Tilings of the sphere by almost equilateral pentagons

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(joint work with Min Yan and Yohji Akama)

The classification of edge-to-edge tilings of the sphere by congruent pentagons can be divided into three cases in terms of edge: variable edge lengths, equilateral, and almost equilateral. The first two cases have been largely settled by Min Yan and his collaborators. The almost equilateral case (four edges of the same length and the fifth different) is the most difficult one, and earlier techniques are insufficient. We have introduced decision-making algorithms in wxMaxima and new geometric constraints to handle this case. We have obtained full classification for almost equilateral pentagons with three distinct angles and partial results for those with five distinct angles. We will discuss our findings which include foundamental tilings, Earth Map Tilings, and some special tilings which are not seen in the other pentagon cases. We will also discuss the linkage between Earth Map Tilings and geometric realisation of the duals of certain spherical maps.