Planetary Profile: Duskara

Host Star

- **Name**: HD Xanthea (colloquial: “Xanthea’s Star”)
- **Spectral Type**: K3–K4 main-sequence star
- **Mass**: ~0.8 Solar masses
- **Luminosity**: ~0.3–0.4 Solar luminosities
- **Estimated Age**: ~4–5 billion years
- **Habitable Zone**: Relatively close-in orbits, suitable for tidally locked planets if atmospheric and geothermal conditions allow

Orbital & Planetary Characteristics

- **Planet Name**: **Duskara**
- **Orbital Distance**: ~0.15 AU from HD Xanthea (varies slightly with eccentricity)
- **Orbital Period**: ~30–35 Earth days (synchronous rotation leads to tidal locking)
- **Rotation**: Tidally locked (one hemisphere faces the star constantly)
- **Axial Tilt**: Minimal (≤ 1°), little to no seasonal variation

Physical Properties

- **Diameter**: ~1.00–1.05 × Earth’s diameter
- **Mass**: ~1.00–1.10 × Earth’s mass
- **Surface Gravity**: ~0.95–1.05 g (near Earth-normal)
- **Escape Velocity**: Similar to Earth’s (slightly higher or lower depending on precise mass/radius)

Day–Night Temperature Extremes

- **Day Side**:
  - Surface Temperatures: ~350–450°C (subject to local conditions)
  - Brutal solar flux, extreme UV and particle radiation
  - Frequent dust storms in transition zone
  - Minimal or no standing water at the surface
- **Night Side**:
  - Surface Temperatures: ~−100 to −150°C (variable by region)
  - Permanently dark or in deep twilight from scattered auroras
  - Glacial ice sheets, occasional geothermal vents or volcanic hotspots
  - Some pockets of life in subterranean areas warmed by geothermal heat

Twilight Belt

- **Width**: ~200–300 km band encircling the planet
- **Temperature Range**: Generally −5°C to +40°C, depending on proximity to day or night side
- **Atmospheric Dynamics**:
  - Strong, persistent winds due to stark temperature gradient
  - Frequent superstorms where hot and cold air masses meet
- **Habitable Zone**: Nearly all surface settlements and farmland lie here; major cities form linear chains along temperate corridors

Atmosphere

- **Composition** (approx.):
  - ~76–78% Nitrogen (N_2)
  - ~20–22% Oxygen (O_2)
  - ~1–3% Argon / other inert gases
  - Trace amounts of CO_2, H_2O vapor, and exotic molecules
- **Surface Pressure**: ~0.9–1.1 bar (near sea-level Earth equivalent)
- **Radiation & Weather**:
  - Enhanced stellar radiation on the day side; partial protection via thick atmosphere
  - Robust wind circulation redistributing heat and moisture from day to twilight regions

Water & Geological Features

- **Primary Water Reservoirs**:
  - Subterranean aquifers, glacial deposits on the night side
  - Collection of atmospheric moisture in twilight and day-night transition storms
- **Surface Water**:
  - Present mainly in the form of rivers or small seas in the deeper parts of the twilight belt
  - Lake- or river-like bodies fed by precipitation and geothermal springs
- **Geology**:
  - Tectonically active regions produce geothermal vents, crucial for night-side warmth
  - Abundant mineral deposits in dayward highlands, mined by robotic systems

Ecology & Life

- **Native Flora & Fauna**:
  - Adapted to low light, high winds, or subterranean niches
  - Some species show bioluminescence or specialized thermal regulation
  - Deep-cave ecosystems rely heavily on geothermal/chemosynthetic processes
- **Human Settlements**:
  - Concentrated in twilight belt, forming linear “wind-hardened” cities
  - Cave-dwelling communities near geothermal vents on night side
  - Careful agriculture (vertical farming, hydroponics) in stable twilight microclimates

Key World Constraints

- **Tidal Locking** → Eternal day side and perpetual night side
- **Severe Wind Patterns** → Massive storms at the day-night interface
- **Resource Scarcity** → Especially water, making conservation paramount
- **Radiation** → Day-side flux drives genetic and potential psychic adaptations
- **Geothermal Relief** → Vital for warming settlements in night-side caverns

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