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The Meteoritical Bulletin, No. 110

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Abstract—Meteoritical Bulletin 110 contains the 2802 meteorites approved by the Nomenclature Committee of the Meteoritical Society in 2021. It includes 10 falls (Arpu Kuilpu, Djadjarm, Glendale, Kindberg, Madura Cave, Motopi Pan, Orconuma, Punggur, Tihigrin, Winchcombe), with 2014 ordinary chondrites (including 1 ungrouped ordinary chondrite), 220 carbonaceous chondrites (including 11 ungrouped), 212 HED achondrites, 69 lunar meteorites, 62 ureilites, 43 iron meteorites, 35 Martian meteorites, 31 Rumuruti chondrites, 27 primitive achondrites, 24 mesosiderites, 19 relict meteorites (all iron meteorites), 15 pallasites, 13 enstatite chondrites, 11 ungrouped achondrites, 7 enstatite achondrites. Of the meteorites classified in 2021, 1270 are from Antarctica, 1049 from Africa, 329 from South America, 123 from Asia, 20 from North America, 6 from Europe, 3 from Oceania, and 2 from unknown locations.

TRENDS AND SPECIFICITIES

Meteoritical Bulletin 110 (MB110) contains the 2802 meteorites submitted to and accepted by the Nomenclature Committee of the Meteoritical Society in 2021. This is the highest number of new meteorites since the Meteoritical Bulletin has been phased with calendar years starting with Bulletin 105 in 2016. This high number is driven by the large numbers of Antarctic meteorites, and a record high number of meteorites classified as Northwest Africa (NWA) meteorites (930 meteorites). The 28 meteorites in MB110 total 18.9 tons of material, most of which is from the El Ali iron meteorite (15.2 t). Five other meteorites are over 100 kg (including NWA 13758 R3 chondrite), and 10

meteorites are between 50 and 100 kg (including Dhofar 2115 ureilite and NWA 13670 EL6).

In detail, 1270 meteorites are from Antarctica, 1049 from Africa (930 with an NWA name), 329 from South America (326 from Chile), 123 from Asia, 20 from North America (19 from the USA), 6 from Europe, 3 from Oceania, and 2 from unknown locations (Fig. 1). As for the last few years, Chile, with 326 meteorites (12% of the total), is now the main source of meteorites outside of North Africa and Antarctica.

The meteorites classified in MB110 include 10 falls that occurred between 2018 and 2021 with the addition of Orconuma that is from 2011. It is noteworthy that 5 of these 10 falls' meteorites were recovered with the assistance of camera networks such as the Desert Fireball

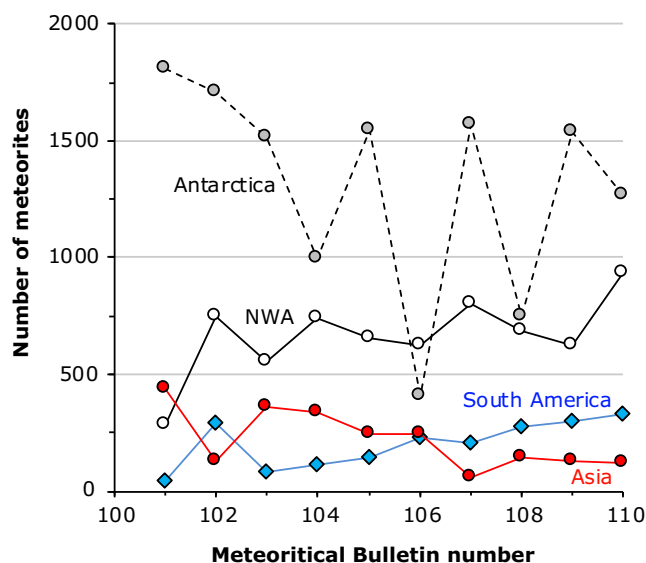


Fig. 1. Number of meteorites from Antarctica, northwest Africa (NWA), South America, and Asia reported in the last 10 Meteoritical Bulletins. (Color figure can be viewed at wileyonlinelibrary.com.)

Network in Australia (Bland et al., 2012), or international networks such as FRIPON (Colas et al., 2020).

The meteorites listed in MB110 comprise 2014 ordinary chondrites (including one ungrouped ordinary chondrite), 220 carbonaceous chondrites (including 66 CM, 55 CV, 42 CK among which 9 CK3, 35 CO, 9 CR, and 11 ungrouped carbonaceous chondrites), 212 HED achondrites, 62 ureilites, 69 lunar meteorites (a record high), 43 iron meteorites, 35 Martian meteorites (including 5 nakhlites), 31 Rumuruti chondrites, 27 primitive achondrites, 24 mesosiderites, 15 pallasites, 13 enstatite chondrites, 11 ungrouped achondrites, 7 aubrites.

Compared to previous years, the number of ungrouped chondrites (12) and ungrouped achondrites (11) has increased significantly. The ungrouped chondrites include mostly chondrites that are on the border between type 2 and type 3, and that have oxygen isotopic composition distinct from CM2 (for instance Telakoast 001; see Irving et al., 2022).

The following references were used to support the classification of meteorites in MB110: Barrat et al. (2016), Bischoff (2000), Bischoff et al. (2014), Gattacceca et al. (2020), Giguere et al. (2000), Goodrich and Keil (2002), Greenwood et al. (2017), Grossman and Brearley (2005), Huss et al. (2006), Jenniskens et al. (2021), Lunning et al. (2018), Metzler (2018), Metzler et al. (2021), Miller (2002), Newton et al. (2000), Rochette et al. (2003), Scott and Jones (1990), Sears et al. (1991), Shearer et al. (2008), Stoeffler et al. (1980), Torrano et al. (2020), Warren (1993), Wasson and Choi (2003), Wasson and Kallemeyn (2002),

Wasson and Richardson (2001), Wasson et al. (2007), and Weyrauch et al. (2017).

NOTABLE METEORITES

Winchcombe (CM2) is the latest of a series of five CM falls since 2017. Another notable fall is the Motopi Pan howardite. Meteorite finds that are notable for their mass, rarity, and/or scientific interest include El Ali (15.2 t iron belonging to the IAB complex), Erg Atouila 001 (a 793 g ungrouped achondrite with a modal abundance of ~95% albitic alkali feldspar, making it the first meteoritic albitite), Chug Chug 086 (only the 11th ungrouped ordinary chondrite), NWA 13758 (100 kg R3), NWA 14505 (24 kg CV3). Five new nakhlites have been registered in MB110, a very significant addition in view of the total numbers of known nakhlites (28 without considering pairing). The Nomenclature Committee now recognizes the CL carbonaceous chondrite group following the publication of Metzler et al. (2021). Five meteorites have been reclassified as CL in MB110: Coolidge, Loongana 001, Los Vientos 051, NWA 033, and NWA 13400. The large number of type 2/3 ungrouped carbonaceous in MB110 call for more work that may eventually lead to the definition of additional carbonaceous chondrite groups in peer-reviewed literature.

ALPHABETICAL TEXT ENTRIES FOR NON-ANTARCTIC METEORITES

See online version of this article.

NEW DENSE COLLECTION AREAS

In 2020, 38 new dense collection areas (DCA) were created, including 26 in the northwest Africa area: 11 in Algeria, 11 in Morocco and Western Sahara, 3 in Mali, 1 in Mauritania, 4 in China, 4 in Iran, 2 in the United Arab Emirates, 1 in Turkey, and 1 in Libya. A full list of all approved DCAs, with maps, can be found at <https://www.lpi.usra.edu/meteor/DenseAreas.php>.

LISTING OF INSTITUTES AND COLLECTIONS

An up-to-date index of collections and approved repositories (next to a green check mark) cited in the Meteorite Bulletin can be found here:

<https://www.lpi.usra.edu/meteor/MetBullAddresses.php?grp=country>

Data Availability Statement—The data that support the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article.

Appendix S1. A complete copy of the text entries for non-Antarctic meteorites.

Appendix S2. Data including Antarctic meteorites.

Information about the approved meteorites can be obtained from the Meteoritical Bulletin Database (MBD) available online at <https://www.lpi.usra.edu/meteor/>.
