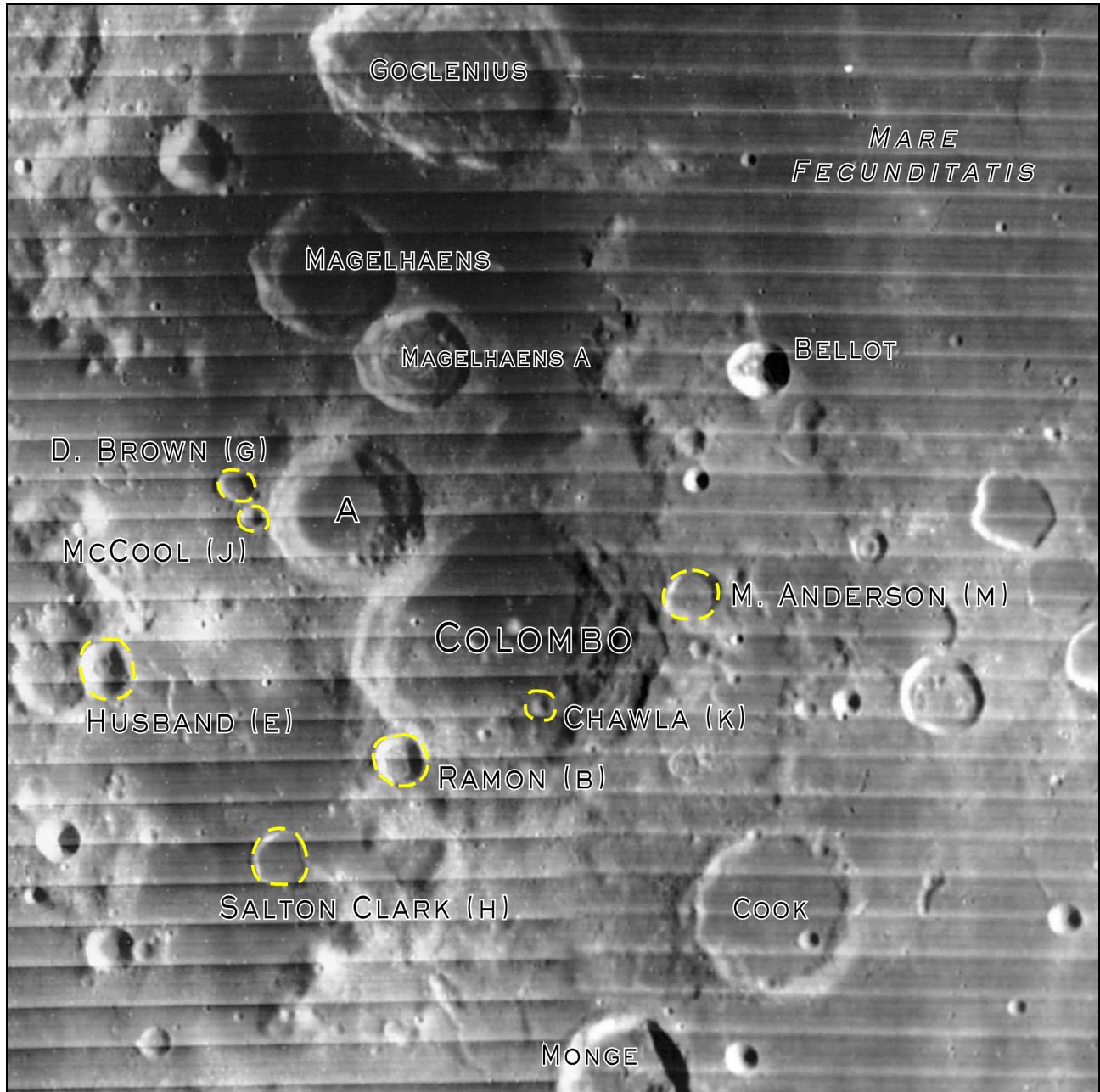
Col. Ramon was selected as a Payload Specialist in 1997, representing the Israel Space Agency. He was designated to train as prime crew member for the Mediterranean Israeli Dust Experiment (MEIDEX), a multispectral camera intended to measure small dust particles (dust aerosols) in the atmosphere over the Mediterranean and the Saharan coast of the Atlantic.

Among the other research responsibilities Col. Ramon handled aboard STS-107 were the European Space Agency Advanced Respiratory Monitoring System; Astroculture; Biological Research in Canister-Development of Gravity Sensitive Plant Cells in Microgravity; Combustion Module, including Laminar Soot Processes, Water Mist Fire Suppression and Structures of Flame Balls at Low Lewis-Number experiments; the Microbial Physiology Flight Experiments Team experiments, which include the Effects of Microgravity on Microbial Physiology and Spaceflight Effects on Fungal Growth, Metabolism and Sensitivity to Anti-fungal Drugs; the Physiology and Biochemistry Team suite of experiments, which includes Calcium Kinetics, Latent Virus Shedding, Protein Turnover and Renal Stone Risk; and Space Technology and Research Students Bootes.

He also carried a copy of a drawing entitled "Moon Landscape" by 14-year-old Petr Ginz, which depicts a view of the Earth from the Moon. The picture was drawn by Ginz during his incarceration in the Theresienstadt ghetto; he was murdered in the Auschwitz concentration camp in 1944 at age 16.

Col. Ramon is survived by his wife, Rona, and their four children. He enjoyed snow skiing and squash (handball) in his leisure time.

PROPOSED DESIGNATION OF LUNAR CRATERS IN HONOR OF SPACE SHUTTLE COLUMBIA CREW



- COLOMBO E PROPOSED AS CRATER HUSBAND (COLONEL RICK D. HUSBAND, USAF)
- COLOMBO J PROPOSED AS CRATER MCCOOL (COMMANDER WILLIAM C. MCCOOL, USN)
- COLOMBO M PROPOSED AS CRATER ANDERSON (LT. COLONEL MICHAEL P. ANDERSON, USAF)
- COLOMBO G PROPOSED AS CRATER BROWN (CAPTAIN DAVID M. BROWN, USN)
- COLOMBO K PROPOSED AS CRATER CHAWLA (KALPANA CHAWLA, PH.D.)
- COLOMBO H PROPOSED AS CRATER CLARK (CAPTAIN LAUREL BLAIR SALTON CLARK, MD, USN)
- COLOMBO B PROPOSED AS CRATER RAMON (COLONEL ILAN RAMON, IAF)

- NOTE 1:** REGION IN VICINITY OF CRATER COLOMBO TO BE DESIGNATED "REGIO COLUMBIA."
- NOTE 2:** CRATER COLOMBO A TO RETAIN CURRENT DESIGNATION.
- NOTE 3:** CRATERS GOCLINIUS, MAGELHAENS, BELLOT AND COOK SHOWN FOR REFERENCE ONLY.
- NOTE 4:** THIS EXHIBIT IS A MERGED PHOTO COMBINING LUNAR ORBITER PLATES 65-2 (LEFT) AND 60-2 (RIGHT).