

COLORADO RING STRUCTURE: A POSSIBLE ANALOG OF CORONAE ON VENUS.

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Introduction: Definition is given for the large circular structure on the Earth, named hereafter as Colorado Ring Structure (CRS), which is located in North America. Its center is at 37°N, 110°W. The overall topographic appearance of this structure looks to be similar to the large circular features on Venus termed Corona. So, it could have some importance for planetological studies to compare the coronae on Venus with terrestrial ring structures.

Geographic setting: The CRS is located in the western part of North America, between the Great Plains on the east and the Great Basin on the west. The structure have a clear appearance on the satellite images due to the sharp colour differences of its landscapes – dark-looking forests on the mountain ranges and bright-looking desert ground at the lower areas (Fig. 1). Its latitude/longitude framing is 33 and 41°N, 105 and 115°W.

The main rim of the CRS could be traced along the mountain ranges (Fig. 2), which are (counter-clockwise from Flagstaff): Mogol on Rim at S, Manzano Mountains and Sangre de Cristo Mountains (within the Rocky Mountains system) at E, Sawatch Range, Gore Range and Park Range (Rocky Mountains) at NE, Elkhead Mountains and Uinta Mountains at N, southern segment of Wasatch Range at NW, Kaibab Plateau and Coconino Plateau at W.

Colorado Plateau occupies most of the inner part of CRS.

Topographic description: The outer diameter of CRS (between the rim foothills) is 840–880 km, the inner diameter is about 520 km, and the rim width is 150–200 km.

The rim altitudes are in general up to 3000 m. The higher areas within W and S segments are at 3000–3500 m, with maximal point at San Francisco Mount near Flagstaff (Humphreys Peak, 3851 m). E and N segments of the CRS rim are higher, around 4000–4400 m. The highest point at N segment is Kings Peak, Uinta Mountains (4123 m), and in E segment – Mount Elbert, Sawatch Range (4399 m), which is the highest point of Rocky Mountains range. So, there is a general topographic tilt of CRS from E to W, to be more presice, from NE to SW (Fig. 3). The plain areas within the inner part of CRS are at altitudes 1500–2000 m. The plains surrounding CRS are at altitudes 1000–1500 m.

The outer boundary of CRS have as a rule very sharp topography, expressed as steep megascarpes, especially in W, SW and S segments of the rim, at the areas of Hurrricane and Aubery Cliffs at W outer foothills, and at Sedona Cliffs at SW segment



Fig.1. Satellite photo of Colorado Plateau area at visible band. Colors: dark greenish – forest vegetation, yellowish-pink – desert ground, white – cloudness, black – water. Area is 1200x1500 km. Borders of states are shown. *Photomap: MODIS/NASA.*

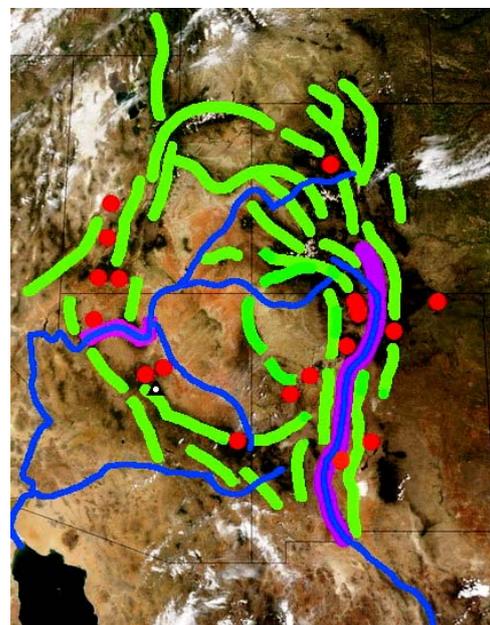


Fig. 2. Interpretation of Colorado Ring Structure (outer diameter is 880 km). Green lines – mountain ranges; red dots – volcanoes/lava fields; blue lines – main river valleys; purple lines – main canyons (Grand Canyon of Colorado and San Luis/Rio Grande Canyon). City of Flagstaff – white dot in black triangle.

Hydrographic patterning: The circular pattern of the CRS is outlined with the net of river valleys. Inner part of CRS is framed with Colorado river at N, NW and W, as well as with Little Colorado river from S and SW (Fig. 2). Just west of the Little Colorado mouth there is Grand Canyon, which cuts through the western rim of CRS. From E and SE there is a long canyon/valley of Rio Grande, which outlines the inner foothills of CRS rim. Gila river outlines the outer foothill of CRS from S. There are valleys of Muddy and Sevier rivers along the western outward side of CRS rim. As a whole, the CRS inner area is a catchment basin of Colorado river.

Current geologic activity: Colorado Ring Structure looks to be geologically active one.

Seismicity. Earthquake epicenters are concentrated along the rim of CRS. About 120 earthquakes occurred here during 1990–2000. All epicenters were at shallow depths – less than 35 km. Most of the epicenters are located within N, NW, W and SE segments of the rim.

Volcanism. There are about 20 volcanoes and lava fields along the rim of CRS (see red dots on fig. 2). The most recent activity took place at the Sunset Crater volcano, which is located on the SW segment of the rim. Its foothill altitude is 2120 m, cinder cone height is 320 m (Fig. 4). The latest activity occurred here 825 year ago, in 1180, when basaltic lava flow from the foothill have been formed, which is named Bonito Lava Flow.

Comparison with coronae on Venus: The overall topographic shape of the Colorado Ring Structure – a high mountain ring/rim around the lower, but still topographically high plateau, and lowland plains outside the rim – resembles the typical topography of the large circular features on Venus termed Corona [1]. Such topographic similarity could be result of the similarity in geologic evolution of these structures both on Earth and Venus. The data on Colorado Ring Structure could be applied for interpretation of the processes which form corona features on Venus.

References: [1] Burba G. A. and Shashkina V. P. (1992) LPS XXIII, 320–321.

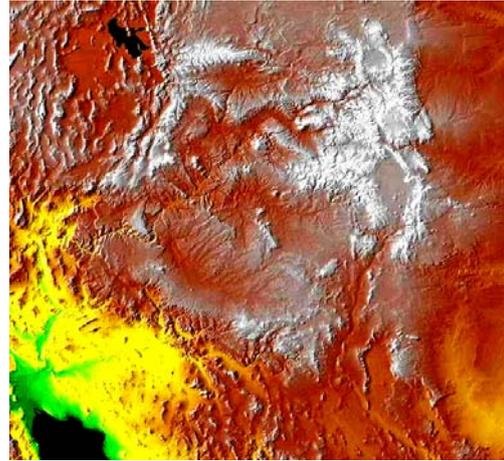


Fig. 3. Topographic map of Colorado Plateau Ring Structure. Area size is 1200 x 1200 km. Ocean – black, lowlands – green/yellow, uplands – brown, mountain ranges – grey/white. *Map: USGS.*



Fig. 4. Sunset Crater – an active volcano on the SW rim of Colorado Ring Structure. Its latest activity (basaltic lava flow from the foothill) took place 825 year ago, in 1180. Located 25 km NE of Flagstaff, Arizona. *Aerial photo: USGS.*