ANTARCTICA: A TREASURE–TROVE FOR PLANETARY SCIENCES. AUSTRALASIAN MICROTEKTITES FROM EAST ANTARCTICA. L. Folco[1,2] [1]Dipartimento di Scienze della Terra, Università di Pisa, Via S. Maria 53, I-56126 Pisa, Italy. [2]CISUP, Centro per l'Integrazione della Strumentazione dell'Università di Pisa, Lungarno Pacinotti 43, Pisa, Italy. (luigi.folco@unipi.it).

The planetary science community has benefitted greatly from research in Antarctica. The discovery of large accumulations of meteorites in blue ice fields on the polar plateau since 1969 [1], [2] and of cosmic dust in Antarctic ice, snow [3], [4], [5], [6] and supraglacial moraines [7], as well as in loose sediment traps in the Transantarctic Mountains [8] since the late 1980s has had a tremendous impact on the planetary science community. Over the last 50 years tens of thousands of meteorite specimens and cosmic dust particles have been recovered by Japanese, US, European, Chinese and Korean polar programs. This enormous research effort has provided the international planetary science community with the opportunity to study an extraordinary number of samples from a large variety of planetary bodies, greatly advancing our knowledge of the origin and evolution of the solar system. The discovery of the loose sediment micrometeorite traps in the Transantarctic Mountains [8] made by our research group within the framework of the Italian *Programma Nazionale delle Ricerche in Antartide* (*PNRA*) in the 2000s is worthy of note. These traps have been collecting microscopic fallout particles since the last ~1-2 million years including debris produced by catastrophic impacts of asteroidal or cometary bodies to Earth. as documented by the occurrence of the ~0.8-Myrs-old Australasian microtektites (distal impact glass microspherules) associated with one of the largest impact events over the Quaternary [9], [10], [11] (**Fig. 1**), and microscopic airburst debris produced by a Tunguska-like event over Antarctica ~480-kyrs ago [12], [13]. These findings have elicited the interest of planetary scientists involved in impact cratering research, and have provided new input for meteorite impact studies and insight into the collisional history of our planet over the recent geological past.

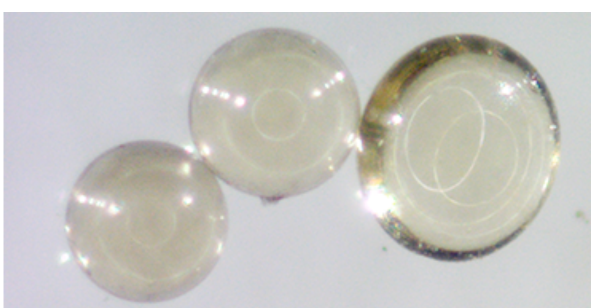

Figure 1. *Australasian microtektites from Victoria Land Transantarctic Mountains. They are transparent glass, siliceous spheroids, from ~50 µm to ~800 µm in diameter, with a typical pale-yellow - pale-green color (fov: 2 mm) [10].*

My presentation focuses on the Australasian microtektites from Antarctica first discovered by our *PNRA* research group [8] [10] in the early 2000s in the Victoria Land Transantarctic Mountains, and subsequently found in the southern Transantarctic Mountains and the Dronning Maud Land Sør Rondane Mountains by US *ANSMET* [14] [15] and Belgian *BELAM* [15] teams, respectively (**Fig. 2**). It provides an overview of the main results obtained so far and implications for impact cratering studies, as well as for the reconstruction of the glacial history of the East Antarctic Ice Sheet.

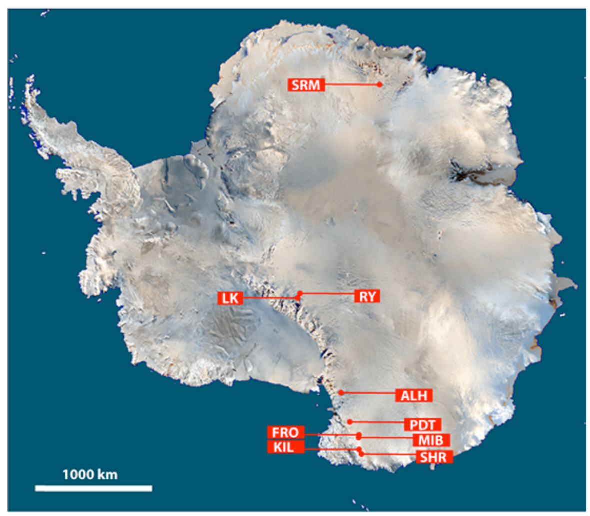

Figure 2. *A) Satellite image map of Antarctica showing locations where Australasian microtektites have been found so far in East-Antarctica by PNRA [9], [20], ANSMET [14], [18] and BELAM research teams [15]. Abbreviations: SHR = Shroeder Spur (~71˚40'S, 160˚20'E; PNRA), KIL = Killer Nunatak (~71˚54'S, 160˚29'; PNRA), MIB = Miller Butte (~72˚42'S, 160˚16'E; PNRA), FRO = Frontier Mountain (~72˚59'S, 160˚20'E; PNRA), PDT = Pian delle Tectici (~174˚11'S, 162˚14'E), ALH (~76˚44'S, 159˚23'E; PNRA), LK = Larkman Nunatak (~86˚46'E, 179˚20'E; ANSMET), RY = Mount Reymold (85˚51'S, 174˚E; ANSMET), SOR = Sør Rondane Mountains (~72˚18'S, 24˚33'E; BELAM).*

In particular I will show i) geochemical, isotopic and geochronological evidence for their attribution to the Australasian tektite-microtektite strewn field [9], [10], [11]; ii) petrographic, geochemical and isotopic trends in tektite/microtektite geographic distributions and implications for the tektite-microtektite formation model and the impact location (namely that microtektites launched at greater distances experienced higher temperature/time regimes [17], [18], and sourced from the topmost layer of the target [19]); iv) the significant (~5,000 km) southward increase in the extension of the Australasian tektite-microtektite strewn field due to Antarctic finds (**Fig. 3**) and the question it poses in terms of microtektite displacement mechanism and energy and type of impact [20]; v) the role Australasian microtektites can play in constraining the denudation age of Antarctic bedrock, e.g. the case of Allan Hills main blue ice field supports a glaciological scenario in which the East Antarctic Ice Sheet in the inland catchment of the Mackay glacier was extremely stable over at least the last ~1 Ma [20].

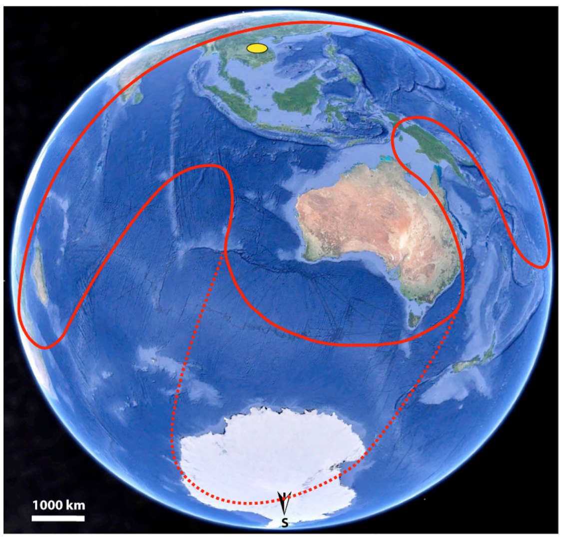

Figure 3. *The geographic boundary of the Australasian tektite-microtektite strewn field (solid red line) defined previously on the basis of the recovery of tektites on land and microtektites from deep see sediment cores in the ocean [21]. The dotted red line indicates the possible new boundary of the strewn field, which is extended ~5,000 km further south after the recovery of Australasian microtektites in East Antarctica.*

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