Name of School to be determined (encompassing the disciplines of geological, atmospheric, hydrologic and environmental sciences)

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Existing units and degree programs:
Department of Atmospheric Sciences (ATMO)
  M.S. and Ph.D. in Atmospheric Sciences
Department of Geosciences (GEOS)
  B.S. in Science Education (Earth Sciences)
  Professional Science Masters degree in Economic Geology
  B.S., M.S. and Ph.D. in Geosciences
Department of Hydrology and Water Resources (HWR)
  B.S. in Environmental Hydrology and Water Resources
  M.Eng. Engineering in Water Resources Engineering
  M.S. and Ph.D. in Hydrology and Water Resources
Department of Mining and Geological Engineering (MGE)
  B.S., M.Eng., M.S. and Ph.D. in Mining Engineering
Laboratory of Tree-Ring Research (LTRR)
  Degree programs through contributing departments
Accelerator Mass Spectrometry Laboratory (AMS)

Notes:
- This proposal was developed principally by faculty, staff and students from ATMO, GEOS and LTRR. While AMS, HWR and MGE have indicated they are receptive to the concept we outline below, they have not been active participants in the process to date.
- We also recognize the potential value of including the Departments of Geography and Regional Development (GRD), Civil Engineering and Engineering Mechanics (CEEM) and Chemical and Environmental Engineering (ChEE) within the School. They have not participated in the development of this proposal.
School to incorporate the Departments of Geosciences (GEOS), Atmospheric Sciences (ATMO), Hydrology and Water Resources (HWR), Mining and Geological Engineering (MGE), the Laboratory of Tree-Ring Research (LTRR), and the Accelerator Mass Spectrometry Laboratory (AMS)

This new School’s mission is to provide world-class education and basic research in the earth sciences, encompassing the geological, atmospheric, hydrologic and environmental sciences. We seek to generate new knowledge about earth and environmental processes at all geographic and temporal scales and to transmit that knowledge to benefit students and society.

The new School focuses the UA’s already-formidable strengths in the natural, social and engineering sciences directly related to research, teaching and outreach in geosciences, climate, water and environmental sciences (including human and ecological impacts). These address scientific grand challenges and key elements of the UA’s Strategic Plan priority in “Climate, Environmental, Water and Energy Sustainability”. Our existing world-class strengths in understanding Earth materials and the tectonic forces that shape those materials at all scales are essential to the scientific foundations of this priority area. The units include two “top-ten”, nationally-ranked programs (GEOS and HWR), and the world’s first and finest tree-ring laboratory. ATMO’s expertise in climate and weather provides critical linkage among many of the units. MGE develops and delivers technologies vital to the sustainable development of mineral resources. The AMS Lab provides extraordinary research and service in the dating of materials essential to understanding rates of many earth processes.

This impact will be further amplified across campus as the School will promote and contribute to initiatives and programs with allied faculty in Ecology, Anthropology, Geography, SNR, SWES, etc. The whole will clearly be greater than the sum of the parts.

We are aware of a complementary proposal to form a School of Soil, Water, Environment and Natural Resources within CALS and have been in close communication with its author, Dr. Lisa Graumlich. We see the two proposals as complementary, with our COS/ENG–housed School emphasizing basic research, the physical aspects of the earth and environmental sciences, and regional - to global-scale scientific challenges. We have already begun conversations about forming a coordinating council that would address teaching and curricula, and to facilitate existing and new research collaborations.

Teaching:

- At the Tier 1 level, the School will offer more than the present units separately by providing more sections of or larger NATS classes in the areas of climate, environmental change and water resources - topics of vital importance to an educated citizenry in general and to the State of Arizona in particular. Consolidation will provide greater flexibility in teaching assignments and enable the School to take greater advantage of variable faculty workload assignments to meet its teaching obligations.

- At the undergraduate major level, the merger will attract more students to what is presently GEOS’ new undergraduate concentration in Earth System Science. With appropriate modifications, this concentration could provide an academic home for the small undergraduate program in HWR and enable more majors to benefit from faculty in programs that do not now provide an undergraduate major (ATMO and LTRR).

- At the graduate level, some consolidation of courses in modeling and quantitative methods may be possible, but more importantly, greater interdisciplinary research would be fostered by the participation of a broader range of faculty in graduate student advisory committees. All the units already provide an annual showcase for student research. Combining these successful showcases would demonstrate the strengths of our educational programs to stakeholders (agencies, industry, NGOs) and enhance the already-strong job prospects of our graduates.

Research
• This School will provide greater opportunities for collaboration in research and will immediately raise the national and international profile of the UA in the areas of climate, water, ecosystems, geosciences, and societal response to environmental change. In addition to conducting research into problems at the national and global level, this unit will more comprehensively contribute to the need for the State of Arizona to plan for the future impacts of climate, human population growth, and human activities on the environment, water, and natural resources.

• The combination of LTRR, ATMO, GEOS, MGE and HWR will make the new School a principal locus on campus for research on the earth and environmental sciences, including climate and water. Research ties are already strong between ATMO and HWR, and their new joint hydrometeorology research program will further strengthen those ties. LTRR and GEOS have a long tradition of cooperation in research and teaching, especially in geochronology and paleoclimatology. LTRR also has long-standing ties to ATMO, including joint appointment of past and current faculty. LTRR houses active research on surface water supply variability and climate change impacts on ecosystems and human societies. GEOS and MGE already enjoy a close collaboration through the Institute for Mineral Resources. A prospective joint hire in climate dynamics by ATMO and GEOS (via support from the Institute for the Environment and Society) will strengthen ties, and a recent joint appointment between GEOS and HWR promises to expand research opportunities in the behavior of water and other fluids in the subsurface. MGE is active in the development of technologies for the mineral resource industries. The AMS lab provides valuable instrumentation and dating for many researchers in the proposed School.

• The combination of observational/instrumental and computational/modeling approaches in the earth and environmental sciences within one unit would be a major strength. This combination of disciplines and expertise also would facilitate cooperation with other campus units in the natural and social sciences. The proposed alignment is a natural one.

• Greater application of variable workload agreements with faculty in such a larger School would make it easier to form research teams that would be able to respond to major funding initiatives.

• The new School we envision will put us in a far stronger position to compete for funding for the coming major initiatives in climate research, water supply, earth resources, and human-environment interaction. It also would expand the range of NSF programs and other funding resources that could be exploited well beyond those available to the units individually. Support from NOAA, NASA, NSF and resource industries is likely to increase because of our ability to assemble interdisciplinary teams of faculty and researchers.

• Our enhanced external profile, expanded topical base, and increased funding would also increase our ability to compete for the best students in the world.

Outreach/service
• All units currently have strong outreach and service programs that both deliver information to state, regional, and national stakeholders and generate translational science of broad impact.

• LTRR has outreach contacts with more than 3,000 K-12 students and other visitors per year, and with international research and training programs, and it provides professional-level summer session courses that attract a broad audience from other universities, agencies and NGOs.

• Recently secured major funding from ExxonMobil to GEOS and a new award from Science Foundation Arizona to MGE, GEOS and the School of Public Health will greatly enhance technology transfer and translational science with resource industries. GEOS is also the home of an endowed professional Masters’ program in economic geology that also provides short courses for industry professionals. HWR, especially through the programs developed by SAHRA, has extensive and effective outreach programs.

• ATMO delivers daily weather forecasts for viewers of KUAT, provides high-resolution monsoon forecasts for Davis-Monthan AFB, the Salt River Project, and Maricopa County and conducts lighting research with Viasala Corporation with application to Tucson Airport.
• Coordination of all these efforts under a single unit would increase visibility, thereby attracting additional participants and external support.

How the reorganization will raise the unit’s and the University’s ranking or reputation.
• Our collective expertise will address the scientific foundations of UA’s Strategic Plan priority in “Climate, Environmental, Water and Energy Sustainability”. Of the eight “grand challenges in environmental science” recently identified by the National Research Council, the proposed School’s efforts would address six: biogeochemical cycles, climate variability, hydrologic forecasting, institutions and resource use, land-use dynamics and reinventing the use of materials. In 2008, the American Geological Institute identified seven areas of critical needs for the 21st Century. Five of these critical needs (Energy and Climate Change, Water, Natural Hazards, Raw Materials and Geoscience Workforce and Education) are addressed in the proposed School’s portfolio.
• GEOS and HWR are already nationally ranked in the “top ten” in their fields, and re-aligning these departments into a new school that included ATMO would explicitly establish a coherent and more readily recognized program in geological, atmospheric, hydrologic and environmental sciences, with unique capabilities. No other such school in the country would include such a strong hydrology department. The two associated laboratories, LTTR and AMS, are recognized throughout the world as leaders in their disciplines.
• If the school is organized in a manner that capitalizes on the different disciplinary strengths (e.g., in curriculum, research initiatives and outreach), while also maintaining the identity and integrity of the unique capacities of the units, disciplinary rankings will rise further. Overall, in the coming decades of climate change and consequent impacts on water, ecosystems and society, the University must better position itself to take scientific and educational leadership in these disciplines. The school that we envision has potential for helping achieve this distinction and improve the University’s reputation and ranking as a leader in this strategic emphasis area.

Description of the process of consultation.
The deans of the colleges of Science and of Engineering are both aware of this proposal, and the three COS department heads lead the effort. The proposal has been jointly written by a committee representing the faculty, staff and students of three of the four affected departments – ATMO, GEOS, and LTRR. Consultations have taken place with graduate students and staff. The heads of HWR, MGE and AMS have read the proposal and see substantial benefits to inclusion of their units in this School. There is overwhelming approval amongst the faculty of the three COS departments to draft this document, with the understanding that a formal vote will be taken only after the broad concept is approved and a more detailed proposal, including management structure, is available for discussion.

Opportunities and Challenges to be Addressed in Further Planning and Discussion
• Many disciplinary strengths are embodied within the departments and laboratories under discussion, and we must identify mechanisms to sustain and enhance them, and especially to do them no harm. For example, tectonics in GEOS and dendrochronology in LTRR are outstanding areas of research and teaching, and the new organization must not erode or dilute these strengths.
• Interdisciplinary linkages outside of the current departments and the COS are important now and will be in the future. For example, LTRR has strong academic and research ties to Anthropology, Geography, and School of Natural Resources, especially in the areas of environment-human interactions, and climate change impacts on ecosystems. We must assure that mechanisms are in place to maintain or strengthen linkages and to ensure continuation of UA’s record of excellence in interdisciplinary and interdepartmental teaching and research.
• Co-location. Nothing facilitates collaboration more than proximity. Whatever transformation takes place, its full potential won’t be realized without putting our now-separate units under the same roof (Gould-Simpson) or at least in adjacent buildings (Gould-Simpson plus an enlarged ENRB-II or III).
Budget implications

Fifteen years of budget cuts have resulted in maximum efficiency in all the units so no staff layoffs are possible or contemplated in what would be a physically separated School. While it is impossible to assign dollar values at this preliminary stage, it seems feasible that there will be some savings through the collaborating departments. The following are areas in which savings and increased funding opportunities may be realized.

Teaching and Academic Support

- Pooling faculty teaching responsibilities will reduce spending on temporary teaching support.
- Teaching support resources (e.g. D2L, Scantron) will be maximized by sharing expertise and equipment.
- Running joint colloquium series will reduce expenses and increase participation.
- Dedicated professional staff support for advising and admissions exists in only two of the units, so the opportunity to extend and coordinate this effort could result in increased service to faculty and students.

IT Support

- More efficient use of server facilities will make better use of space and eliminate the need for expensive physical renovations.
- Centralization of IT support may free up technical support for specialized research efforts.
- There will be no direct savings by eliminating any tech support positions.

Business Support

- Efficiencies may be found through coordination and realignments, but definitely not by further reducing the number of already-overextended staff.

Alumni Outreach & Fund Raising

- The highly successful existing alumni outreach program in Geosciences could be extended to increase fund-raising for all units. Such fund-raising efforts depend critically on maintaining and developing the distinct identities and strengths of the units involved.