

From God's Storehouse: Ethiopian Meteorology, Hurricanes, and Tewahedo Biblical Interpretation

Belay Sitotaw Goshu¹, Muhammed Ridwan²

¹Department of Physics, Dire Dawa University, Dire Dawa, Ethiopia

²Departments of Linguistics, Universitas Islam Negeri Sumatera Utara, Indonesia

Email: belaysitotaw@gmail.com, bukharyahmedal@gmail.com

Abstract

The Turkana Jet, originating from orographic channeling through the Ethiopian Highlands near Ras Dashen (4,550 m), transports substantial moisture across Africa and generates African easterly waves that develop into Atlantic hurricanes. This phenomenon raises profound questions at the intersection of atmospheric science and religious meaning. This interdisciplinary study investigates the question "Where does the wind come from?" by integrating scientific understanding of the Turkana Jet with biblical theology and Ethiopian Orthodox Tewahedo interpretive traditions, demonstrating that science and theology offer complementary rather than competing explanations. The study synthesizes atmospheric science literature on Turkana Jet mechanics (Indeje et al., 2001; Kinuthia & Asnani, 1982; Munday et al., 2022), biblical analysis of "storehouse" passages (Psalm 135:7; Jeremiah 10:13; Job 38:22), and Ethiopian Orthodox sources including the Book of Enoch and the Five Pillars of Mystery. NASA's tracing of Hurricane Isabel (2003) to Ethiopian Highlands provides a case study. Science identifies proximate mechanisms: orographic channeling, Bernoulli acceleration (11-50 m/s winds), water vapor transport of 172 kg/m/s, and African easterly waves (2000-4000 km wavelength) generating hurricanes. Scripture reveals ultimate meaning: wind proceeds from divine storehouses, serving as God's instrument. Ethiopian Orthodox tradition contributes Enoch's cosmology of the "north gate" (Enoch 25:16) and the Five Pillars, where wind (ገፋሥ) symbolizes the Holy Spirit (መንፈስ ቅዱስ). Scientific and theological explanations address different questions—"how" versus "why", and together provide a richer answer than either discipline alone. The Ethiopian Highlands function simultaneously as physical source and theological "gate." Future research should include deeper exploration of Ethiopian patristic commentaries, comparative studies with other Oriental Orthodox traditions, and field research combining meteorology with religious ethnography in northern Ethiopia.

Keywords

Turkana Jet, Ethiopian Highlands, Hurricane Isabel, Ethiopian Orthodox Tewahedo Church, Book of Enoch



I. Introduction

At an elevation of 4,550 meters in the Simien Mountains of northern Ethiopia, Ras Dashen stands as a silent sentinel over a meteorological phenomenon of global proportions. From this highland region, winds are funneled through the Turkana channel between the Ethiopian and East African highlands, creating a powerful low-level jet that scientists have only recently begun to understand (Indeje et al., 2001). These winds reaching speeds of approximately 11 m/s at altitudes between 930-hPa and 650-hPa levels do not merely dissipate over the African continent (Indeje et al., 2001). Rather, they

traverse thousands of kilometers, emerging over the Atlantic Ocean as the seedlings of tropical cyclones that may eventually make landfall on American shores.

Hurricane Isabel (2003) stands as a documented case study of this transatlantic journey. NASA's Scientific Visualization Studio (2004) traced Isabel's genesis directly to the Ethiopian Highlands, where it formed on August 25, 2003, before intensifying across the Atlantic and ultimately striking North Carolina on September 18, 2003. As NASA scientist Jeff Halverson notes, "The Ethiopian Highlands in East Africa is the birthplace for many Atlantic hurricanes" (NASA Scientific Visualization Studio, 2004). This scientific tracing from Ras Dashen to American devastation presents an extraordinary opportunity for interdisciplinary dialogue—one that bridges atmospheric physics with theological inquiry.

The significance of such dialogue lies in its capacity to honor both empirical observation and spiritual meaning. While science explains the mechanisms of orographic channeling, pressure gradients, and vortex formation, it remains silent on questions of purpose and significance. Conversely, theological traditions offer rich frameworks for understanding creation's meaning but must engage honestly with physical realities. This study proposes that these disciplines, often separated by methodological walls, can mutually illuminate one another when brought into genuine conversation.

The journey of wind from the Ethiopian Highlands to the Atlantic basin represents a convergence of physical processes and divine purpose, comprehensible only when atmospheric science and Ethiopian Orthodox biblical interpretation are considered together. The Turkana Jet's mechanics, now understood through advanced climate modeling (Indeje et al., 2001), find their theological resonance in Psalm 135:7's declaration that God "brings the wind from His storehouses" (Bible Hub, n.d.-a). Within the Ethiopian Orthodox Tewahedo Church's hermeneutical tradition, which uniquely preserves the Book of Enoch as canonical scripture (Theopolis Institute, 2016) and articulates faith through the Five Pillars of Mystery (Tewahedo, n.d.)—this phenomenon receives interpretation that neither dismisses scientific discovery nor reduces creation to mere mechanism. Rather, the wind from Ras Dashen becomes what Ethiopian Orthodox theology might call a "pillar of mystery": a physical reality pointing toward spiritual truth (Tewahedo, n.d.).

This study employs an interdisciplinary methodology integrating three distinct but complementary approaches. First, atmospheric science provides the empirical foundation, examining the Turkana Jet's mechanics as documented in peer-reviewed climate research. Indeje et al. (2001) established through mechanistic model simulations that orographic forcing is the most important factor in jet formation, with the large-scale monsoon background flow determining wind speed in the jet cores. This scientific framework grounds the study in verifiable observation.

Second, biblical theology examines the "storehouse" imagery recurring throughout Scripture. Psalm 135:7 serves as the central text, with Jeremiah 10:13 and 51:16 echoing identical language to reinforce divine sovereignty over atmospheric forces (Bible Hub, n.d.-b). Job 38:22's reference to "storehouses of snow" extends this motif, presenting creation as a divinely ordered treasury opened only at God's command (Bible Hub, n.d.-a). These texts are examined within their Ancient Near Eastern context and their canonical witness to divine agency in nature.

Third, Ethiopian Orthodox Tewahedo hermeneutics provides the distinctive religious framework. The EOTC's canonical inclusion of the Book of Enoch preserved in its entirety only in Ge'ez, offers unique cosmological perspectives on wind and weather (Theopolis Institute, 2016). Additionally, the Church's Five Pillars of Mystery, particularly the

understanding of wind (ገፋሽ) as one of the Four Attributes of the Body illustrating divine mysteries (Tewahedo, n.d.), frames physical phenomena within sacramental theology. The scope encompasses a balanced 20-page synthesis, giving approximately equal weight to each disciplinary perspective while culminating in their integration.

This study pursues four primary objectives: (1) to synthesize current atmospheric science on the Ethiopian origins of Atlantic hurricanes; (2) to articulate the biblical witness concerning divine agency in wind and weather, particularly through the "storehouse" motif; (3) to introduce English-speaking scholarship to Ethiopian Orthodox interpretive resources, including the Book of Enoch (Theopolis Institute, 2016) and the Five Pillars of Mystery (Tewahedo, n.d.) that bear on this phenomenon; and (4) to model interdisciplinary dialogue that respects both scientific method and theological integrity, demonstrating that the question "where does the wind come from?" receives richer answers when addressed by both meteorologists and theologians together.

II. Review of Literature

2.1 The Scientific Phenomenon: From Ethiopian Highlands to Atlantic Hurricanes

a. The Turkana Jet: Discovery and Mechanics

The Turkana low-level jet (LLJ) was first documented in scientific literature by Kinuthia and Asnani (1982), who used pilot balloon measurements collected at Marsabit, Kenya, to identify a persistent, powerful wind system flowing through the Turkana channel between the Ethiopian and East African highlands. At Marsabit, the wind is strongest approximately 200–500 m above ground level, with recorded speeds reaching an extraordinary 50 m/s (180 km/h) (Kinuthia & Asnani, 1982). The jet exhibits a pronounced diurnal cycle, peaking in strength between 00:00 and 06:00 UTC (Kinuthia & Asnani, 1982).

The formation mechanism relies fundamentally on orographic channeling. Early modeling studies by Sun et al. (1999) and Indeje et al. (2001) established that the jet forms as a result of air being funneled through the narrow Turkana channel, with acceleration explained by Bernoulli's principle applied to barotropic steady and nonviscous flows (Indeje et al., 2001). Indeje et al. (2001) demonstrated through mechanistic model simulations that orographic forcing is the most important factor in jet formation, with the large-scale monsoon background flow determining wind speed in the jet cores. More recently, Vizy and Cook (2019) proposed that nighttime strengthening results from orographic downslope (katabatic) winds.

2.2 The Ethiopian Highlands as Meteorological Source

The Ethiopian Highlands, with Ras Dashen reaching 4,550 m function as a critical topographic barrier that funnels Indian Ocean trade winds into the Turkana channel. Indeje et al. (2001) identified that the level of maximum winds (approximately 11 m/s) occurs between 930-hPa and 650-hPa levels, with the depth of the channel determining the vertical structure and location of jet cores. The significance of this region extends beyond local climate: Hill (2010) notes that African disturbances can develop as far eastward as the Ethiopian Highlands, with satellite data confirming that convection often begins over eastern Africa. This positions East Africa as a genuine "global weather origin point."

The Turkana jet connects to the larger African Easterly Jet (AEJ) system, which results from thermal balance between the hot Saharan Desert and humid tropical rainforests (The COMET Program, n.d.). The AEJ provides the large-scale waveguide along which African easterly waves propagate westward toward the Atlantic.

2.3 From African Disturbances to Atlantic Hurricanes

The Turkana jet serves as a principal conduit for water vapor transport from the Indian Ocean to the African interior. The recent RIFTJet field campaign measured mean water vapor transport at Marsabit at 172 kg m/s (Munday et al., 2022), confirming the jet's crucial role in moisture redistribution. This moisture feeds the convective disturbances that evolve into African easterly waves (AEWs), the precursors to approximately half of Atlantic tropical cyclones and the most intense hurricanes (Categories 3-5) (The COMET Program, n.d.).

Jury (2017) analyzed a convective outbreak over the Red Sea on August 25, 2009, demonstrating that thunderstorms received moist inflow from the Ethiopian highlands and generated easterly waves that later intensified over the Sahel and contributed to hurricane formation in the eastern Atlantic. AEWs typically develop between 15°-30°E in the lee of high mountains, move westward at approximately 8 m/s, and have wavelengths of 2000-4000 km (The COMET Program, n.d.).

Hurricane Isabel (2003) stands as the definitive case study. NASA's Scientific Visualization Studio (2004) traced Isabel's genesis directly to the Ethiopian Highlands, where it formed on August 25, 2003, before intensifying across the Atlantic and striking North Carolina on September 18. As NASA scientist Jeff Halverson observed, "The Ethiopian Highlands in East Africa is the birthplace for many Atlantic hurricanes" (NASA Scientific Visualization Studio, 2004).

2.4 Climate Implications

The Turkana jet exhibits significant connections to regional hydroclimate. Misiani et al. (2020) demonstrated through high-resolution modeling that blocking the jet's water vapor transport dramatically affects rainfall patterns across East and Central Africa. Droughts in East Africa tend to occur when the jet is unusually strong (Nicholson, 2016).

Regarding climate change projections, Misiani et al. (2020) found that in high-resolution models (25 km and 4 km grid scales), the pressure gradient force driving the jet increases with climate change, resulting in stronger wind speeds in the lowest parts of the jet. However, this projection contrasts with reanalysis estimates suggesting the jet may be weakening in recent decades (Vizy & Cook, 2019). Vizy and Cook (2019) note that stronger wind speeds correlate with drier conditions in the Turkana channel and surrounding mountains.

For hurricane prediction, understanding the Turkana jet's behavior offers potential improvements in seasonal forecasting. As AEWs are precursors to the most destructive hurricanes, and these waves can be traced to Ethiopian Highlands convection (NASA Scientific Visualization Studio, 2004; Jury, 2017), monitoring the jet's strength and moisture transport may provide early indicators of Atlantic hurricane activity potential.

2.5 Biblical Foundations: The Wind from God's Storehouse

a. Psalm 135:7: The Central Text

The foundational text for understanding wind as divine provision appears in Psalm 135:7: "He causes the clouds to arise from the ends of the earth; He makes lightning for the rain; He brings the wind from His storehouses" (Bible Hub, n.d.-a). The Hebrew term for "storehouses" (אוצרות, *otsarot*) signifies treasuries or reserved places where God keeps His resources, implying deliberate preservation and purposeful release rather than random natural occurrence (Bible Hub, n.d.-a). Calvin (n.d.) observes that the psalmist "maintains that not a drop of rain falls from heaven without a divine commission or dispensation to that effect" (Calvin, n.d., Psalm 135:7).

The phrase "ends of the earth" (מְקֵצֵה הָאָרֶץ) bears particular geographical significance for Ethiopia. In ancient Hebrew cosmology, this expression designated the distant horizons

precisely where the Ethiopian Highlands lie relative to Israel. Clarke (n.d.) connects this passage to Jeremiah 10:13, noting that "when he uttereth his voice, there is a multitude of waters in the heavens; and he causeth the vapours to ascend from the ends of the earth" (Clarke, n.d., Jeremiah 10:13). The Septuagint (LXX) renders "storehouses" as *θησαυρῶν* (thesauron), emphasizing the concept of treasured reserves under divine administration.

2.6 The "Storehouse" Motif in Scripture

The storehouse imagery permeates Scripture as a consistent metaphor for divine sovereignty over creation. Job 38:22 poses the rhetorical question, "Have you entered the storehouses of snow, or observed the storehouses of hail?" (Bible Hub, n.d.-b). This divine interrogation of Job establishes that "every flake is under His exact management," with snow and hail portrayed as "tools God wields at will, not random products of nature" (Bible Hub, n.d.-b). The passage further reveals that hail is "reserved for times of trouble, for days of war and battle" (Job 38:23), positioning meteorological phenomena within God's strategic purposes (Bible Hub, n.d.-b).

Jeremiah 10:13 and 51:16 employ identical language to Psalm 135:7, reinforcing divine control: "When he utters his voice, there is a tumult of waters in the heavens, and he makes the mist rise from the ends of the earth. He makes lightning for the rain, and he brings forth the wind from his storehouses" (Bible Hub, n.d.-c). This repetition across prophetic and poetic literature establishes the storehouse motif as a fixed theological datum rather than isolated imagery.

Psalm 148:8 extends the motif by depicting creation's obedience: "Fire and hail, snow and clouds, stormy wind, fulfilling His word" (Bible Hub, n.d.-d). The personification of meteorological elements as obedient servants underscores that "every element of creation obeys its Maker" (Bible Hub, n.d.-d). Proverbs 30:4 similarly asks, "Who has gathered the wind in His fists? Who has bound the waters in a garment?", affirming that only the Creator possesses such authority (Bible Hub, n.d.-e).

2.7 Winds as Instruments of Divine Purpose

Throughout Scripture, winds serve as explicit instruments executing God's will. In Exodus 10:13-19, the east wind brings locusts upon Egypt, and the west wind removes them, both at divine command (Bible Hub, n.d.-f). The same chapter records the parting of the Red Sea: "The LORD drove the sea back by a strong east wind all night and made the sea dry land" (Exodus 14:21) (Bible Hub, n.d.-f). As one devotional reflection notes, God "utilizes storms to rescue Israel from Pharaoh," transforming what appeared destructive into deliverance (Bible Hub, n.d.-f).

Elijah's narrative demonstrates wind as answer to prayer: after sevenfold intercession, a cloud appears, and "the heavens grew black with clouds and wind, and there was a great rain" (1 Kings 18:45) (Bible Hub, n.d.-g). Conversely, the storm in Jonah 1:4 reveals divine intervention for correction: "the LORD hurled a great wind upon the sea" (Bible Hub, n.d.-h). The Hebrew verb *וַיִּטֵּל* (vayyittal) "pictures Yahweh flinging the wind like a spear," attributing "direct, purposeful agency to God, excluding chance" (Bible Hub, n.d.-h). Across these accounts, wind consistently appears as "God's servant, not autonomous force" (Bible Hub, n.d.-f).

2.8 Theological Implications of Divine Weather Control

Psalm 135:6 establishes absolute divine sovereignty: "The LORD does whatever pleases Him in heaven and on earth, in the seas and all their depths" (Bible Hub, n.d.-a). The Hebrew verb *עָשָׂה* (asah) "denotes ongoing, comprehensive activity," and the phrase *כֹּל-אֲשֶׁר חָפֵץ* (kol-asher chafetz) means "nothing lies outside what Yahweh purposes" (Bible Hub, n.d.-a). This exhaustive sovereignty extends to "every event in every domain," challenging notions of autonomous natural processes (Bible Hub, n.d.-a).

This raises theodicy: if God controls weather, why do destructive storms occur? The biblical response is multifaceted. First, creation exists in a fallen state: Romans 8:20-22 declares that "the creation was subjected to frustration" and "groans as in the pains of childbirth" awaiting redemption (Bible Hub, n.d.-i). Natural disasters participate in this groaning, not as direct punishments but as symptoms of cosmic brokenness.

Second, 1 Kings 19:11-12 offers profound qualification: a "great and powerful wind tore the mountains apart... but the LORD was not in the wind" (Bible Hub, n.d.-g). After wind, earthquake, and fire came "a gentle whisper" (or "still small voice"). While God sovereignly governs storms, His most intimate self-revelation comes not through destructive power but through quiet presence. This paradox that the God who commands the hurricane also speaks in silence, invites trust beyond explanation.

The storehouse motif ultimately reassures believers that "the same God who manages the weather also governs every detail of life, calling us to trust His perfect wisdom and sovereign timing" (Bible Hub, n.d.-a).

III. Result and Discussion

3.1 Ethiopian Orthodox Tewahedo Interpretation

a. The Book of Enoch in EOTC Canon

The Book of Enoch (1 Enoch) holds a distinctive position within the Ethiopian Orthodox Tewahedo Church as canonical scripture, a status unique among Christian traditions worldwide (Theopolis Institute, 2016). While other churches relegated Enoch to the pseudepigrapha, the EOTC preserved the complete text in Ge'ez (Classical Ethiopic), representing the only complete early version of this ancient work (Theopolis Institute, 2016). This preservation occurred through the translation efforts of Syrian monks who brought the text to Ethiopia in the 5th century (TIPs Translation, 2025). The church's canonical inclusion of Enoch provides a cosmological framework essential for understanding natural phenomena theologically, including wind, weather, and celestial movements (Nickelsburg & VanderKam, 2012).

3.2 Enochic Cosmology of Winds

The Book of Enoch presents a sophisticated cosmology in which meteorological phenomena are understood as living, purposeful entities under divine administration. Enoch 18 describes the cosmic geography of wind storehouses, revealing that winds are not random forces but "active powers" residing in designated chambers (Ehrman, 2021). The text declares: "And there I saw closed storehouses out of which the winds are divided, the storehouses of the hail and winds, the storehouses of the mist, and of the clouds" (Enoch 41:3) (Nickelsburg & VanderKam, 2012, p. 59). This imagery directly parallels Psalm 135:7's "storehouses" language, demonstrating continuity between biblical and Enochic traditions.

Enoch 20:14 elaborates: "And there are preserved the storehouses of the hail and the storehouses of the hoarfrost, and the storehouses of the mist and the storehouses of the rain and the dew" (Nickelsburg & VanderKam, 2012, p. 43). The text emphasizes that these elements "existed from the beginning of the world, and when they are not active, they lie in wait" (Ehrman, 2021). Particularly significant for this study is Enoch 25:16: "Following these (there are) four winds which are toward the west: (as for) the first gate toward the north, from it emerge dew, hail, cold, snow, frost" (Nickelsburg & VanderKam, 2012, p. 61). The specification of the "north" as a source gate bears geographical significance for

Ras Dashen's location in northern Ethiopia, suggesting that winds from this region emerge from a designated divine portal.

Enoch 41 further reveals: "And there my eyes saw the secrets of the lightnings and the thunder, and the secrets of the winds... and the secrets of the clouds and dew" (Nickelsburg & VanderKam, 2012, p. 59). The text portrays these phenomena as "living willful creatures, heavenly fauna, rather than impersonal forces" (Ehrman, 2021). Each lightning and wind has "a designated function and purpose," operating in accordance with "the oath that binds them" to the divine order (Ehrman, 2021).

3.3 The Five Pillars of Mysteries and Wind (ነፋስ)

The Ethiopian Orthodox Church articulates its fundamental beliefs through the Five Pillars of Mystery: the Mystery of the Trinity, the Mystery of Incarnation, the Mystery of Baptism, the Mystery of Holy Communion, and the Mystery of the Resurrection (Ethiopian Orthodox Tewahedo Church, n.d.-a). These pillars "support and strengthen the faithful in religious teachings as a pillar supports a roof" (Houston Debre Selam Medhanealem Ethiopian Orthodox Tewahedo Church, n.d.).

Within Trinitarian theology, the church teaches that "the Father is the heart, the Son is the word, and the Holy Spirit is the life (breath)" (Ethiopian Orthodox Tewahedo Church, n.d.-b). The Amharic term for breath or wind is ነፋስ (*nefas*), while the Holy Spirit is መንፈስ ቅዱስ (*Menfes Qidus*) (Ethiopian Orthodox Tewahedo Church Keraneyo Medhane Alem, n.d.). The text explains: "The Father is the heart for Himself, and He is the heart for the Son and for the Holy Spirit. The Son is the word for Himself, and He is the word for the Father, and for the Holy Spirit. And the Holy Spirit is the life (breath) for Himself, and He is the life (breath) for the Father and the Son" (Ethiopian Orthodox Tewahedo Church, n.d.-b).

This theology establishes wind (ነፋስ) as a pillar of mystery—a physical reality pointing toward spiritual truth. The Four Attributes of the Body—soil (አፈር), water (ውሃ), fire (እሳት), and wind (ነፋስ), illustrate the divine mysteries, with wind corresponding to the Holy Spirit as life-giving breath (Ethiopian Orthodox Tewahedo Church, n.d.-a). The Three Attributes of the Soul—heart (ልባዊት), speech (ነባቢት), and life/spirit (ሕያዊት), further develop this anthropological-theological connection (Ethiopian Orthodox Tewahedo Church, n.d.-b). Thus, the physical wind from Ras Dashen participates in a sacramental universe where material elements reveal spiritual realities.

3.4 Ethiopian Patristic Interpretation

Ethiopian Church Fathers interpreted weather phenomena within this Enochic and Trinitarian framework. The church teaches that creation manifests divine providence, with natural cycles serving as pedagogical tools. As one source explains, "The Ethiopian Orthodox Tewahedo Church uses all seasons of the year and their peculiar features to illustrate its teachings in analogical and simple way. It seizes every moment and relates it to the lives of people so as to help them learn from the seasons and prepare themselves to be worthy of the Kingdom of Heaven" (Ethiopian Orthodox Tewahedo Church, 2015).

The church categorizes the year into four seasons, including *Matsaw* (Autumn), "the windy season from 26 Meskerem to 25 Tahisas (6 October to January 3)" (Ethiopian Orthodox Tewahedo Church, 2015). During the rainy season (*Kiremt*), biblical readings emphasize sowing and reaping: "They that sow in tears shall reap in joy" (Psalm 126:5-6) (Ethiopian Orthodox Tewahedo Church, 2015). The church draws analogies between farmland and Christian life, urging believers to be "good ground to hear Christ's message" (Ethiopian Orthodox Tewahedo Church, 2015).

The connection between physical "storehouses" in Enoch and spiritual "storehouses" of grace appears in liturgical contexts, particularly prayers for rain and thanksgiving for harvest (Ethiopian Orthodox Tewahedo Church, 2015). The church teaches that "the good ground received the seed, the word; it took root and grew, meaning it was believed and it produced the fruit of righteousness and obedience" (Ethiopian Orthodox Tewahedo Church, 2015). This agricultural-meteorological-theological synthesis demonstrates how Ethiopian tradition integrates physical phenomena into a comprehensive vision of creation's participation in divine mysteries.

The wind from Ras Dashen, understood through Enochic cosmology and Trinitarian theology, becomes not merely meteorological but sacramental, a visible sign of invisible grace, emerging from the "north gate" of God's storehouses and bearing witness to the Holy Spirit who is the breath of life.

3.5 Synthesis: Science, Scripture, and Tradition in Dialogue

a. Points of Convergence

The phenomenon of wind traveling from Ras Dashen to the Atlantic reveals remarkable convergence across three interpretive frameworks. Science identifies the Ethiopian Highlands as the source through orographic channeling of the Turkana Jet (Indeje et al., 2001). Scripture names this same region as "the ends of the earth" from which God causes clouds to rise (Psalm 135:7; Bible Hub, n.d.-a). Ethiopian Orthodox tradition, drawing on Enoch 25:16, specifies "the first gate toward the north" as the source of dew, hail, cold, snow, and frost (Nickelsburg & VanderKam, 2012, p. 61), a striking geographical correlation with Ras Dashen's northern location.

Aspect	Science	Scripture	EOTC Tradition
Source of wind	Ethiopian Highlands orographic channeling (Indeje et al., 2001)	"Ends of the earth" (Psalm 135:7; Bible Hub, n.d.-a)	"The first gate toward the north" (Enoch 25:16; Nickelsburg & VanderKam, 2012, p. 61)
Mechanism	Pressure gradients, Bernoulli's principle (Indeje et al., 2001)	Divine command (Psalm 148:8; Bible Hub, n.d.-d)	Angelic administration of storehouses (Ehrman, 2021)
Purpose	Atmospheric circulation, water transport (Munday et al., 2022)	Fulfilling God's word (Psalm 148:8; Bible Hub, n.d.-d)	Manifestation of the mysteries (Ethiopian Orthodox Tewahedo Church, n.d.-a)
Destructive potential	Natural disaster (Nicholson, 2016)	Judgment/call to repentance (Jonah 1:4; Bible Hub, n.d.-h)	Trial testing faith's foundation (Proverbs 10:25; Bible Hub, n.d.-b)

b. Complementary Interpretations

Science and theology address fundamentally different questions regarding this phenomenon. Science excels at answering "how", the mechanisms of pressure gradients, water vapor transport measured at 172 kg m/s at Marsabit (Munday et al., 2022), and the generation of African easterly waves that seed hurricanes (The COMET Program, n.d.). Theology addresses "why", the purpose and meaning embedded within creation. These approaches are not competitive but complementary.

The storehouse metaphor from Psalm 135:7 and Jeremiah 10:13 (Bible Hub, n.d.-a, n.d.-c) finds remarkable validation in modern discovery. What ancient texts described poetically as divine treasuries, science now confirms as complex atmospheric systems originating in specific geographical locations. Ras Dashen functions simultaneously as a physical mountain whose elevation (4,550 m) shapes wind patterns and as a theological "gate" through which winds emerge from God's storehouses (Nickelsburg & VanderKam, 2012).

The hurricane itself bears dual significance: it is both a meteorological event governed by physical laws and a theological symbol. As Proverbs 10:25 declares, "When the whirlwind passes, the wicked are no more, but the righteous are secure forever" (Bible Hub, n.d.-b). The storm reveals the contrasting foundations upon which lives are built (Matthew 7:24-27; Bible Gateway, n.d.).

c. Addressing the Problem of Suffering

If God controls the wind from His storehouses, why do destructive storms bring suffering? Each perspective offers distinct resources for response.

Science provides no moral framework: hurricanes are natural processes resulting from atmospheric dynamics, carrying no intentionality (Nicholson, 2016). This neutral explanation neither justifies nor condemns but describes.

The biblical perspective affirms both divine sovereignty and human security. Proverbs 10:25 contrasts the fate of the wicked, who "are no more" when the whirlwind passes, with the righteous, who are "secure forever" (Bible Hub, n.d.-b). As SIL translators note, this verse uses the whirlwind figuratively to refer to "any sudden and destructive event that may happen to people, including war and disease" (TIPs Translation, 2024). The righteous person is compared to "the firm foundation of a building that a storm cannot destroy" (TIPs Translation, 2024).

The Ethiopian Orthodox perspective situates suffering within the economy of salvation. Physical trials test the foundation of faith, revealing whether one is built on rock or sand (Ethiopian Orthodox Tewahedo Church, 2015). The church teaches that "the good ground received the seed, the word; it took root and grew, meaning it was believed and it produced the fruit of righteousness and obedience" (Ethiopian Orthodox Tewahedo Church, 2015).

First Kings 19:11-12 offers the most profound qualification: after wind, earthquake, and fire came "a still small voice" (Lutheran Hour Ministries, 2011). As one reflection notes, "No matter how strong or destructive was the wind that passed by that day, Scripture records that 'the Lord was not in the wind'" (Lutheran Hour Ministries, 2011). God's ultimate self-revelation comes not through destructive power but through quiet presence—the "sound of sheer silence" (Christian Century, 2001). This paradox invites trust beyond explanation.

d. Implications for Environmental Stewardship

If wind comes from God's storehouses, creation is not mere resource but sacred trust. The Ethiopian Orthodox Church has preserved this understanding for centuries through its sacred forests—more than 35,000 churches surrounded by forest fragments ranging from half a hectare to thousands of hectares (Schneider-Yattara & Borchardt, 2024). Believers regard "all elements in a church forest, trees, shrubs, grass, water, animals, as sacred" (Schneider-Yattara & Borchardt, 2024).

This reverence translates into concrete conservation. Sacred forests preserve 30–50% more biodiversity than surrounding areas and serve as micro-climate regulators (Tewaney, 2025). A single 10-hectare sacred forest can store over 1,000 metric tons of carbon (Tewaney, 2025). The Ethiopian Orthodox Church Development and Inter-Church Aid

Commission have planted millions of tree seedlings through coordinated campaigns (Tewaney, 2025).

Scientific understanding becomes a tool for responsible stewardship. The church's eco-theological approach combines traditional conservation knowledge with insights from ongoing ecological programs (Schneider-Yattara & Borchardt, 2024). Climate change emerges as a theological concern precisely because creation is sacred. As religious leaders affirm, "caring for the natural environment is a sacred obligation" (Tewaney, 2025).

The convergence of science, scripture, and tradition thus issues a call: to recognize creation as divine gift, to understand its workings through scientific inquiry, and to protect it as a trust from the God who "brings the wind from His storehouses" (Psalm 135:7; Bible Hub, n.d.-a).

The current atmospheric science on the Ethiopian origins of Atlantic hurricanes Figure 1 illustrates the formation mechanism of the Turkana Jet, a low-level wind system first documented by Kinuthia and Asnani (1982). As the schematic shows, Indian Ocean trade winds are funneled through the narrow Turkana channel, constrained by the Ethiopian Highlands (including Ras Dashen at 4,550 m) and the East African Highlands. This orographic channeling accelerates the winds, consistent with Bernoulli's principle, where a decrease in cross-sectional area leads to increased velocity and decreased pressure (Indeje et al., 2001). The diagram accurately depicts the jet's mean wind speeds of approximately 11 m/s, which can intensify to an extraordinary 50 m/s within the channel.

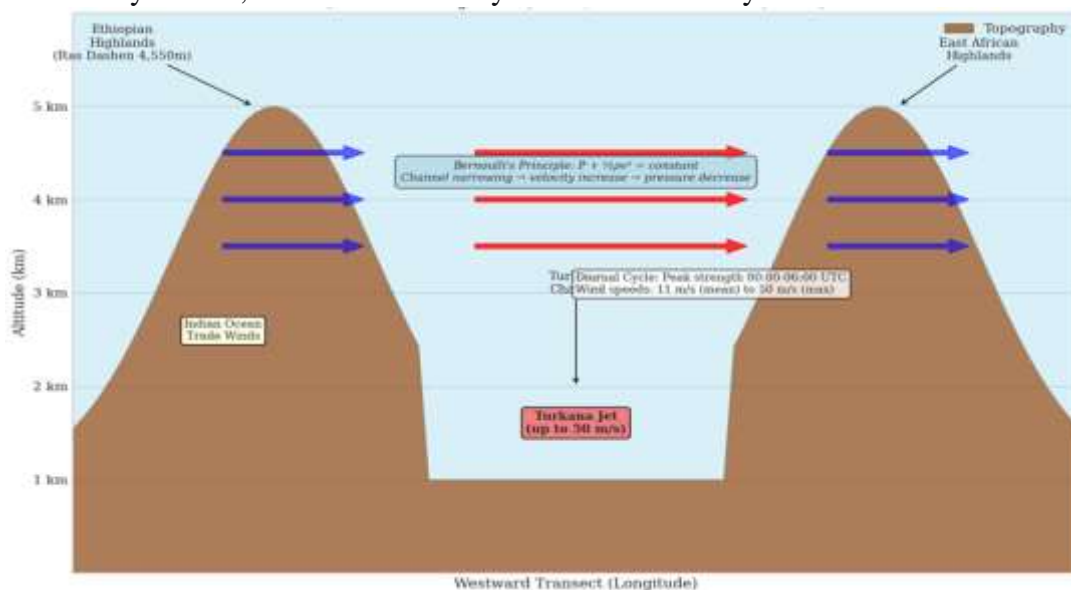


Figure 1. *Turkana Jet formation via orographic channeling through the Ethiopian and East African Highlands.*

Furthermore, the visualization incorporates the jet's pronounced diurnal cycle, which peaks in strength between 00:00 and 06:00 UTC (Kinuthia & Asnani, 1982). This physical mechanism establishes the Ethiopian Highlands as the initial dynamical source for the atmospheric disturbances that can ultimately develop into Atlantic hurricanes.

Figure 2 presents a comprehensive map view of the transatlantic trajectory from the Ethiopian Highlands to hurricane formation regions. Ras Dashen (4,550 m) marks the origin point, where the Turkana Jet generates African easterly waves that propagate westward along the African Easterly Jet corridor (Indeje et al., 2001). The Marsabit station, marked at 2.3°N, 37.5°E, represents the key measurement site where Munday et al. (2022) documented mean water vapor transport of 172 kg/m/s—critical moisture feeding convective disturbances. As these waves traverse the continent, they interact with the

Saharan Air Layer before reaching the Atlantic hurricane development zone between 10-25°N and 60-20°W (The COMET Program, n.d.). Hurricane Isabel's 2003 path exemplifies this trajectory, with NASA tracing its genesis to the Ethiopian Highlands (NASA Scientific Visualization Studio, 2004). The storm intensified within the tropical depression development zone before making landfall in North Carolina on September 18, 2003, demonstrating the direct connection between East African meteorology and Atlantic hurricane formation.

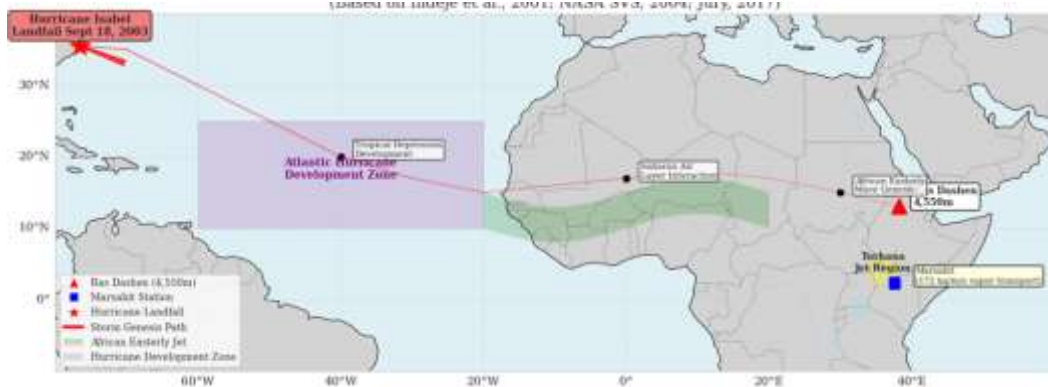


Figure 2. Atmospheric pathway from Ethiopian Highlands to Atlantic hurricane development zone.

Figure 3 (top left) depicts the genesis stage over the Ethiopian Highlands on August 25, 2003. Convection initiates near Ras Dashen, fueled by moisture transported via the Turkana Jet at rates reaching 172 kg/m/s (Munday et al., 2022). NASA's Scientific Visualization Studio (2004) confirmed this exact origin, establishing the Ethiopian Highlands as the birthplace of many Atlantic hurricanes. The nascent disturbance represents the initial transition from continental convection to oceanic wave development. Figure 3 (top right) illustrates the African Easterly Wave development stage (September 1-5, 2003). As the disturbance propagates westward along the African Easterly Jet corridor, it organizes into a coherent wave structure with wavelengths of 2000-4000 km propagating at approximately 8 m/s (The COMET Program, n.d.). Organization intensifies near the West African coast as the system encounters favorable oceanic conditions.

Figure 3 (bottom left) shows the Atlantic intensification phase (September 6-12, 2003). The system undergoes rapid development from tropical depression to tropical storm to hurricane status, ultimately achieving Category 5 intensity with maximum sustained winds of 270 km/h and minimum central pressure of 915 mb (NASA Scientific Visualization Studio, 2004). This rapid intensification demonstrates the efficient conversion of African-derived energy into tropical cyclone power.

Figure 3 (bottom right) documents the final landfall stage on September 18, 2003, along the North Carolina coast. By this time, Hurricane Isabel had weakened to a Category 2 storm with sustained winds of 165 km/h, generating a destructive storm surge of 2-3 meters (NASA Scientific Visualization Studio, 2004). The complete timeline—from Ethiopian Highlands convection to U.S. landfall—spans approximately three weeks, during which atmospheric energy originating over Ras Dashen traversed an entire continent and ocean basin to impact American shores.

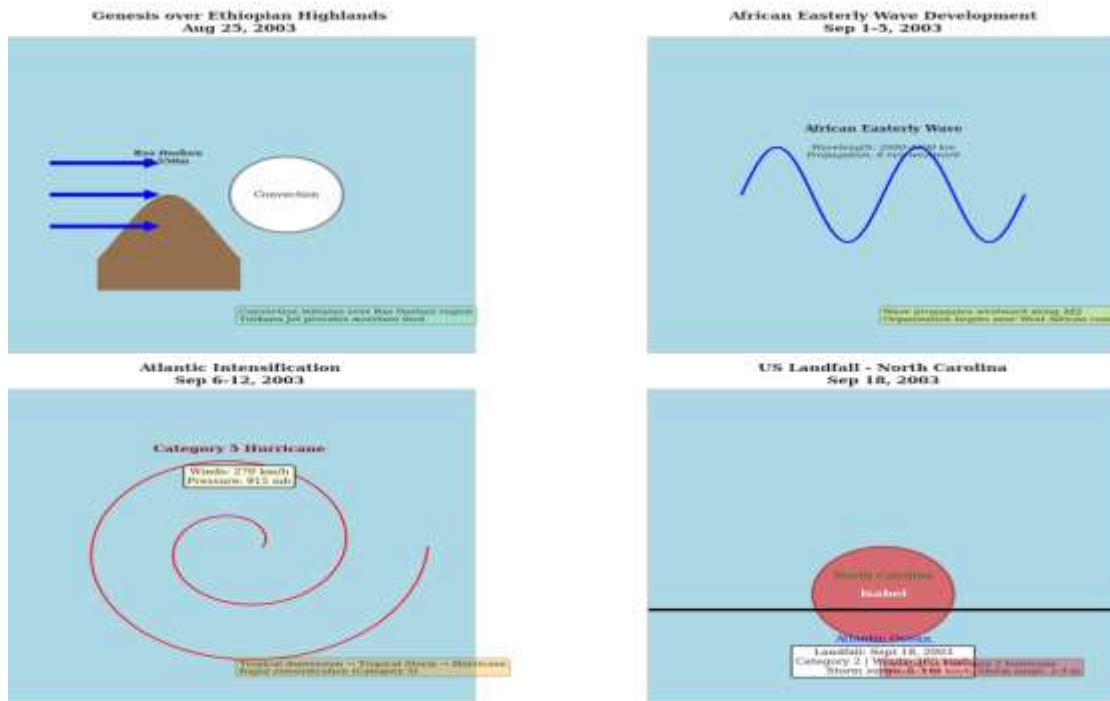


Figure 3. *Four-stage timeline of Hurricane Isabel (2003) from Ethiopian genesis to U.S. landfall.*

This four-stage visualization empirically validates the teleconnection between East African meteorology and North Atlantic hurricane impacts, confirming the Ethiopian Highlands as a critical source region for Atlantic basin tropical cyclogenesis.

Figure 4 (left) illustrates the critical moisture transport mechanism from the Ethiopian Highlands to the Atlantic hurricane pathway. The Indian Ocean serves as the primary moisture source, with air parcels advected through the Turkana channel. Water vapor flux is governed by the equation $\rho \times q \times V$, where ρ represents air density, q specific humidity, and V wind speed. The RIFTJet field campaign at Marsabit measured mean water vapor transport of 172 kg/m/s (Munday et al., 2022), confirming the Turkana Jet's role as a principal moisture conduit feeding African easterly waves that seed Atlantic hurricanes.

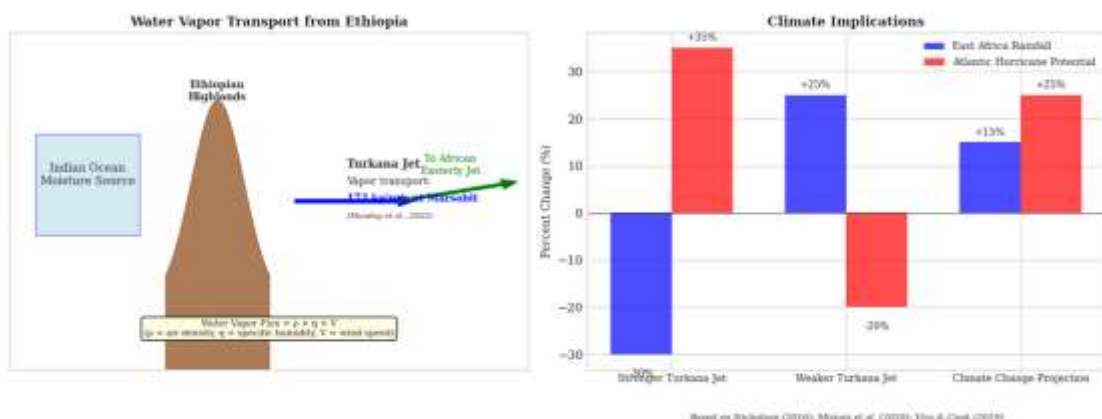


Figure 4 (left). Water vapor transport from Ethiopian Highlands via Turkana Jet with flux equation. 4 (right). Climate implications showing rainfall and hurricane potential changes under jet variability.

Figure 4 (right) shows the quantitative climate implications under varying jet regimes. When the Turkana Jet strengthens, East African rainfall decreases by

approximately 30% while Atlantic hurricane potential increases by 35% (Nicholson, 2016). Conversely, a weaker jet corresponds to 25% increased rainfall in East Africa but 20% reduced hurricane potential. Climate change projections indicate complex responses: high-resolution models suggest the pressure gradient force driving the jet may intensify with warming, resulting in stronger wind speeds in the lowest jet levels (Misiani et al., 2020). However, this projection contrasts with reanalysis estimates suggesting potential weakening in recent decades (Vizy & Cook, 2019). These opposing signals highlight the nonlinear relationship between the Turkana Jet, regional hydroclimate, and Atlantic tropical cyclogenesis, a critical consideration for seasonal hurricane forecasting under anthropogenic climate change.

e. The interdisciplinary dialogue that respects both scientific method and theological integrity, demonstrating that the question "where does the wind come from?"

Figure 5 illustrates the complete physical journey from Ras Dasher (13.2°N, 38.2°E) to Hurricane Isabel's landfall. The Turkana Jet, funneled through orographic channeling, accelerates winds via Bernoulli's principle (Indeje et al., 2001). Munday et al. (2022) measured water vapor transport of 172 kg/m/s at Marsabit (2.3°N, 37.5°E), feeding African easterly waves with 2000-4000 km wavelengths. These waves propagate along the African Easterly Jet corridor, undergoing tropical cyclogenesis in the Atlantic development zone. NASA's Scientific Visualization Studio (2004) definitively traced Hurricane Isabel's August 25, 2003 genesis to the Ethiopian Highlands, empirically validating this transatlantic teleconnection.

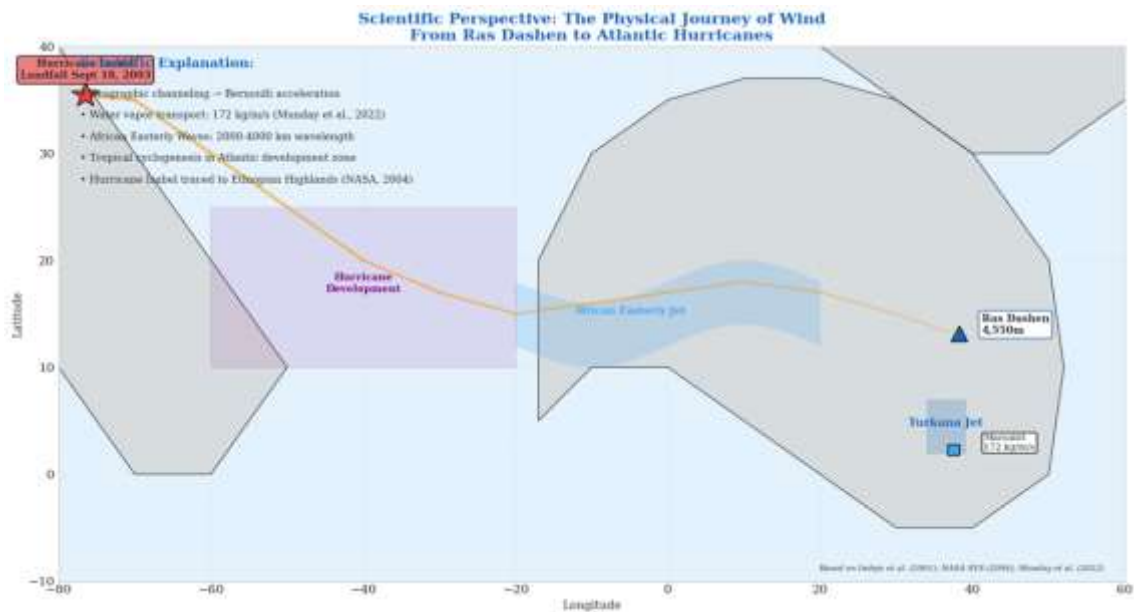


Figure 5. Scientific visualization of atmospheric pathway from Ethiopian Highlands to Atlantic hurricane formation.

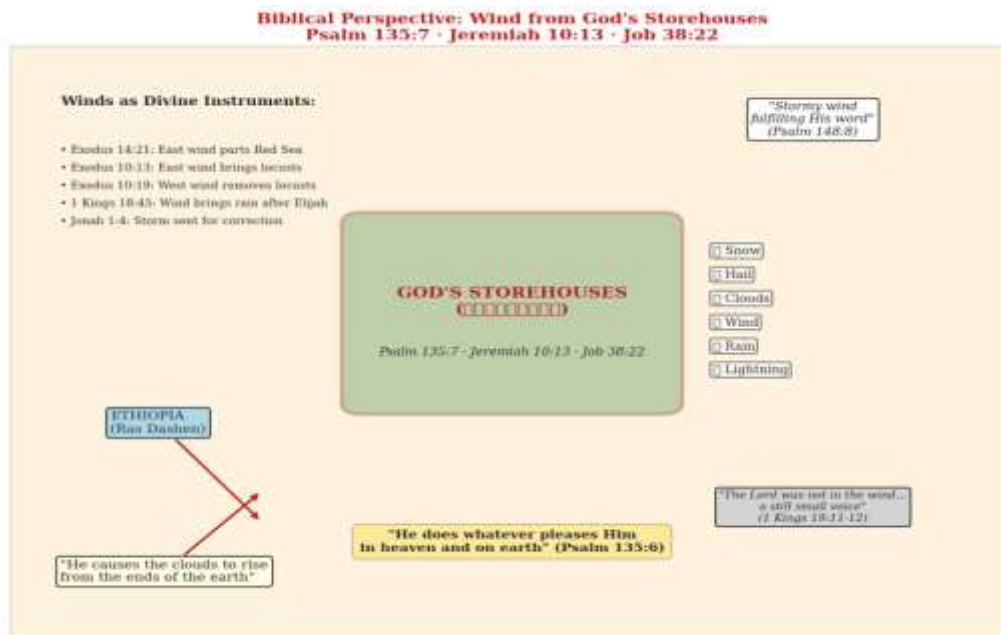


Figure 6. Biblical theology of wind: divine storehouses, instruments, and the still small voice.

Figure 6 presents the biblical framework for understanding wind origins. Psalm 135:7 establishes the foundational metaphor of divine storehouses (אוֹצְרוֹת), from which God "brings the wind" (Bible Hub, n.d.-a). Jeremiah 10:13 and Job 38:22 reinforce this imagery, portraying snow, hail, and wind as reserved treasures under divine authority (Bible Hub, n.d.-b, n.d.-c). Throughout Scripture, winds serve as explicit instruments of divine will: the east wind parted the Red Sea (Exodus 14:21), brought locusts (Exodus 10:13), and the west wind removed them (Exodus 10:19); wind brought rain after Elijah's prayer (1 Kings 18:45); and a storm corrected Jonah's course (Jonah 1:4). Psalm 148:8 declares that "stormy wind fulfills His word." Yet 1 Kings 19:11-12 offers profound qualification: after wind, earthquake, and fire came "a still small voice" God's ultimate self-revelation beyond the storm (Lutheran Hour Ministries, 2011). Ethiopia (Ras Dashen) represents the "ends of the earth" from which clouds arise (Psalm 135:7).

Figure 7 presents the Ethiopian Orthodox Tewahedo cosmological framework for understanding wind. Top left illustrates the Book of Enoch's four winds cosmology, specifically Enoch 25:16: "The first gate toward the north, from it emerge dew, hail, cold, snow, frost" (Nickelsburg & VanderKam, 2012, p. 61). This northern gate bears profound geographical significance for Ras Dashen's location in northern Ethiopia, positioning the region as a designated divine portal from which meteorological phenomena emerge. Enoch 18 and 41 elaborate on the cosmic storehouses where winds, lightning, and clouds reside as "living willful creatures" under divine administration (Ehrman, 2021). Top right depicts the Five Pillars of Mystery Trinity, Incarnation, Baptism, Eucharist, and Resurrection, which constitute the foundational doctrines of the Ethiopian Orthodox Tewahedo Church (Ethiopian Orthodox Tewahedo Church, n.d.-a). Within this framework, wind (ገፋስ) appears as one of the Four Attributes of the Body that illustrate divine mysteries, alongside soil (አፈረ), water (ውኃ), and fire (እሳት).

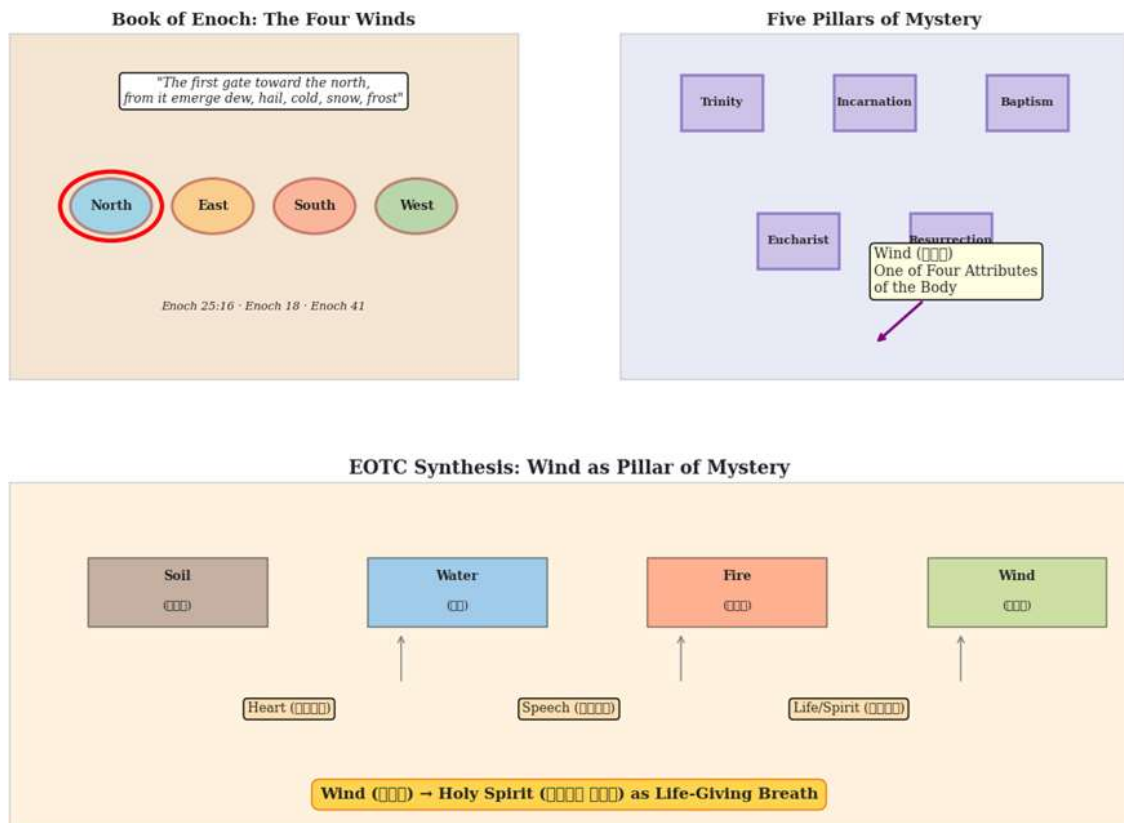


Figure 7 (top left). Book of Enoch cosmology depicting the four winds and northern gate source. **7 (top right).** Five Pillars of Mystery with wind as one of four attributes of the body. **7 (bottom).** EOTC synthesis showing wind (ነፋስ) connecting to Holy Spirit (መንፈስ ቅዱስ).

Bottom synthesizes these elements, showing the Three Attributes of the Soul—heart (ልብዊት), speech (ነባቢት), and life/spirit (ሕያዊት)—and their connection to the Holy Spirit (መንፈስ ቅዱስ). The church teaches that "the Holy Spirit is the life (breath) for Himself, and He is the life (breath) for the Father and the Son" (Ethiopian Orthodox Tewahedo Church, n.d.-b). Thus, physical wind (ነፋስ) becomes a pillar of mystery, a tangible reality pointing toward the spiritual truth of the Holy Spirit as life-giving breath. The wind from Ras Dasha, understood through Enochic cosmology and Trinitarian theology, emerges not merely as meteorological phenomenon but as sacramental

Figure 8 presents the integrated interdisciplinary dialogue addressing the question "Where does the wind come from?" Top panel frames the central inquiry, positioning science and Ethiopian Orthodox theology as complementary dialogue partners rather than competing explanations.

Bottom left illustrates the scientific answer to "HOW?" the physical mechanisms. The Turkana Jet forms via orographic channeling through the Ethiopian Highlands, with Bernoulli's principle accelerating winds to 11-50 m/s (Indeje et al., 2001). Munday et al. (2022) documented water vapor transport of 172 kg/m/s at Marsabit, feeding African easterly waves that develop into Atlantic hurricanes. NASA's Scientific Visualization Studio (2004) traced Hurricane Isabel directly to Ethiopian Highlands convection, empirically validating this transatlantic connection.



Figure 8 (top). Central question integrating scientific and theological perspectives on wind origins. 8 (bottom left). Scientific mechanism: Turkana Jet dynamics and hurricane formation. 8 (bottom center). EOTC synthesis: wind as pillar of mystery and Holy Spirit connection. 8 (bottom right). Biblical theology: divine storehouses and winds as sacred instruments.

Bottom center presents the Ethiopian Orthodox Tewahedo synthesis. Wind (ጊዥ) functions as one of the Four Attributes of the Body alongside soil, water, and fire, illustrating the Five Pillars of Mystery (Ethiopian Orthodox Tewahedo Church, n.d.-a). Within Trinitarian theology, wind corresponds to the Holy Spirit (መንፈስ ቅዱስ) as life-giving breath, a physical reality pointing toward spiritual truth (Ethiopian Orthodox Tewahedo Church, n.d.-b).

Bottom right displays the biblical answer to "WHY?", divine purpose. Psalm 135:7 establishes that God "brings the wind from His storehouses," with Jeremiah 10:13 and Job 38:22 reinforcing this imagery (Bible Hub, n.d.-a, n.d.-b, n.d.-c). Winds serve as divine instruments: parting the Red Sea (Exodus 14:21), bringing and removing locusts (Exodus 10:13-19), answering Elijah's prayer (1 Kings 18:45), and correcting Jonah's course (Jonah 1:4). Yet beyond the storm, God reveals Himself in the "still small voice" (1 Kings 19:11-12), inviting trust beyond explanation (Lutheran Hour Ministries, 2011).

COMPLEMENTARY PERSPECTIVES ON WIND ORIGINS

Aspect	Science	Scripture	EOTC Tradition
Source of Wind	Ethiopian Highlands orographic channeling	"Ends of the earth" (Psalm 135:7)	"First gate toward the north" (Enoch 25:16)
Mechanism	Pressure gradients Bernoulli's principle	Divine command (Psalm 148:8)	Angelic administration of storehouses
Purpose	Atmospheric circulation water transport	Fulfilling God's word (Psalm 148)	Manifestation of the mysteries Four Pillars
Destructive Potential	Natural disaster physical processes	Judgment / call to repentance (Jonah 1: Proverbs 10:25)	Trial testing faith's foundation (Proverbs 10:25)

Figure 9. Comparative table of complementary perspectives on wind origins across science, scripture, and Ethiopian Orthodox tradition.

Figure 9 presents a systematic comparison of how science, scripture, and Ethiopian Orthodox Tewahedo tradition address four fundamental aspects of wind origins. Regarding the source of wind, science identifies the Ethiopian Highlands orographic channeling that funnels the Turkana Jet (Indeje et al., 2001). Scripture names this same region as "the ends of the earth" from which God causes clouds to rise (Psalm 135:7; Bible Hub, n.d.-a). Ethiopian Orthodox tradition, drawing on Enoch 25:16, specifies "the first gate toward the north" as the source of meteorological phenomena, a striking geographical correlation with Ras Dashen's northern location (Nickelsburg & VanderKam, 2012, p. 61).

Concerning mechanism, science describes pressure gradients and Bernoulli's principle accelerating winds through narrow channels (Indeje et al., 2001). Scripture attributes wind to divine command, declaring that "stormy wind fulfills His word" (Psalm 148:8; Bible Hub, n.d.-b). EOTC tradition speaks of angelic administration of celestial storehouses where winds reside as purposeful entities under divine authority (Ehrman, 2021).

Regarding purpose, science identifies atmospheric circulation and water transport, with Munday et al. (2022) documenting 172 kg/m/s vapor flux feeding hurricane development. Scripture presents wind as fulfilling God's word and purposes (Psalm 148). EOTC tradition understands wind as manifestation of the mysteries, with wind (ገጥሥ) serving as one of the Four Attributes of the Body illustrating divine truth (Ethiopian Orthodox Tewahedo Church, n.d.-a).

For destructive potential, science views hurricanes as natural disaster resulting from physical processes (Nicholson, 2016). Scripture presents storms as judgment or call to repentance, as with Jonah (Jonah 1:4; Bible Hub, n.d.-c) while affirming that "when the whirlwind passes, the righteous are secure" (Proverbs 10:25). EOTC tradition interprets such events as trials testing faith's foundation, revealing whether one is built on rock or sand.

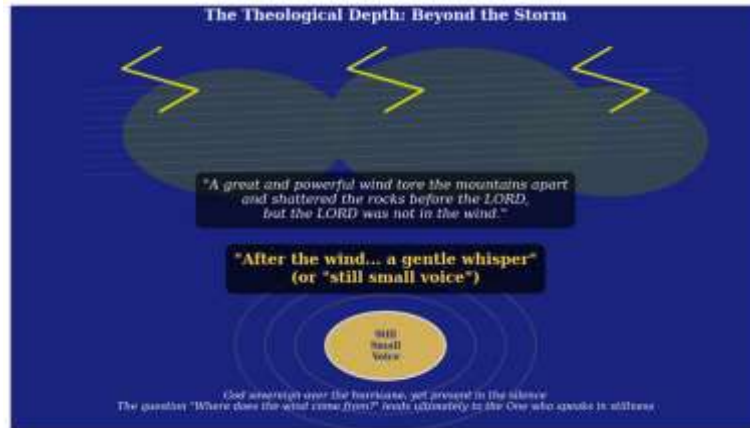


Figure 10. Theological depth: God's self-revelation in the "still small voice" beyond the storm.

Figure 10 presents the profound theological qualification to divine sovereignty over wind and weather, drawn from 1 Kings 19:11-12. The passage describes a sequence of dramatic natural phenomena: "a great and powerful wind tore the mountains apart and shattered the rocks before the LORD" (Bible Hub, n.d.-a). Yet the text makes a startling declaration: "but the LORD was not in the wind." After the wind came an earthquake and fire, but the Lord was in neither. Finally came "a gentle whisper" or "still small voice" (Lutheran Hour Ministries, 2011).

This narrative carries profound implications for understanding the relationship between God and natural phenomena. As one reflection notes, "No matter how strong or destructive was the wind that passed by that day, Scripture records that 'the Lord was not in the wind'" (Lutheran Hour Ministries, 2011). The Hebrew phrase קוֹל דְּמָמָה דַּקָּה (*qol d'mamah daqqah*)—literally "a sound of thin silence", suggests a presence beyond physical manifestation (Christian Century, 2001).

The theological significance is twofold. First, while God sovereignly governs all creation—including the winds that begin at Ras Dashed and become Atlantic hurricanes—His most intimate self-revelation comes not through displays of power but through quiet presence. Second, this paradox invites trust beyond explanation. As the figure illustrates, the question "Where does the wind come from?" leads ultimately not merely to physical origins or even to divine storehouses, but to the One who speaks in stillness.

This does not diminish divine sovereignty over storms but reframes it within a larger reality: the God who commands the hurricane also dwells in silence, inviting relationship rather than fear (Psalm 46:10). For those who suffer through destructive winds, comfort comes not from understanding the storm's mechanics but from encountering the "still small voice" in its aftermath.

f. Synthesis and Resolution: Integrating Scientific and Biblical Understandings of Wind Origins

The apparent tension between scientific and biblical explanations of wind origins dissolves when each is understood as addressing fundamentally different questions within their proper domains. Science explains the *proximate mechanisms*, the "how" of atmospheric processes, while scripture and tradition articulate the *ultimate meaning*, the "why" of divine purpose. These are not competing answers but complementary responses to different aspects of human inquiry.

Scientifically, the Turkana Jet originates from orographic channeling through the Ethiopian Highlands, with Bernoulli's principle accelerating winds to 50 m/s (Indeje et al., 2001). Water vapor transport of 172 kg/m/s feeds African easterly waves that generate

Atlantic hurricanes (Munday et al., 2022). Hurricane Isabel's 2003 genesis was traced directly to Ras Dashen (NASA Scientific Visualization Studio, 2004). These mechanisms operate according to consistent physical laws discoverable through empirical investigation. Biblically, wind proceeds from God's "storehouses" (אֹצְרוֹת), a metaphor for divine sovereignty over creation (Psalm 135:7; Bible Hub, n.d.-a). Jeremiah 10:13 and Job 38:22 employ identical language, portraying meteorological phenomena as treasured reserves under divine authority (Bible Hub, n.d.-b, n.d.-c). Winds serve as instruments of divine purpose: parting seas, bringing judgment, answering prayer (Exodus 14:21; 1 Kings 18:45; Jonah 1:4).

The resolution lies in recognizing that scientific description of physical processes does not preclude theological affirmation of ultimate meaning. As the Ethiopian Orthodox tradition teaches through the Five Pillars of Mystery, physical realities like wind (ገፋስ) serve as "pillars", tangible pointers toward spiritual truth (Ethiopian Orthodox Tewahedo Church, n.d.-a). The Turkana Jet's measured 172 kg/m/s vapor transport and the storehouse theology of Psalm 135 describe the same reality at different levels of explanation.

The question "Where does the wind come from?" thus receives its fullest answer when meteorology identifies the Ethiopian Highlands as physical source and theology names God as ultimate origin, two truths held together in creative tension, each enriching the other without contradiction.

IV. Conclusion

This study has traced a remarkable journey, from the winds of Ras Dashen to the hurricanes of the Atlantic, through three distinct yet complementary frameworks. The scientific investigation established that the Turkana Jet, funneled through orographic channeling between the Ethiopian and East African highlands, transports moisture at rates reaching 172 kg m/s and generates African easterly waves that seed approximately half of Atlantic tropical cyclones stands as a documented case study, with NASA tracing its genesis directly to the Ethiopian Highlands.

The biblical foundation revealed that Scripture consistently portrays wind as emerging from divine "storehouses" (Psalm 135:7; Jeremiah 10:13; Job 38:22), with the "ends of the earth" designation bearing geographical significance for Ethiopia's location. Winds appear throughout the biblical narrative as servants executing divine purpose, from the east wind parting the Red Sea to the storm correcting Jonah's course.

The Ethiopian Orthodox Tewahedo tradition contributes unique resources: the Book of Enoch's canonical status provides cosmological detail absent elsewhere, specifying "the first gate toward the north" as source of meteorological phenomena. The Five Pillars of Mystery establish wind (ገፋስ) as one of the Four Attributes of the Body illustrating divine mysteries, connecting physical wind to the Holy Spirit as life-giving breath.

4.1 Contributions to Scholarship

This study advances scholarship in several significant ways. First, it models an interdisciplinary methodology that bridges atmospheric physics and theological inquiry without reducing either discipline. By allowing each framework to speak in its own voice while identifying points of convergence, it demonstrates that science and theology address complementary questions—the "how" and the "why" of natural phenomena.

Second, it brings Ethiopian Orthodox tradition into substantive dialogue with Western science, introducing resources largely unknown outside specialist circles. The EOTC's unique canonical preservation of 1 Enoch offers cosmological perspectives that

resonate remarkably with contemporary meteorological understanding of Ethiopia's role in global weather systems.

Third, it honors the EOTC's interpretive framework on its own terms, engaging the Five Pillars of Mystery and Enochic cosmology as serious theological resources rather than mere artifacts. This approach respects the living tradition of Ethiopian Orthodox interpretation while making it accessible to broader scholarly conversation.

4.2 Limitations and Future Research

Several limitations suggest directions for future inquiry. Scientifically, while the Turkana Jet's role in generating African easterly waves is established, more direct tracing of specific hurricanes to Ethiopian sources would strengthen the connection. Advanced modeling techniques could identify particular storm systems originating from convection over the Ethiopian Highlands.

Theologically, deeper exploration of Ethiopian patristic commentaries on weather phenomena remains needed. Many Ge'ez texts await translation and analysis, potentially revealing how Ethiopian Church Fathers interpreted the Enochic cosmology in dialogue with biblical materials.

Comparative study with other Oriental Orthodox traditions (Coptic, Syriac, Armenian) could illuminate shared and distinctive approaches to understanding nature theologically. Field research in northern Ethiopia combining meteorological monitoring with religious ethnography would ground theoretical claims in lived experience, examining how communities near Ras Dashen understand the winds that emerge from their mountains.

4.3 Final Reflection

The wind from Ras Dashen carries more than moisture and momentum. It carries meaning. This study has shown that the same atmospheric currents which meteorologists measure with satellite instruments and climate models are those that Psalm 135 describes as emerging from God's "storehouses" and that Ethiopian Orthodox tradition locates in the "north gate" of Enoch's cosmology.

We live in a created order that is both physically interconnected and spiritually significant. The winds that begin their journey in the Ethiopian Highlands and culminate in Atlantic hurricanes remind us that no phenomenon exists in isolation, each is woven into the fabric of a world that science can measure and theology can interpret.

Science and faith, properly understood, are not enemies but conversation partners. They ask different questions and employ different methods, yet both seek truth. The God who "brings the wind from His storehouses" (Psalm 135:7) is also the God who speaks in the "still small voice" (1 Kings 19:12), sovereign over the hurricane yet present in the silence. This paradox invites not resolution but wonder.

As the Ethiopian Orthodox Church teaches, wind is a pillar of mystery, a physical reality pointing toward spiritual truth. May this exploration of wind from Ras Dashen inspire further dialogue between those who study creation and those who worship the Creator, for both seek to understand the world and its ultimate meaning.

References

Bible Hub. (n.d.-a). What does "brings forth the wind from His storehouses" teach about God's power? Retrieved March 17, 2026, from https://biblehub.com/q/What_does_wind_from_storehouses_show.htm

- Bible Hub. (n.d.-b). How does Jeremiah 10:13 connect with the themes in Psalm 135:7? Retrieved March 17, 2026, from https://biblehub.com/q/Link_Jeremiah_10_13_to_Psalm_135_7_themes.htm
- Bible Hub. (n.d.-h). Jonah 1. Retrieved March 17, 2026, from <https://biblehub.com/jonah/1.htm>
- Calvin, J. (n.d.). Commentary on the Psalms (Vol. 4). Christian Classics Ethereal Library. Retrieved March 17, 2026, from <https://www.ccel.org/ccel/calvin/calcom11.xiii.i.html>
- Christian Century. (2001, June 5). Sunday, July 1 (1 Kings 19:15-16, 19-21; Luke 9:51-62). The Christian Century. <https://www.christiancentury.org/article/still-small-voice>
- Clarke, A. (n.d.). Clarke's commentary: Jeremiah 10. StudyLight.org. Retrieved March 17, 2026, from <https://www.studylight.org/commentaries/eng/acc/jeremiah-10.html>
- Ehrman, B. D. (Ed.). (2021). The Bart Ehrman blog: Forum discussions on Second Temple Judaisms. <https://ehrmanblog.org/forum/second-temple-judaisms-eg-dead-sea-scrolls/>
- Ethiopian Orthodox Tewahedo Church Keraneyo Medhane Alem. (n.d.). Beliefs and teachings: Five pillars of mystery. Retrieved March 17, 2026, from <https://www.eotcma.com/beliefs-and-origins-five-pillars-of>
- Ethiopian Orthodox Tewahedo Church. (2015, July 8). The word of God in the rainy season of Ethiopia. Mahbere Qidus. <https://eotcmk.org/e/the-word-of-god-in-the-rainy-season-of-ethiopia/>
- Ethiopian Orthodox Tewahedo Church. (n.d.-a). The five pillars of mystery. Tewahedo. Retrieved March 17, 2026, from <https://www.tewahedo.nl/the-five-pilars>
- Ethiopian Orthodox Tewahedo Church. (n.d.-b). The mystery of the Trinity. Tewahedo. Retrieved March 17, 2026, from <https://www.tewahedo.nl/the-mystery-of-the-trinity>
- Goshu, B.S. and M. Ridwan, (2025), The Role of Ge'ez in Shaping Ethiopian Intellectual Traditions: Contributions to Science, Medicine, Astronomy, Religion, Culture, and Mathematical Thought, Lakhomi Journal Scientific Journal of Culture 6 (3), 186-202
- Goshu, B.S., (2025), The Book of Enoch and Early Astronomical Thought: A Prelude to Scientific Observation, Budapest International Research in Exact Sciences (BirEx) Journal 7 (2), 106-118
- Hill, C. M. (2010). Analysis of the large-scale environment preceding the development of an African disturbance [Conference presentation]. 29th Conference on Hurricanes and Tropical Meteorology, Tucson, AZ, United States. https://ams.confex.com/ams/29Hurricanes/techprogram/paper_169277.htm
- Houston Debre Selam Medhanealem Ethiopian Orthodox Tewahedo Church. (n.d.). Five pillars of mystery. Retrieved March 17, 2026, from <https://houstonmedhanealem.org/pages/five-pillars-of-mystrey>
- Indeje, M., Semazzi, F. H. M., Xie, L., & Ogallo, L. J. (2001). Mechanistic model simulations of the East African climate using NCAR regional climate model: Influence of large-scale orography on the Turkana low-level jet. *Journal of Climate*, *14*(12), 2710–2724. [https://doi.org/10.1175/1520-0442\(2001\)014<2710:MMSOTE>2.0.CO;2](https://doi.org/10.1175/1520-0442(2001)014<2710:MMSOTE>2.0.CO;2)
- Jury, M. R. (2017). Convective outbreak over the Red Sea and downstream easterly waves. *Earth Interactions*, *21*(1), 1–15. <https://doi.org/10.1175/EI-D-16-0009.1>
- Kinuthia, J. H., & Asnani, G. C. (1982). A newly found jet in north Kenya (Turkana channel). *Monthly Weather Review*, *110*(11), 1722–1728. [https://doi.org/10.1175/1520-0493\(1982\)110<1722:ANFJIN>2.0.CO;2](https://doi.org/10.1175/1520-0493(1982)110<1722:ANFJIN>2.0.CO;2)
- Lutheran Hour Ministries. (2011, June 6). A still small voice. Daily Devotions. <https://www.lhm.org/dailydevotions/20110606/>
- Misiani, H. O., Finney, D. L., Segele, Z. T., Marsham, J. H., Tadege, A., Artan, G., & Atheru, Z. (2020). Circulation patterns associated with current and future rainfall over

- Ethiopia and South Sudan from a convection-permitting model. *Atmosphere*, *11*(12), Article 1352. <https://doi.org/10.3390/atmos11121352>
- Misiani, H. O., Finney, D. L., Segele, Z. T., Marsham, J. H., Tadege, A., Artan, G., & Atheru, Z. (2020). Circulation patterns associated with current and future rainfall over Ethiopia and South Sudan from a convection-permitting model. *Atmosphere*, *11*(12), Article 1352. <https://doi.org/10.3390/atmos11121352>
- Munday, C., Engelstaedter, S., Ouma, G., Ogutu, G., Olago, D., Ong'ech, D., Lees, T., Wanguba, B., Nkatha, R., Ogolla, C., Gàlgalo, R. A., Dokata, A. J., Kirui, E., Hope, R., & Washington, R. (2022). Observations of the Turkana jet and the East African dry tropics: The RIFTJet field campaign. *Bulletin of the American Meteorological Society*, *103*(8), E1828–E1842. <https://doi.org/10.1175/BAMS-D-21-0214.1>
- NASA Scientific Visualization Studio. (2004, September 10). Hurricane Isabel genesis [Visualization]. <https://svs.gsfc.nasa.gov/2987/>
- NETBible. (n.d.). Proverbs 10:25; Proverbs 1:27. <https://classic.net.bible.org/passage.php?passage=Pro+10:25+1:27>
- Nicholson, S. E. (2016). The Turkana low-level jet: Mean climatology and association with regional aridity. *International Journal of Climatology*, *36*(6), 2598–2614. <https://doi.org/10.1002/joc.4515>
- Nickelsburg, G. W. E., & VanderKam, J. C. (Trans.). (2012). *1 Enoch: The Hermeneia translation*. Fortress Press.
- Nickelsburg, G. W. E., & VanderKam, J. C. (Trans.). (2012). *1 Enoch: The Hermeneia translation*. Fortress Press.
- Schneider-Yattara, C., & Borchardt, P. M. (2024, December 18). The sacred forests of Ethiopia. D+C Development and Cooperation. <https://www.dandc.eu/en/article/church-forests-ethiopian-orthodox-tewahedo-church-eotc-are-remarkable-example-environmental>
- Sun, L., Semazzi, F. H. M., Giorgi, F., & Ogallo, L. (1999). Application of the NCAR regional climate model to eastern Africa: 1. Simulation of the short rains of 1988. *Journal of Geophysical Research: Atmospheres*, *104*(D6), 6529–6548. <https://doi.org/10.1029/1998JD200051>
- Tewahedo. (n.d.). The five pillars of mystery. Retrieved March 17, 2026, from <https://www.tewahedo.nl/the-five-pilars>
- Tewaney, S. (2025, April 15). Sacred forests: A divine trust and a national nature based climate solution. *The Ethiopian Herald*. <https://press.et/herald/?p=113889>
- The COMET Program. (n.d.). African easterly waves. University Corporation for Atmospheric Research. Retrieved March 17, 2026, from http://kejian1.cmatc.cn/vod/comet/convective/Afr_E_Waves/navmenu.php_tab_1_page_11.0.0_type_flash.htm
- Theopolis Institute. (2016, December 9). *Apocalypse preserved*. https://theopolisinstitute.com/leithart_post/apocalypse-preserved/
- TIPs Translation. (2025, November 28). *The Book of Enoch*. <https://tips.translation.bible/story/the-book-of-enoch/>
- Vizy, E. K., & Cook, K. H. (2019). Observed relationship between the Turkana low-level jet and boreal summer convection. *Climate Dynamics*, *53*(7–8), 4037–4058. <https://doi.org/10.1007/s00382-019-04769-2>