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Kh. Gul'medov and A. P. Savrukhin. Research in Astrophysics and the Physics of the Upper Atmosphere in the Turkmenian SSR.

Turkmenia is the southernmost republic of the Soviet Union and enjoys a large number of clear days in the year, a fact that permits systematic observations of meteors, the skyglow, and other celestial phenomena in this region. Broad astrophysical research on meteors, comets, and the gegenschein were begun in Turkmenia in 1942. During the International Geophysical Year, the work on meteors was expanded and research on night-sky emissions was begun.

A system of radar stations for meteor observations, working in continuous generation at 25 MHz, has now been created. It has been used to obtain data on the deceleration of meteors in the earth's atmosphere and to determine the orbital elements of faint meteors[1,2]. Comparison of these data with the results of photographic observations of bright meteors indicates substantial differences between bright and faint ones.

During the approach of the Leonid meteor swarm to the earth in 1965–1967, Turkmenian astrophysicists obtained a great wealth of material from photographic and telescopic observations of the glowing trains of the meteors and their drift. Spectra of the meteor trains were obtained. Reduction of these spectra indicated that most of the emission is in the yellow and red parts of the spectrum, and several emission lines were resolved[3].

Electrophotometric investigations of the atomic-oxygen emission lines at λ 5577 Å and λ 6300 Å in the intrinsic luminescence of the upper atmosphere made it possible to establish morphological features of the emission-line strengths and to investigate their diurnal and seasonal variations and their relation to geomagnetic activity and lunar tidal phenomena in the atmosphere. A peculiarity of the λ 5577 Å emission is the presence of space-time inhomogeneities in the distribution of the emission intensities over the celestial vault. The shape, dimensions, and strength of the inhomogeneity luminescence experience rather rapid changes in time[4].

The kinetic temperature of the atmosphere at heights of 250–300 km was determined by measuring the profile of the λ 6300 Å emission on a Fabry-Perot interferometer. Its value at night during magnetically quiet periods is 700–1500°K, with minima around local midnight. At times of geomagnetic disturbances, the upper atmosphere heats up sharply, with a simultaneous increase in the strength of the emission[5].

Spectrographic observations of the rotational-vibrational bands of hydroxyl in the skyglow brought out short-period variations in the intensity of the emission. The average rotational temperature of the OH molecule is 240°K.

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A. Ashirov, A. V. Anikin, O. Gandymov, and A. S. Vasilevskaya. Results of X-ray Structural and X-ray Spectral Investigations of Certain Compounds.

Research on the topic "Formation and Structure of Crystals" is being conducted in two trends at the Physico-technical Institute of the Turkmenian Academy of Sciences: deciphering the atomic structure of crystals and experimental and theoretical study of fine structure in the x-ray absorption spectra of metals and metallic alloys.

In the first trend, the monoclinic structure of the hydrated magnesium borate inderite $Mg_2B_6O_{11} \cdot 15H_2O$ was exhaustively resolved by direct determination of the signs. Especially characteristic for the deciphered structure are the discrete neutral complexes $MgB_3O_3(OH)_5 \cdot 4H_2O$, in whose composition, in turn, the "island" anion trinuclear radical $[B_3O_3(OH)_5]^{-2}$ is distinguished; the "molecular" complexes are combined into a single structure by hydrogen bonds.

The doubts that existed as to the summetry of hydroboracite $CaMg[B_3O_4(OH)_3]_2 \cdot 3H_2O$ were eliminated, and its monoclinic structure was fully deciphered. The efficiency of two-stage harmonic analysis with Fourier syntheses of higher symmetry in the presence of pseudosymmetry in Patterson syntheses was demonstrated. Colemanite-type $[B_3O_4(OH)_3]_n^{-2n}$ boron-oxygen chains emerge most characteristically in the structure of hydroboracite and are bound into a single architectural motif by parallel chains of Mg octahedra and columns of Ca octagons. The heavy-atom method was used to determine the crystal structure of p-veatchite $Sr_2[B_5O_8(OH)]_2 \cdot B(OH)_3 \cdot H_2O$. For the first time, boron-oxygen radicals $[B_5O_8(OH)]_n^{-2n}$ that are infinite in two dimensions were identified in the structure of this hydrated borate. It was established that witschite and p-veatchite are two dimorphic modifications whose structures are composed of identically constructed boron-oxygen network layers and differ only in the relative arrangement of these layers. Insular triangular boron-oxygen complexes $B(OH)_3$ are present simultaneously in the structures of these minerals. These first known mixed borates permit an expansion of the borate classification scheme by addition of a fifth class of "mixed borates," the first representatives of which must be recognized in the witschite and p-veatchite that we have deciphered...

The crystal structure of the n-hydroxy isomer of cyclohexyl-o-cresyl ketone was determined by a direct method. It was established that the packing of the molecules forms endless chains in which the molecules are bound crystallographically to one another at planes of glancing reflection. Formation of the chains is explained