M06b 3D Fine-Scale Structure and Dynamics of Solar Polar Faculae

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The three dimensional fine-scale structure and dynamics of solar polar faculae were studied using Hinode/SOT filtergraphic observations at polar regions in G-band and Ca II H broadbands and H-alpha line narrowband. To elucidate finer scale structure of the faculae, we improved time series of images from G-band and Ca II H by applying a super-resolution technique to derive structures finer than the diffraction-limit of the SOT. As a result, much thinner structures of close to 0.1 arcsec are being revealed and the faculae appear as a cluster of thin tapered tube-like structures; individual size is about 0. 2 x 0.5 arcsec, reaching the maximum closer mid-way to the limb, are likely projected on the limb-side neighboring granules with center-ward dark lanes in G-band. Typical lifetime of each facular elements is about five minutes, showing side-way motion during the life. Corresponding bright fine elongated structures are seen in Ca II H, although such structures are more numerous and therefore there does not always exist one-to-one correspondense of Ca II H bright structures with the G-band facular elements. In H-alpha, fibril structure emanating limb-ward from the faulae and Ca II H bright regions. Those facts imply that the polar faculae appear in the root of intense vertically-oriented thin magnetic flux tubes. We give detailed characteristics of fine-scale structure and dynamics of the polar faculae, discussing about the hot-wall flux tube model to interpret them.