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New data on the presence and distribution of Hg in the Paglia-Tiber fluvial system

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The presence of anomalously high Hg values in the Paglia-Tiber fluvial system (central Italy) has been known for some years (Gray et al., 2014; Colica et al., 2019, and references therein). In 2017, the Tiber watershed authority prompted a systematic study of the presence and distribution of this metal in various environmental segments of this important fluvial system. The regional environmental agencies (ARPA) of Tuscany, Umbria and Latium were charged to carry out the study, with consultancy by the Universities of Firenze (geochemistry) and Perugia (fluvial dynamics). We present here the first results of the geochemical study.

There are at least two potential Hg sources for the Paglia-Tiber system: the past mining activity in the Mt. Amiata district (the 3rd largest Hg district in the world), and the ongoing exploitation of geothermal energy. Benvenuti & Costagliola (2016) suggested that contribution from this last source is by far minor compared to mining activity. The first data of this study indeed confirm this suggestion. The highest values of Hg in sediments (up to 1,900 mg/kg) occur in the Siele and Stridolone watersheds, affected by the Siele and Cornacchino mines.

The concentration of Hg in sediments markedly decreases southward, most notably downstream of the Alviano dam, that acts as a physical barrier for Hg-bearing particulate. However, anomalous (i.e. beyond the 1 mg/kg Italian regulatory limit for residential soil) Hg values are documented in sediments and soil along a narrow band extending at least to Castel Giubileo, just north of Rome. A main goal of the study will be a reliable operational definition of this “contaminated” band.

By contrast, Hg contents in stream waters are consistently below the 1 g/L limit for drinking waters. However, fish contents in the Paglia river often exceed the recommended limits for human consumption, and suggest the opportunity of cautionary measures. On the other hand, Hg contents in vegetables grown on soils of the “contaminated” band apparently do not pose sanitary problems, assuming standard dietary habits.

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